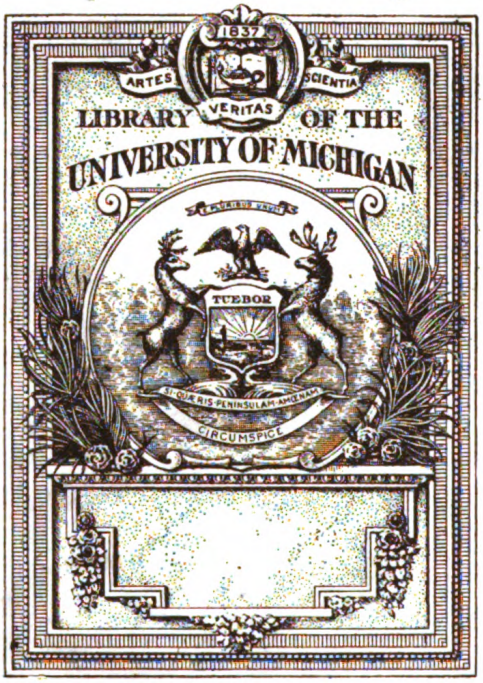
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OF THE

ROYAL SOCIETY OF MEDICINE

EDITED BY

J. Y. W. MacALISTER

UNDER THE DIRECTION OF

THE EDITORIAL COMMITTEE

VOLUME THE TENTH

SESSION 1916-17

PART I

GENERAL REPORTS

SECTIONS:—

ANÆSTHETICS BALNEOLOGY AND CLIMATOLOGY
STUDY OF DISEASE IN CHILDREN CLINICAL DERMATOLOGY

LONDON
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(*November* 14, 1916.)

Marcus Beck Laboratory Reports.—No. 6.

A Method of Concentrating Entamœba Cysts in Stools.[1]

By J. W. CROPPER, M.B., M.Sc.Liverp., and R. W. HAROLD ROW, B.Sc., F.L.S., F.Z.S.

INTRODUCTORY.

THE following investigations have been made in the Marcus Beck Laboratory on behalf of and with the help of the Medical Research Committee.

One of the principal objects of our experiments has been the cultivation of the causative organism of amœbic dysentery, and, as is well known, the difficulties in the way of the accomplishment of this have hitherto proved insuperable, almost all observers now being agreed that the amœbæ which have been successfully grown are distinct from both *Entamœba coli* and *Entamœba histolytica*; in fact, the genus created by Chatton and Lalung-Bonnaire,[2] *Vahlkampfia*, has been frequently used, especially for the culturable intestinal forms, to emphasize their

[1] Read before the Section of Pathology.

[2] "*Amibe limax* (Vahlkampfia, n. gen.) dans l'intestin humain; son importance pour l'interprétation des amibes de culture," *Bull. Soc. Path. Exot.*, Par., 1912, v, p. 135.

distinction from these two species. In a recent communication Penfold, Woodcock, and Drew[1] have described a method by which they have succeeded in causing the excystation of *Entamœba histolytica*, but they also state that they have been unable to keep the excysted amœbæ alive for more than a comparatively short time, forty-two to forty-four hours as a maximum. They ascribe this failure to obtain a successful culture to the rapid growth of bacteria in their preparations, derived from the fæcal matter not got rid of in the washings to which the cysts were subjected. The injurious influence of the products of putrefactive bacteria has, indeed, been already shown experimentally[2] with cultures of amœbæ of the *limax* type. We have therefore since then devoted a considerable amount of time to the attempt to devise a method of completely separating the cysts from the fæcal matter contained in the stools.

Such a separation as we have just mentioned has not, so far as we are aware, been accomplished by anyone in the case of amœba cysts, but a modification of Bass's method of concentration described by Cochran[3] has very nearly achieved it for helminth ova. This method consists in the preliminary emulsification of the fæces in water, and then centrifugalization, after which the supernatant water is poured off, and the centrifuge tubes filled up with a 42·5 per cent. solution of calcium chloride in water, well shaken and re-centrifuged, when the eggs rise to the top of the tubes, away from the fæces and almost free from contamination.

On trying this method with *Entamœba coli* cysts, we found that the cysts are far too fragile to withstand the osmotic currents set up by the concentrated solution, and incontinently crumple up; and a number of other chemical substances which we have tried, such as syrup, glycerine, and albumin, have given precisely the same results, so that we feel that there is probably no specific gravity method of differentiation between cysts and fæces which will avail for entamœbæ, nor has any other method that we have yet found enabled us to achieve the complete separation of cysts and débris. We have, however, obtained a very considerable measure of success by the methods detailed below,

[1] "The Excystation of *Entamœba histolytica* (*Tetragena*) as an Indication of the Vitality of the Cysts," *Brit. Med. Journ.*, 1916, i, p. 714.

[2] J. W. Cropper and A. H. Drew, "Researches into Induced Cell-Reproduction in Amœbæ," McFadden Researches, iv, April, 1914; John Murray, London.

[3] "The Concentration of Helminth Ova from Fæces," *China Med. Journ.*, 1915, xxix.

and we are now able to obtain the cysts practically free from bacteria, and from the major part of the fæces.

The principal part of the experiments which we have carried out in investigating this method has been done with fæces infected with *Entamœba coli* cysts, of which a constant supply has been available to us, but a sufficient series of determinations has been made with *histolytica*-infected material and with *Lamblia* infections, to show that it is equally applicable to these species, and we see no reason to suppose that any protozoal cysts would not be equally easily concentrated by it.

The technique of the method used to obtain a maximum concentration of the cysts is given first; subsequently we describe a method by which we have obtained a relative concentration without the use of any chemicals (which might possibly injure the cysts for cultivation purposes); and, finally, we describe a counting method which was devised to confirm the results of our concentration experiments.

(I) The Maximum Concentration of the Cysts for Diagnosis.

A lump of fæces, which should be at least 1 grm. in weight, is shaken up with about 30 c.c. of normal saline (0·8 per cent. solution of NaCl) per gramme of fæces for a sufficient time to disintegrate the mass into individual particles, and thereby form an emulsion which will only settle very slowly. This is best done on a mechanical shaker in a large flask or bottle of a capacity of at least four times the amount of fluid to be shaken, and we have found it necessary, in order to obtain the best results, to continue the shaking for a minimum of half an hour.

The emulsion is then poured into a separating funnel and shaken up, by hand, for half a minute with 10 to 20 per cent. of its volume of ether (ordinary methylated ether is perfectly suitable for this), after which the mixture is allowed to stand for a minute or two in the funnel until the two liquids have separated. The fæcal débris absorbs ether and consequently becomes lighter than water, and, when separation is complete, lies in a mass at the top of the saline, immediately below the excess of ether. The cysts are not affected by the ether, and consequently remain in the saline beneath.

The saline fluid is then drawn off from the separating funnel, and is centrifuged at a slow speed for two or three minutes, the precise time

required necessarily depending upon the rate of centrifugalization and the sizes of the tubes. By this means the cysts will be brought down to the bottom of the tubes with the comparatively slight amount of fæcal matter not taken up by the ether.

For ordinary diagnostic purposes the concentration now effected, which should be some fifteen times as rich in cysts as the original material, will be found adequate, but, if desired, a still greater proportion of cysts can be obtained by decanting the supernatant liquid and filling up the centrifuge tubes with normal saline, shaking thoroughly, and submitting the tubes to fractional centrifugalization, the material brought down in the first ten seconds being discarded, and the whole time of centrifuging curtailed by half. By repeating this process two or three times the maximum concentration is obtained, and the débris still remaining consists almost entirely of particles of practically the same size as the cysts themselves.

The above is a concise account of the method and its results. We append a series of notes on the various processes.

It is desirable, where possible, to take a fairly large mass of fæces for concentrating, since there appears to be considerable variation in the number of cysts present in different parts of the same stool, and one of the special advantages of a concentration method is to minimize the risk of missing cysts not equally distributed.

The period given for mechanical shaking may seem extraordinarily long, but our experience is that unless the various particles of fæcal matter are thoroughly washed off from the cysts the latter are removed with their adhering particles by the ether, and consequently do not appear in the final deposit. In fact, test experiments, differing only in the length of time the fæces were shaken with saline, showed at least twice as great a proportion of cysts in the final deposit after thirty minutes' shaking as after fifteen minutes; and while in the latter case examination of the material removed by the ether showed a considerable proportion of cysts, they were almost entirely absent from it in the material shaken for thirty minutes. This length of time may, however, need to be modified in accordance with the character of the stool to be examined; our own investigations have been principally made on formed or sub-formed stools.

We have employed tap water, distilled water, and normal saline for emulsifying the fæces, and we think that saline is preferable. Whatever the method used, we have very frequently found that a considerable

number of cysts have shown what we regard as osmotic collapse, their protoplasmic contents being withdrawn from the cyst wall and collected into a spherical mass about half the diameter of the cyst, but we are unable at present to determine the precise causes which have produced this result, as both the occurrence of the phenomenon is irregular and the proportion of cysts affected has varied very considerably under the same conditions. We find, however, that there tends to be a smaller proportion of cysts showing this effect in emulsions for which normal saline has been used than in tap water or distilled water emulsions from the same fæces and prepared concurrently under identical conditions. The ether employed subsequent to emulsification may be to some extent responsible, but we have more than once observed collapsed cysts in material which has not been treated with ether. In our experience this collapse does not interfere with the identification of the cysts, and we have never seen it save in *Entamœba coli.*

We find that the proportion of the material removed by the ether varies considerably with the character of the stool used, but with an ordinary formed stool at least 90 per cent. of the weight of fæces employed is extracted. To give a concrete example, 10 grms. of fæces were emulsified, treated with ether, and centrifuged in tubes of known weight, and the deposit, after pipetting off the supernatant fluid, weighed 0·595 grm.

Should the fæces contain fruit pips or other large heavy particles not removed by the ether it is advantageous to transfer the fluid, after treatment with ether but before centrifuging, to a tall test-tube or similar vessel and to permit the heavy particles to settle for a minute before decanting into the centrifuge tubes. The cysts themselves settle very slowly, and it has been found that the proportion which fall to the bottom with the large particles in one minute is negligible.

The time which we have found most suitable for centrifuging with 15 c.c. tubes is either one and a half minutes at 1,200 revolutions per minute or two and a half minutes at 600 revolutions per minute. This will bring down practically all the entamœba cysts from the fluid, but only a small proportion of the bacteria present come down in this length of time. In the case of lamblia a more thorough centrifuging is needed to bring down all the cysts.

The special advantages which this method possesses for diagnosis are obvious. The cysts are much more easily noticed and far more easily identified in the concentrated material than in preparations from

untreated fæces. The saving of time spent in the examination of scanty or doubtful infections is considerable, and the concentrate from a comparatively large mass of stool can be examined in a short time; there is, further, the added advantage that the possible errors attendant upon the examination of a single loopful of fæces are almost wholly eliminated. This is especially useful in the case of suspected infections in which the ordinary preliminary examination has given a negative result, and we think the method will also prove to be of great value for the final examination of carriers and of apparently cured cases before discharge.

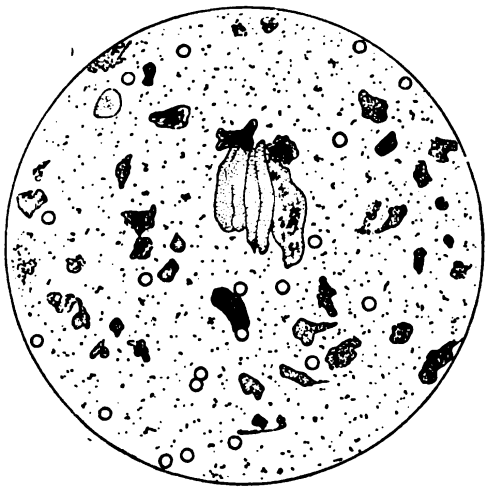

FIG. 1.

Maximum concentration of *Entamœba coli* cysts in stools by the ether method. One field. (Low power: × 50.)

An illustration is given (fig. 1) of the appearance under the low power of a field from a concentration prepared in this manner. A count of the original fæces, from a smear made in the ordinary way without concentration, gave forty-eight cysts in 117 fields; under the same lens after concentration there was hardly a field to be found in which there were not a dozen cysts, and the average number per field was between sixteen and seventeen.

(II) The Relative Concentration of Cysts for Cultivation.

We feel that there are distinct disadvantages in the use of ether for treating material to be employed for cultural purposes, as the prolonged contact of the cysts with ether and with ether-saturated water may easily have some deleterious effect, and we have consequently devised a method of concentration which does not require chemicals. The first attempt to effect this was made by filtering an emulsion of fæces in water or normal saline through very fine silk cloth, some varieties of which show microscopically a mesh which is but little larger than an entamœba cyst. It was hoped in this way to remove all particles larger than the cysts, but in practice the meshes became clogged so rapidly with débris that no filtrate was obtainable, even with the aid of a pressure pump. The smallest mesh which can be employed satisfactorily for the filtration of fæcal emulsions is about 40 μ in diameter, and the method by itself is of little value for concentration purposes. Combined, however, with subsequent centrifugalization it forms a ready means of obtaining a large proportion of the cysts free from all particles save those which approximate in size to that of the cysts, the larger fragments being held back in the deposit on the silk and the minuter débris remaining suspended in the tubes after centrifuging.

It was found, however, that no modification of this method would give so large a proportion of cysts to débris as the ether method described above, and estimations of the number of cysts per gramme of stool, as determined from the deposit in the tubes by our method of counting, showed that they were considerably less than the actual number present in the untreated fæces, a considerable number having been lost during the treatment, so that the concentration was only a "relative" one—i.e., with respect to the nature of the accompanying débris.

As finally adopted, our method follows in most respects that used by Penfold, Woodcock, and Drew, but as it differs in certain points of importance we think it desirable to give it in full, especially in order to emphasize the necessity of these or similar measures when undertaking any routine work in an endeavour to cultivate entamœbæ.

Ten grammes of fæces are shaken with 100 c.c. of normal saline in a bottle or flask on a mechanical shaker for five minutes to obtain a uniform emulsion. This is poured on to a layer of fine silk whose mesh is of the size mentioned above, and which is stretched on a tambour

(such as is used by milliners), and the emulsion is gently and continuously stirred with a glass rod to prevent the clogging of the meshes of the silk. The residue left on the filter consists chiefly of large lumps and stringy matter, and is discarded. It contains only a small percentage of cysts, which can be still further reduced, if required, by washing. The filtrate (or a portion of it) is then centrifuged for one minute at a speed of 1,200 revolutions per minute, the supernatant liquid poured off, and the volume made up again with normal saline. The tube is then well shaken, and again centrifuged as before. This process is repeated until the supernatant liquid is almost clear. Finally the deposit is shaken

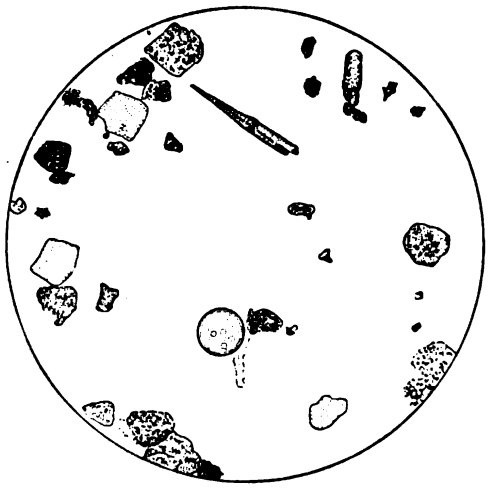

FIG. 2.

All visible particles and a four-nucleate cyst of *Entamœba coli* in one field of an emulsion prepared by the method of relative concentration for cultivation experiments. (High power: × 275.)

with 10 c.c. of normal saline and is allowed to stand for a few minutes. The upper portion is then poured off and is thoroughly centrifuged, and loopfuls of the deposit are used to make hanging-drop preparations for culture experiments. An illustration (fig. 2) is given of a high-power view of the appearance of cysts and débris in such a preparation.

By this means cysts are obtained which have been thoroughly washed free from toxic bacterial products, acid substances, and other deleterious matter present in the original fæces. The cysts can be

found easily with low powers of the microscope, and are not subsequently lost, even though it is necessary to keep the preparations for several days in the incubator. *Amœba limax* cysts submitted to this process have been subsequently cultivated without difficulty, and were evidently unaffected either by the shaking or the centrifugalization.

It must be noted that the length of time and the speed of centrifuging considerably affects the percentage of cysts in the final deposit; and we have selected one minute at 1,200 revolutions per minute as giving the best practical results. Apparently about two minutes is required to carry down all the cysts, but a much greater proportion of the finer particles of fæcal matter and bacteria accompanies them than when centrifugalization is confined to the shorter time. An additional method of removing any large particles that may still be present is afforded by centrifuging for fifteen seconds at 600 revolutions per minute, decanting the fluid into other centrifuge tubes and re-centrifuging for one minute at 1,200 revolutions per minute; the larger particles are brought down during the preliminary fifteen seconds with but a very small proportion of the cysts, and this process, repeated four times, results in the larger débris containing only one-tenth of the proportion of cysts present in the original fæces.

We have not been able to separate the cysts from débris to any further extent except by picking off a single cyst in a capillary tube, which is a comparatively simple matter in the case of *Entamœba coli*, and has been done repeatedly in our experiments.

(III) Method for Counting Entamœba Cysts in Stools.

In the *Lancet* of June 10, 1916, Miss Annie Porter[1] described a method of counting lamblia cysts in stools by means of a Thoma-Zeiss hæmacytometer. Finding the volume of the chamber too small for counting entamœba cysts, owing to their comparative scarcity—viz., about one cyst per 400 squares in an ordinary degree of infection—we devised the following method, which is described in the stages in which it is carried out:—

A uniform emulsion of 10 grms. of stool (selected from several different portions of the bulk) is made in 100 c.c. of normal saline (i.e., 10 per cent. weight/volume) by shaking on a mechanical shaker for ten

[1] "An Enumerative Study of the Cysts of *Giardia* (*Lamblia*) *intestinalis* in Human Dysenteric Fæces," *Lancet*, 1916, i, p. 1166.

minutes. All soft masses are broken up in this way, and the sediment which falls consists only of gritty particles, the so-called "false sand," which microscopic examination shows to contain no cysts. A capillary pipette is made and is calibrated to deliver 20 c.mm. in a length of about 2 in. It is provided with a rubber teat. It is well to have several of these pipettes ready to hand, so that successive counts can be made with a dry one without any unnecessary delay. The pipette supplied with Gowers's hæmoglobinometer, and other similar ones which are on the market, can be used for the purpose, but they have a somewhat narrow bore and frequently become clogged with débris. There is little risk of any cysts being retained in a pipette made according to the above instructions when the mixture is blown out: in fact, we have not yet found a single cyst in the washings out after use. Several glass

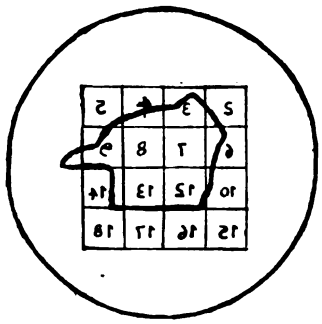

FIG. 3.

Diagram to show the method of counting entamœba cysts in stools. The edges of the large drop of 20 c.mm. of fæcal emulsion are indicated by the thick irregular line, and all cysts in this drop are counted with a low power. (× 1¼.)

slides, 3 in. by 1½ in., having been prepared with a ring of vaseline 1 in. in diameter, a measured volume (20 c.mm.) of the emulsion of fæces is drawn into the pipette and is placed in the centre of the ring. A cover-slip ruled in squares, such as is used with Böttcher's slides, is then allowed to fall gently, with the engraved face lowermost, flat on to the drop of emulsion, and, if necessary, is pressed down to diminish the depth of the layer of liquid. The count is made with a low power. The cysts which happen to be in any portion of the drop which extends beyond the squares are easily counted, and are indicated in the count by the letters A, B, C, &c. The squares themselves are numbered as shown (the reverse way up) in the diagram (fig. 3).

We have made sufficient experiments to establish the utility of the method for counting entamœba cysts in fæces, and we see no reason why its employment should not be extended, with such modifications as are found necessary, to the counting of other protozoa, either in their natural surroundings or under different conditions of cultural environment.

It has been pointed out to us by Sir Ronald Ross that in counting methods there are considerable statistical errors, the magnitude of which depends, roughly in an inverse ratio, on the actual number of things counted. Thus it is necessary to count a fairly large number of cysts in order to reduce the error to a reasonable percentage, and the present method has been devised to render this possible. The statistical tables compiled by Ross and Stott[1] show, for example, that if only sixty-eight cysts are counted the probability is nine to one that the error does not exceed 20 per cent., and that, if the error is required to be within 10 per cent. 271 cysts must be counted. It is advisable, therefore, to use an emulsion for counting purposes as thick as possible, consistent with ability to recognize the cysts without difficulty. For counting *Entamœba coli* cysts we find a one in ten emulsion the most suitable, and in an average infection we count 100 cysts. With *Entamœba coli*, as in Miss Porter's cases of lamblia infection, there are considerable daily variations in the number of cysts present in the stools, ranging in a case we have been studying from 1,500 to 60,000 per gramme.

Summary.

(1) Methods of concentrating entamœba cysts from fæces are described, suitable for diagnosis and cultivation experiments respectively.

(2) A very high concentration, suitable for diagnosis, has been obtained by emulsifying fæces and treating the emulsion with 10 to 20 per cent. of ether. This removes the greater proportion of the fæcal matter, while the cysts remain in the saline used for emulsification, and are collected by subsequent centrifugalization with but little accompanying débris.

(3) A second concentration method is described which does not necessitate the use of ether, and which is therefore more suitable for

[1] "Tables of Statistical Error," *Ann. Trop. Med. and Parasitol.*, 1911-12, v, p. 347.

preparing cysts for cultivation experiments. This consists of filtering the emulsion through silk, and subsequent fractional centrifugalization.

(4) The difficulties in the way of enumerating entamœba cysts are discussed, and the method hitherto found most suitable, by means of the coverslips used with Böttcher's slides, is described.

The Royal Society of Medicine.

President—Sir RICKMAN J. GODLEE, Bt., K.C.V.O., M.S.

(*December* 18, 1916.)

OCCASIONAL LECTURE.

Conditions which govern the Growth of the Bacillus of "Gas Gangrene" in Artificial Culture Media, in the Blood Fluids *in vitro*, and in the Dead and Living Organism.

By Sir ALMROTH E. WRIGHT, Colonel A.M.S., C.B., M.D., F.R.S.

A Consultant Physician to the British Army in France.

MY subject-matter to-day is not, as on previous occasions, the general question of the treatment of infected wounds. It is a much narrower issue. I would propose to consider with you the conditions which respectively promote and inhibit the growth of the "gas gangrene" bacillus of Welch, but here also I shall have in view a purely practical end. The investigation of the conditions which favour or hinder the growth of the organism here in view has, as I see it, only one possible object. That is to conduct sooner or later to the saving of life and limb.

I may, I think, take it as certain that clinical observation is incompetent to furnish us with any precise information regarding the conditions which favour or impede the growth of the bacillus of gas gangrene, and that such information can be obtained only by laboratory investigation. But that does not mean—and we must never lose sight of

this—that we can place unrestricted confidence in inferences based upon laboratory experiments. For in laboratory experiments we make for ourselves artificially simplified conditions; and confine our attention to a very limited number of factors. By virtue of this we are liable to make erroneous generalizations, concluding that what holds true under the conditions obtaining in the laboratory experiment will hold true universally. Presumptions of that kind can be avoided only by continually extending and critically revising our laboratory experiments and organizing inquiries to find out whether our doctrines really give good results in practice.

And it is specially necessary to take these precautions when therapeutic procedures are based upon laboratory data. For quite a large proportion of such therapeutic procedures rest either upon generalizations which do not apply outside the conditions which are obtained in the experiments, or else upon generalizations which emphasize the the thing that is unimportant to the prejudice of the thing that is important. I have in my mind, for example: the doctrine that antiseptics will sterilize an infected wound; and, in connexion with my present subject-matter, the doctrine that the growth of the gas gangrene bacillus pivots upon the presence or absence of oxygen. It will provide me with a convenient point of departure if I invite you to consider what is the experimental basis of this doctrine.

(I) Conditions which Govern the Growth of the Bacillus of Welch in Artificial Media.

To all of us practically the most important scientific datum ascertained with regard to the bacillus of Welch is that it will not grow in the presence of air. And this datum, firmly believed, has dominated all surgical thinking in the domain of gas gangrene. It has led to the employment of oxygen or peroxide of hydrogen injected into the tissues as a sovereign remedy against the progress of gangrene. And it has suggested that the advantage of thoroughly opening up a wound infected by anaërobes is, in the main, advantage derived from letting in the air.

But the thesis upon which all this rests—the thesis that the bacillus of Welch cannot grow and multiply in a presence of air—is as a matter of fact erroneous. It was discovered by Tarozzi that when pieces of animal tissue were added to bouillon, cultures of anaërobes could be obtained in open tubes. Ori and Wrzosek, following up this work,

showed that the same result could be obtained with pieces of either raw or autoclaved potato, and also with other vegetable tissues. Nor are these, as might be supposed from the fact that we have continued to think along the old lines, very recent discoveries; nor, again, do the aërobic cultures of anaërobes here in question yield only meagre growth. Quite the contrary. The work of Ori and Wrzosek dates back already some ten years. And in reality the cultures of the bacillus of Welch grown in the open in bouillon containing a piece of potato, are characterized by very rapid and vigorous growth, with gas production. So vigorous in point of fact is the growth of the bacillus of Welch in the open potato bouillon tube, that this method furnishes, it would seem, the best method for isolating the microbe from specimens of pus in those cases where the organism is present in only very small numbers.

There are displayed before you here a series of open culture tubes implanted with the bacillus of Welch, all showing by their turbidity and by foaming how vigorous is the growth. And, in order that the erroneous mental images which the appellation "anaërobes" nurtures in the mind may be obliterated, I have ranged up before you here also cultures in open of a variety of other anaërobes. And let me say that so far we have not obtained any anaërobe from a wound which cannot by proper devices be made to grow freely in open tubes.

You can see that it follows from this, that we cannot possibly promise ourselves that if we introduce oxygen into the tissues, or admit air to the interior of the wound cavity, we shall thereby inevitably arrest a gangrene bacillus infection. Or, putting the conclusion in more general form, we see that the therapeutic principle of combating anaërobes by combating anaërobic conditions cannot be regarded in any sense as an adequate therapeutic principle.

Let us be careful to read the lesson of these tubes aright. All that they teach is that anaërobic microbes can be got to grow with astonishing freedom in culture tubes fully open to the air. But it is not thereby established that the presence of oxygen is either indifferent or congenial to anaërobic microbes. And, in point of fact, it has been suggested, and the view is *a priori* tenable, that the potato may provide some reducing agent which, by holding off the oxygen of the air at the outset, enables the microbes to get a start, the subsequent growth being due to anaërobic growth in a medium deprived of air by the generation of gas in the culture. This hypothesis seems to win support from the fact that the potato bouillon gives much less vigorous cultures

when stale than when freshly prepared. And, again, the traditional view that oxygen is inimical, or at least uncongenial, to the growth of the class of microbes denoted "anaërobes" does not entirely lack support. When after implanting I empty out the major part of the contents of a potato bouillon tube, reserving only a few cubic centimetres, and then lay the tube on its side in the incubator, I get only a very meagre culture. The same holds true when I draw a continuous stream of air bubbles through the culture, and again in the case when cultivating in a capillary tube, I break up my column of fluid by intercalating a number of air bubbles. Moreover, when I endeavour to subculture from the meagre cultures of anaërobes grown under such conditions of maximum exposure to air, I am practically always unsuccessful. But all these considerations do not avail to obscure the fact that we are required to abandon the traditionary view that the growth of anaërobes pivots upon the presence or absence of oxygen. And after taking cognizance of these cultures in open tubes we are intellectually impoverished to the extent that we see that the doctrine of anaërobiotic growth which, as we thought, held unrestrictedly, holds true only with limitations.

Intellectual impoverishment is, however, impetus to research. And now that the presence or absence of oxygen turns out not to be the factor which controls the growth of the bacillus of Welch, we are stimulated to try to find out what is the controlling factor, or rather what are the controlling factors. For—it being in the order of nature that things should never be too easy—there are bound to be many controlling factors. I and my fellow workers, Major Georges Dreyer at Boulogne and Dr. Alexander Fleming at St. Mary's, have consequently set ourselves to search for these controlling factors. In each case we set out to look for mechanical factors which might favour or hinder the growth of the bacillus of Welch.

The first question to which investigation was directed was the question as to what would be the effect in the one case of dispersing the implanted microbes through the culture medium, and in the other case of concentrating the infection in some one region of the culture medium. Seventeen years ago, in a study[1] of the distribution of agglutinins and bactericidal substances in the body in cases of typhoid and Malta fever, I had already called attention to the circumstance that microbes which would, if carried into the blood stream, have been killed

[1] *Lancet*, 1899, ii, p. 1727, and "Studies in Immunization," Constable, London, pp. 36-44.

or impeded in their growth by the bacteriotropic powers of the blood, succeeded in maintaining themselves alive in the internal organs, collected together in what I called " niduses of lowered bacteriotropic pressure "—i.e., in regions where, because collected together, they can by active and passive chemical force maintain conditions propitious to their survival. In view of this analogy, and in view also of the circumstance that for the successful starting of a culture of the bacillus of Welch a large implantation is usually required, it appeared not unreasonable to inquire from experiment whether concentration of the infection comes into account also in connexion with growth upon artificial media.

The experiments were in each case carried out with measured volumes of glucose broth implanted with graduated additions of a suspension of Welch's bacillus, and cultivated anaërobically in capsules of glass tubing or capillary pipettes. In each case duplicate volumes were taken, and the one tube was cultivated lying flat, and the other in the upright position—the microbes in this latter being concentrated at the bottom either by gravitation or centrifugalization. In every series of such experiments—and, in all, eight were performed—the advantage from the point of view of successful cultivation of the microbe was with the series of tubes that were incubated in the upright position. The following may serve as an illustrative experiment.

Experiment 1.

A twenty-four hours' culture of the bacillus of Welch, grown upon serum agar[1] in an atmosphere of coal-gas sealed up in a test-tube drawn out in the blow-pipe flame, was suspended in a convenient quantity of glucose broth. This suspension, enumerated in a Thoma-Zeiss cell, was found to contain 220,000,000 microbes (the actual figure arrived at was 217,600,000). From this a graduated series of dilutions were made in glucose broth. Two 20 c.mm. volumes of each dilution were then taken up into graduated capillary pipettes and anaërobic conditions were provided by driving the column of fluid down to

[1] Serum or blood agar—i.e., agar which has been flushed with a very minute quantity (10 c.mm. is enough) of blood or serum—furnishes, in my experience, a very much more satisfactory culture medium for the bacillus of Welch than ordinary agar. Not only does it give a more abundant culture but we obtain a much larger proportion (in the present experiment 100 per cent.) of living microbes. That ordinary agar provides in many instances a comparatively unfavourable culture medium would seem to be deducible also from Miss Robertson's careful work. For her result—the result that colonies of the bacillus of Welch contain, even after repeated platings, an admixture of other anaërobic microbes—would seem to me to indicate that her medium grew the bacillus of Welch very badly in pure culture and satisfactorily only when admixed with other anaërobes which functioned as foster nurses.

the throttled distal end of the tube and then sealing up the proximal end filled with coal-gas.[1]

The cultural results are here set out in tabular form.

EXPERIMENT 1.

Serial number of the dilution	Number of microbes in 20 c.mm. of that dilution	Cultural result in the tube standing upright		Cultural result in the tube lying flat	
		After 24 hours	After 48 hours	After 24 hours	After 48 hours
1	400,000	Growth	Growth	Growth	Growth
2	80,000	Growth	Growth	Growth	Growth
3	16,000	Growth	Growth	Growth	Growth
4	3,200	Growth	Growth	Growth	Growth
5	640	Growth	Growth	0	Growth
6	128	Growth	Growth	0	Growth
7	25	Growth	Growth	0	Growth
8	5	0	Growth	0	0
9	1	0	Growth	0	0

[1] The most convenient method of culture for experiments such as this is the "gas-piston method illustrated in the accompanying figure.

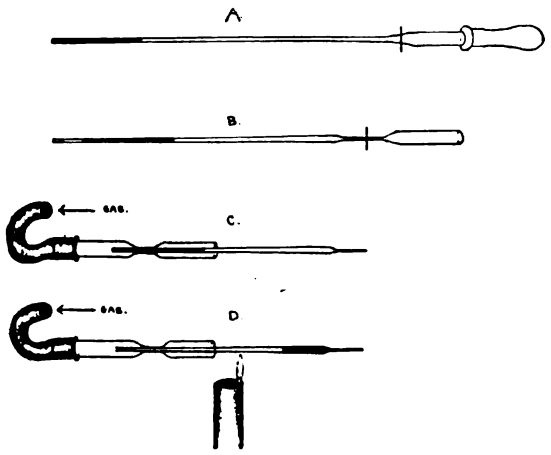

FIG. 1.

(A) Capillary pipette filled in with culture fluid for anaërobic cultivation. (B) The same pipette after drawing out in the flame of a by-pass. (C) The stem of the pipette broken off at the throttle with the fluid shaken down to the distal end is introduced into a glass nozzle connected up with the gas-supply. (D) After the fluid has been driven down to the distal end of the pipette by the piston action of the gas the tube is sealed up at the tip, and then in its middle in the flame of a by-pass.

An effect essentially similar to that produced by collecting the infection into a restricted region of the cultural fluid ought, as reflection will show, to be achievable also by dividing up the culture medium by a series of partitions. For the chemical effort which the microbes will have to put forth for the transformation of the provided culture medium into a really propitious medium will, when that is divided up, be concentrated upon a fraction of the whole.

The experiment, conducted in duplicate, set out in the table below, seems to indicate that this does hold good.

Experiment 2.

Serial number of the dilution	Number of microbes in each 100 c.mm. of the dilution	Volume of dilution taken for anaërobic culture in tubes lying flat.										
		100 c.mm. as a single unit		100 c.mm. divided up by gas[1] into five units of 20 c.mm.								
		A	B	A					B					
1	102,400	+	0	+	+	+	+	0	+	+	+	+	0
2	20,480	+	+	+	0	0	0	0	+	+	0	0	0
3	4,095	+	+	0	+	0	0	0	+	+	+	0	0
4	820	+	0	+	+	+	+	+	0	0	0	0	0
5	165	+	+	0	+	0	0	0	+	+	0	0	0
6	35	+	+	+	+	+	0	0	+	0	0	0	0
7	7	+	0	0	+	+	0	0	+	+	0	0	0

[1] The dividing up of the column of fluid by bubbles of gas was carried out by the technique depicted in the subjoined figure.

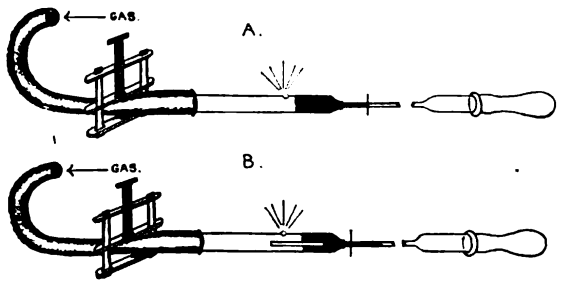

FIG. 2.

Method of filling into the stem of a capillary pipette a series of unit volumes of culture fluid separated by bubbles of gas. (A) Showing method of filling in the first unit volume of culture fluid: (*a*) By-pass in glass nozzle through which gas is escaping; (*b*) Fiduciary mark on distal portion of the stem of capillary pipette. (B) Showing method of filling in gas to partition off the successive unit volumes of culture fluid.

Other and more interesting experiments falling entirely into line with those which have been in question above are the experiments devised and carried out by Dr. Alexander Fleming. You have these cultural experiments in open tubes displayed for view here. We have, *first*, a culture of the bacillus of Welch obtained by introducing a pledget of asbestos into glucose broth left open to the air; *secondly*, a culture obtained under the same conditions with a pledget of cotton-wool; *thirdly*, a culture obtained by the addition of platinum black; *fourthly*, one obtained with a rust-covered nail; and *fifthly*, a culture obtained by introducing into the open bouillon a hair-fine capillary glass tube filled in with a minute quantum of a diluted culture. When we take cognizance of all these—and you see we have here in each case a turbid and vigorous gas-producing culture—and when we bring what we see here into relation with the fact that we obtain cultures also in open tubes containing potato, carrot, white haricot beans, bread, cabbage, cheese, earth, desiccated and ground-up albumen, and other additions, it comes home to us that the common factor here must almost certainly be a mechanical factor. And that mechanical factor would appear to be the providing of some hole or cranny to serve as a nidus in which the microbe can, by concentrating its chemical effort upon a fractional portion of the provided culture medium, get a start. Again, when we look beyond these test-tube experiments to clinical facts we see that the supervention of gangrene is very frequently correlated with the leaving behind in the wound of infected portions of clothing; in other words, the self-same mechanical factor which is operative in the test-tube experiment would seem to come into account also in the body.

(II) Conditions which Govern the Growth of the Bacillus of Welch in the Blood Fluids.

(a) Bactericidal Factor.

In the matter of the culture of the bacillus of Welch in the blood-fluids the factor which more than any other factor comes into account is—and this was shown by Captain d'Este Emery when he was my fellow worker at Boulogne—the bactericidal action of the serum. The following experiment shows how considerable is this restraining and bactericidal action of the normal serum. It brings out also the fact that the implanted microbes have a better chance of surviving and establishing themselves when collected together than when dispersed through the blood fluids.

Experiment 3.

This experiment was a companion experiment to Experiment 1 (*see* p. 5), and is to be read in connexion with it. The same bacterial suspension was employed, and the procedure was the same, except in the respect that the dilutions were made in the author's serum instead of in glucose broth.

EXPERIMENT 3 (COMPANION TO EXPERIMENT 1).

Serial number of the dilution	Number of microbes in 20 c.mm. of that dilution	Cultural result in the tube incubated upright	Cultural result in the tube incubated lying flat
1	400,000	Growth	Growth
2	80,000	Growth	0
3	16,000	0	0
4	3,200	0	0
5	640	0	0
6	128	0	0
7	25	0	0
8	5	0	0
9	1	0	0

We see here (computing from the figures for the tubes lying flat—i.e., the tube in which the microbes were dispersed through the culture medium)—that 1 c.c. of normal serum was capable of disposing of an implantation of 4,000,000 (80,000 × 50) gas gangrene bacilli, all of which bacilli were (as the control experiment, Experiment 1, shows) living bacilli.

(*b*) *Mechanical Factor.*

Also we can see here that advantage accrues to the blood fluids when the microbes are dispersed and cannot co-operate, and disadvantage when the microbes are collected together and afforded an opportunity of making a combined attack. The influence of this factor of dispersing or concentrating the infection comes out more clearly when we make similar implantations into duplicate volumes of serum; centrifuge the tube containing the one portion and incubate it upright, and leave the other tube uncentrifuged and incubate it lying flat.

In the following experiments the cultures were made anaërobically by the "gas-piston" method. The implantations in Experiments 4 and 5 were made by the "method of washes"—i.e., they were made by filling into the pipette a unit volume of serum, then filling in a unit volume of the microbic suspension or a dilution of this suspension,

expelling this, and incorporating the microbes left behind into the unit volume of serum. In Experiment 6 graduated dilutions of the bacterial suspension were made in serum.

Experiment 4.

	Amount of microbic suspension implanted into serum					
	Washes					
	4	3	2	1	½	¼
Centrifuged tubes incubated upright	Growth	Growth	Growth	0	0	0
Uncentrifuged tubes incubated lying flat	Trace	0	0	0	0	0

Experiment 5.

	Amount of microbic suspension implanted into serum				
	Washes				
	2	1	½	¼	⅛
Centrifuged tubes incubated upright	Growth and gas	—	Growth and gas	Growth and gas	Growth only
Uncentrifuged tubes incubated lying flat	Trace	Trace	Trace	0	0

Experiment 6.

	Bacterial suspension progressively diluted with neutralized serum						
	2 fold	4 fold	8 fold	16 fold	32 fold	64 fold	128 fold
Centrifuged tubes incubated upright	Growth	Growth	Growth	Trace	Trace	Trace	0
Uncentrifuged tubes incubated lying flat	Trace	Trace	Trace	0	0	0	0

It comes out, as you will see, quite clearly in these experiments that the doctrine of the " non-bacteriotropic nidus "—which I suggested to explain the survival of microbes in an organism which has in its blood stream an ample provision of protective substances—is a doctrine which applies also to cultivations in serum conducted *in vitro*. And the full details of the experiments, if there were room to give them here, would bring out that the more rapidly the concentration of the implanted microbes is effected, and the shorter the preliminary exposure to the full bactericidal action of the serum, and again the less bactericidally potent the serum, the greater becomes the chance that an implanted microbe will get a start and go on from that to produce a generalized infection.

Up to this point the problem of the conditions which govern the growth of the bacillus of Welch in the blood fluids has been treated as if practically all that was of moment was to withdraw by mechanical methods the implanted microbes from full exposure to bactericidal power of blood fluids. But even here the factor which is in ultimate analysis the operative factor is, of course, the chemical factor. What comes into account is, on the one hand, the diminished mass effect exerted by the bacteriotropic action of the serum upon the microbes; and, on the other hand, the increased mass effect exerted by the products elaborated by the chemical activity of the microbes upon the phylactic elements of the blood fluids.

When the bacillus of Welch grows freely in serum it reduces the antitryptic power of the medium and it elaborates acid. Concurrently, as it would seem with this, the microbe starts to grow with phenomenal rapidity after the manner of an avalanche gathering force as it goes. Our next task must be to inquire whether there is any causal relation between the reduction of antitryptic power and the precipitate progression of the culture.

(*c*) *Experiments showing that the Culture of the Bacillus of Welch in Serum is Largely Governed by the Antitryptic Power of the Blood.*

The question as to what it is that converts the pus of neglected wounds into an ideally propitious culture medium for the gangrene bacillus and every other species of microbe presented itself very early in the course of this war. To that question I proposed an answer, and I think with every day it has become clearer that it was the right answer. That answer was to the effect that what stands in the way of

free growth of all micro-organisms in the blood fluids is the antitryptic power. We have to suppose in connexion with this that the antitryptic power inhibits the digestive processes which must precede the conversion of the native albumins of the blood into congenial pabulum for microbes. It therefore seemed to follow that if trypsin were directly added to the blood fluids, or else if trypsin were indirectly added, and this is what occurs in stagnant pus through the disintegration of the leucocytes, we should have a *corruption of the discharges*—i.e., a disintegrative change which would allow every manner of microbe to cultivate itself therein without restraint. In brief, what I suggested was that the antitryptic power is the guardian of the blood. In connexion with this I would point to the experiments of my fellow workers, Captains S. R. Douglas and L. Colebrook. They have shown[1] that hæmocultures, otherwise so frequently infertile, can very often be rendered fertile by the addition of trypsin to the culture medium. And the following experiments, conducted with the bacillus of Welch, show exactly the same thing.

Experiment 7.

A twenty-four hours' culture of the bacillus of Welch, grown upon agar flushed with serum, was suspended in a convenient quantum of glucose broth. This was found to contain 350 millions of bacilli per cubic centimetre. Graduated dilutions of the suspension were then made in a serum (A. E. W.'s) which neutralized an equal bulk of a twenty-five fold dilution of trypsin. Another precisely similar series of dilutions was made in another sample of the same serum to which had been added one-twenty-fifth of its bulk of the same sterile trypsin undiluted. Six 20 c.mm. volumes of each successive dilution of either serum were then taken up into calibrated capillary pipettes for anaërobic cultivation. The cultural results as determined by microscopic examination were as set out below.

Serial number of the dilution	Number of microbes in the 20 c.mm. volume which was cultivated	Unaltered serum	Trypsinized serum
		Number of fertile cultures	Number of fertile cultures
1	7,000,000	6 out of 6	6 out of 6
2	1,400,000	5 ,, 6	6 ,, 6
3	280,000	0 ,, 6	6 ,, 6
4	56,000	0 ,, 6	5 ,, 6
5	11,200	0 ,, 6	2 ,, 6
6	2,240	0 ,, 6	0 ,, 6
7	450	0 ,, 6	0 ,, 6
8	90	0 ,, 6	0 ,, 6
9	18	0 ,, 6	0 ,, 6

[1] *Lancet*, 1916, ii, p. 180.

We see here that for the infection of 20 c.mm. of trypsinized serum there were required fifty times fewer microbes (33,600 as contrasted with 1,700,000) than for the infection of the same quantity of unaltered serum.

Experiment 8.

Here in the one set of tubes a wash of trypsin of the bacillus of Welch was added to serum, followed by a wash, or fraction of a wash ; in the control tubes larger quanta of microbial culture were implanted.

Control tubes	Serum + 3 washes of bacterial suspension ...	No growth
	,, + 2 ,, ,, ,, ...	,,
	,, + 1 wash of ,, ,, ...	,,
	,, + ½ ,, ,, ,, ...	,,
	,, + ¼ ,, ,, ,, ...	,,
Trypsin tubes	Serum + 1 wash trypsin, 1 wash bacterial suspension	Abundant growth with gas
	Serum + 1 wash trypsin, ¼ wash bacterial suspension	,, ,, ,,

Experiment 9.

Here the same procedure was followed.

Control tubes containing normal serum	Serum + 4 washes of bacterial suspension ...	No growth
	,, + 3 ,, ,, ,, ...	,,
	,, + 2 ,, ,, ,, ...	,,
	,, + 1 wash of ,, ,, ...	,,
	,, + ½ ,, ,, ,, ...	,,
	,, + ¼ ,, ,, ,, ...	,,
Tubes containing trypsinized serum	Serum + 2 washes of bacterial suspension ...	Abundant growth with gas
	,, + 1 wash of ,, ,, ...	,, ,, ,,
	,, + ½ ,, ,, ,, ...	,, ,, ,,
	,, + ¼ ,, ,, ,, ...	,, ,, ,,

Experiment 10.

Here again the same technique was employed except in the respect that the trypsinized serum was prepared by adding 1 unit volume of trypsin respectively to 9, 19, and 39 unit volumes of serum. The serum was A. E. W.'s serum, which neutralized an equal volume of a twenty-five-fold dilution of trypsin. The cultural results were as set out below.

	Amount of bacterial suspension implanted					
	Washes					
	3		1	½	¼	⅛
Serum without addition	Trace	Trace	0	0	0	0
Serum + $\frac{1}{40}$ of its volume of trypsin	Growth	Growth	Trace	Trace	Trace	0
Serum + $\frac{1}{20}$ of its volume of trypsin	Growth and gas	Growth	Growth	Growth	Growth	Growth
Serum + $\frac{1}{10}$ of its volume of trypsin	Growth and gas	Growth and gas	Growth and gas	Growth and gas	Growth and gas	Growth and gas

To this experiment may be added the following which brings out that there is a general but not a perfect correlation between the antitryptic power of the serum and its power of resisting infection by the bacillus of Welch.

Experiment 11.

Derivation of the serum	Antitryptic power* of the serum	Infection-resisting (phylactic) power					
		Amount of culture implanted					
		Washes					
		3	2	1	½	¼	⅛
Patient with serious compound fracture	10 units (reciprocal of T/10)	0	0	0	0	0	0
Patient with perforating wound of chest	6·6 units (reciprocal of T/15)	Trace	0	0	0	0	0
Patient with gangrene infection of leg	6·6 units (reciprocal of T/15)	Growth	0	0	0	0	0
Patient with serious flesh wound	5 units (reciprocal of T/20)	Growth	Growth	Growth	Growth	Growth	0
Patient with serious flesh wound	5 units (reciprocal of T/20)	Growth	Trace	0	0	0	0
Normal man ...	5 units (reciprocal of T/20)	Growth	Growth	Growth	0	0	0

* Here, as elsewhere, the antitryptic power was measured by finding out what dilution of trypsin was neutralized by an equal volume of serum. By dividing in each case the figure representing this dilution into 100 we obtain the reciprocals, figures which provide a very convenient expression for the results of antitryptic measurement.

(*d*) *Experiments showing that the Growth of the Bacillus of Welch in the Blood Fluids is promoted by the addition of Acid.*

When we note that the bacillus of Welch when growing freely in serum turns it acid; and reflect upon the fact that all serum cultures of the microbe, whether *in vitro* or in the living body, begin with difficulty, and then, after reaching a certain critical point, progress *avalanche fashion*, we inevitably, as in regard to the reduction of the antitryptic power of the serum, ask ourselves whether the characteristic avalanche-like acceleration of growth may not be a direct result of this particular change in the medium.

The answer is given in the following experiments.

Experiment 12.

Seven unit volumes of serum were neutralized by the addition of two unit volumes of a N/10 sulphuric acid—the control sample of serum being diluted to the same extent with physiological saline solution. This done, the antitryptic power of the two samples of serum was measured. It worked out in each case as three (approximately)—i.e., a unit volume of each of the sera neutralized a forty-fold and failed to neutralize a thirty-fold dilution of the trypsin. These preliminaries completed, the resistance of the two sera to infection by the bacillus of Welch was investigated by aspirating into a capillary pipette a unit volume of a thick bacterial suspension, and following up in each case (I call this the after-wash method) by a series of unit volumes of serum. These successive after-washes were divided off by bubbles of coal-gas introduced by the technique already explained (*vide* footnote, p. 7). The results after twenty-four hours' culture were as shown in the table below.

	Cultural results						
	After-wash						
	First	Second	Third	Fourth	Fifth	Sixth	Seventh
Neutralized serum ...	Growth	Growth	Growth	Growth	Growth	Growth	Growth
Correspondingly diluted serum	0	0	0	0	0	0	0

Experiment 13.

As in the last experiment, 7 unit volumes of serum were mixed in the one case with 2 unit volumes of N/10 sulphuric acid, and in the other with 2 unit volumes of physiological salt solution. The sera were then put away for

twenty-four hours. The antitryptic power of each sample of serum was then tested. It worked out, in the case of the *neutralized serum*, as less than 3·3 units and greater than 2·5 units, in the case of the correspondingly *control sample of serum* as less than 4 units and greater than 3·3 units. Graduated dilutions of a suspension of Welch's bacillus were then made upon slides by the wash-volume $(\frac{W}{V})$ method—i.e., in each case a wash of bacterial suspension or implanted serum was carried over into a unit volume of serum to make the next dilution in series. An unmeasured sample of acid dilution was then drawn up into the stem of a capillary pipette, the successive volumes being separated by bubbles of coal-gas. The experiment was carried out in duplicate in the case of each serum. The cultural results were as follows:—

	Cultural results						
	Dilution						
	1	2	3	4	5	6	7
Neutralized serum:—							
Pipette No. 1	Growth	Growth	Growth	Growth	Growth	Growth	Growth
,, ,, 2	Growth	Growth	Growth	0	0	0	0
Control serum:—							
Pipette No. 1	Trace	0	0	0	0	0	0
,, ,, 2	0	0	0	0	0	0	0

Experiment 14.

Normal serum was neutralized by the addition of N/10 sulphuric acid and then mixed with one-ninth of its bulk of a five-fold dilution of trypsin. The control sample of serum was diluted to the same extent with 0·85 per cent. NaCl solution. Both specimens were then implanted with a suspension of the bacillus of Welch by the after-wash method.

	Cultural results							
	After-wash							
	First	Second	Third	Fourth	Fifth	Sixth	Seventh	Eighth
Neutralized and trypsinized serum	Growth	Growth	Growth	Growth	Growth	Growth	Growth	Growth
Control trypsinized serum	Growth	0	0	0	0	0	0	0

Experiment 15.

This given in tabular form below is self-explanatory.

Serum implanted with 3 washes of bacterial suspension	No growth
,, ,, ,, 2 ,, ,, ,, ...	,, ,,
,, ,, ,, 1 wash ,, ,, ...	,, ,,
Serum neutralized (by adding 2 volumes of N/10 sulphuric acid to 7 volumes of serum) and implanted with one-fifth wash of bacterial suspension	Copious growth
Serum acidified (by adding 3 volumes of N/10 sulphuric acid to 7 volumes of serum) and implanted with one-fifth wash of bacterial suspension	,, ,,

This series of experiments makes it, as it seems to me, quite indubitable that additions of acid convert the serum into an eminently favourable medium for the bacillus of Welch, and it is clear from the data set forth in connexion with Experiments 12 and 13 that this effect is obtained quite apart from any reduction of the antitryptic power. We have seen that the converse of this last also holds true, the reduction of antitryptic power, quite apart from any addition of acid, converts the serum into a very favourable culture medium for the micro-organism. And I think there can be no question that when these two factors co-operate we have a combination which adequately accounts for the *avalanche phenomenon*, which is the outstanding feature in the biology of the bacillus of Welch, both when it grows in the blood fluids *in vitro*, when it grows in the dead body, and when in the living body it invades the tissues, giving rise to spreading "gas-gangrene." We have next to study the growth of the bacillus of Welch in the dead body.

(III) Conditions which Govern the Growth of the Bacillus of Welch in the Dead Body.

Already in Welch's very first publication upon the *Bacillus aërogenes capsulatus*—the microbe which now bears his name—it is put upon record that if a culture is introduced into the blood-stream of a rabbit, and the animal is then killed and put into the incubator, the whole organism will be rapidly invaded. Gas is generated in the blood; the condition known as "foaming liver" is produced; and the peritoneal cavity is, after six or more hours, blown up with gas. As soon as we set ourselves to think out what all this imports, we see that it must mean that the chemical changes occurring in the blood and

liver after death transform the blood fluids into an eminently favourable medium for the cultivation of the bacillus of Welch.

The following experiments show that this inference is correct.

Experiment 16.

Rabbit No. 1.—The animal, injected intravenously with 3 c.c. of a broth culture of the bacillus of Welch, was killed five minutes after, and was then placed in the incubator. A sample of blood was taken before and a series of samples after injection. In each case film preparations were made and examined, and measurements of the antitryptic power and of the blood alkalinity were undertaken. These are recorded in tabular form below. In regard to the film preparations, it will suffice to say that no microbes were microscopically discoverable in any but the last specimen; here they were numerous. After six hours the animal was blown up with gas and the liver was foaming.

Times when the samples of blood were collected	Measurements of antitryptic power and chemical reaction of the serum	
	Antitryptic power (units)	Chemical reaction *
Immediately before injection	3	Alkaline N/40
5 minutes after injection	2	—
10 ,, ,, ,, (heart blood)	1·6	Alkaline N/50
3 hours ,, ,, ,, ,, ...	1·6	,, N/60
6 ,, ,, ,, ,, ,, ...	—	Acid

* Here and elsewhere in this paper the alkalinity of the blood was measured by the method described in the author's "Technique of the Teat and the Capillary Glass Tube" (Constable, London).

We have here evidence that—presumably as a result of a destruction of leucocytes—the antitryptic power of the blood is progressively reduced; and that—no doubt as a consequence of lactic acid production in the muscles—the blood fluids lose their alkalinity and finally become acid. One can hardly doubt that it is these changes which favour the growth of Welch's bacillus in the dead rabbit. That the anaërobic conditions do not here play any decisive rôle will appear in connexion with Experiments 19 and 20.

Experiment 17.

Rabbit No. 2.—The rabbit was injected intravenously with 1 c.c. of an aërobically grown potato-broth culture, and was killed immediately after. As in the last case, film preparations of the blood were examined and measure-

ments of the antitryptic power and alkalinity carried out. In films made three and a half hours after death hardly any microbes could be detected. In preparations made four and three-quarter hours after death they numbered 6-8 to the microscopic field. At the end of six hours the animal was blown up with gas, and the liver was honeycombed with small cavities containing a foaming and tryptic fluid.

Times when the samples of blood were collected	Measurements of antitryptic power and chemical reaction of the serum	
	Antitryptic power (units)	Chemical reaction
Immediately before injection	4·5	—
15 minutes after injection (heart blood)	5·5	Alkaline N/35
3½ hours ,, ,, ,, ,, ...	4·5	,, N/80
4¾ ,, ,, ,, ,, ,, ...	3·6	—
6 ,, ,, ,, ,, ,, ...	2·2	Acid

Experiment 18.

Rabbit No. 3.—This received intravenously 1 c.c. of a culture of the bacillus of Welch grown aërobically in potato broth, and the animal was killed fifteen minutes after the injection and placed in the incubator. Samples of blood were taken and examined as in the previous experiments. A single microbe was found in the blood film made two hours after death. The liver seven hours after death was torn to pieces by gas and looked, except for the fact that its colour was a dark brown red, like a mass of coral as obtained from the swimmerets of a hen-lobster; films prepared from it showed an almost solid mass of microbes. The results of the measurements of antitryptic power and blood reaction are subjoined.

Times when the samples of blood were collected	Measurements of antitryptic power and chemical reaction of the serum	
	Antitryptic power (units)	Chemical reaction
Immediately before injection	3	Alkaline N/30
15 minutes after injection	3	,, N/30
2 hours after injection (heart blood)	1·8*	Acid
4 ,, ,, ,, ,, ,, ...	1·6*	,,

* Measured after serum had been neutralized with washes of N/10 NaOH.

Experiment 19.

Rabbit No. 4.—A sample of blood was taken from this animal, and it was then killed and placed in the incubator, without receiving any injection. The second samples of blood were taken three hours after death respectively from the S.V.C. and from the I.V.C. and hepatic vein. Sample 3 was taken from the heart five hours after death. The results of the measurements of antitryptic power, blood reaction, and *phylactic* (infection resisting) power are subjoined.

	Antitryptic power	Chemical reaction
Serum, Sample 1	3 units	Alkaline N/30
,, ,, 2	3 ,,	,, N/80
,, ,, 2B	Tryptic *	Acid N/150
,, ,, 3	Tryptic *	,, N/75

Infection Resisting (Phylactic) Power.

	Amount of culture implanted							
	Washes							
	3	2	1	½	¼	⅛	1/16	1/32
Serum, Sample 1 ...	0	0	0	0	0	0	0	0
,, ,, 2 ...	—	—	Growth and gas	Growth and gas	Growth and gas	Growth and gas	Growth and gas	Growth and gas
,, ,, 2B ...	—	—	Growth and gas	Growth and gas	Growth and gas	Growth and gas	Growth and gas	Growth and gas

* Determined after serum had been neutralized by washes of N/10 NaOH.

It is evident from the results set out here that the blood changes which convert the blood fluids after death into an eminently favourable culture medium for the bacillus of Welch are chemical changes which occur spontaneously, and quite independently of the inoculation of that bacillus. Furthermore, when we consider that the cultures, the results of which are set out above, were in the case of all three samples of serum made anaërobically, we recognize that the rapid pullulation of the microbe in the dead body cannot be attributable to the anaërobic conditions prevailing there.

Experiment 20.

Here a sample of blood was taken from a cat and the animal was then immediately killed and placed in the incubator. Sample 2 was taken from the heart three hours after; Sample 3 six hours after. As in the last case, the antitryptic power, the blood reaction, and infection-resisting power of these samples were measured. It will be seen that except for the fact that the antitryptic power is maintained unaltered the results are precisely the same as those obtained in the rabbit.

	Antitryptic power	Chemical reaction
Serum, Sample 1	4	Alkaline N/50
,, ,, 2	4	,, N/150
,, ,, 3	4	Faintly acid

Infection Resisting (Phylactic) Power

	Amount of culture which was implanted				
	Washes				
	3	2	1	½	¼
Serum, Sample 1 ...	0	0	0	0	0
,, ,, 2 ...	Growth and gas	Growth and gas	Growth and gas	Growth and gas	Growth and gas
,, ,, 3 ...	—	Growth and gas	Growth and gas	—	Growth and gas

(IV) CONDITIONS WHICH GOVERN THE GROWTH OF THE BACILLUS OF WELCH IN THE LIVING ORGANISM, IN PARTICULAR ON THE BLOOD CHANGES WHICH SUPERVENE (*a*) WHEN THE BACILLUS OF WELCH IS INOCULATED INTO THE BLOOD STREAM OR SUBCUTANEOUS TISSUE, AND (*b*) WHEN THE MICROBE INVADES THE TISSUES FROM A WOUND PRODUCING GAS GANGRENE AND THE CHARACTERISTIC TOXÆMIA WHICH IS ASSOCIATED WITH THIS.

Disposing my data in accordance with the scheme thus indicated I may set forth first, adding here and there brief comment, certain data furnished by blood examinations undertaken upon rabbits inoculated intravenously with cultures of the bacillus of Welch.

(*a*) *Experiments in which the Bacillus of Welch was Inoculated Intravenously into Rabbits.*

Experiment 21.

Rabbit No. 5.—This was a companion rabbit to Rabbit 3 (Experiment 18), and it was inoculated intravenously with 1 c.c. of the same potato broth culture as was there employed. A comparison of the figures given below with those given in connexion with Experiment 18 shows up to the nineteen hours after the injection profound differences between the two. Here the alkalinity of the blood remains practically unaffected and the antitryptic power sinks away only very slowly. Thereupon, apparently quite suddenly, the rabbit became collapsed and the circulation flagged so much that blood was unobtainable from the ears (these were stone cold) and had to be drawn off from the femoral artery. Respiration was 80 to 100 in the minute, and the clinical picture corresponded to that of the classical "acid rabbit" of Walther and Stadelmann—i.e., to the clinical picture seen when a rabbit is overdosed with hydrochloric acid. The details of the experiment are as follows:—

Times when the samples of blood were collected	Measurements of antitryptic power and alkalinity	
	Antitryptic power	Alkalinity of blood
Immediately before injection	3·6	N/30
15 minutes after injection	2·2	—
4 hours ,, ,, ...	3·0	—
19 ,, ,, ,, ...	2·5	N/35
21 ,, ,, ,, ...	4·0	N/50
23½ ,, ,, ,, (1¼ hours after death) ...	1·6	N/180

Owing to the difficulty of procuring sufficient rabbits only two more experiments of this kind were made. So far as the first hours of observation are concerned, both of these results are similar to those obtained in Experiment 21; but neither of them gave any evidence in corroboration of the view that death in infection by the bacillus of Welch is ushered in by an acidæmia. This, however, may be discounted, for the animal in each case died unexpectedly in the night. The data relating to one of the two rabbits—a rabbit that was found dead eighteen hours after the intravenous injection of a small quantum of culture—are given below.

Experiment 22.

Times when the samples of blood were collected	Measurements of antitryptic power and alkalinity	
	Antitryptic power	Alkalinity of blood
Immediately before injection	3·0	N/40
10 minutes after injection	2·6	N/40
30 ,, ,, ,, ...	2·0	N/40
2 hours ,, ,, ...	2·0	N/40
6 ,, ,, ,, ...	1·5	N/45

We pass now from the consideration of rapidly fatal intravenous inoculations, to which there is no obvious immunizing response, to study the effects of subcutaneous inoculations in the case of animals who for the most part respond and survive.

(*b*) *Experiments in which the Bacillus of Welch was Inoculated Subcutaneously into Guinea-pigs and White Rats.*

Here also observations were made upon the antitryptic power and the alkalinity of the serum from the circulating blood. In addition—for it was possible to do this until such time as the local effusion was either absorbed or broke through the skin and was lost—determinations were made also of the antitryptic power and alkalinity prevailing at the seat of the inoculation. In each case the results are set out in the form of charts. Upon these the unbroken line is the curve obtained from the circulating blood; the interrupted line the curve from the œdema fluid. And in each case the scale is a scale of reciprocals—i.e., the figures are the quotients obtained by taking the dilution of the reagent which neutralized the effect of an equivalent volume of serum and dividing this into 1,000.

Experiment 23.

Guinea-pig No. 1.—The animal was inoculated subcutaneously in the leg with 0·1 c.c. of a twenty-four-hour-old potato-broth culture aërobically grown. Beginning in the leg the effusion gradually spread over the whole of the belly, and finally after three days the skin broke down—the animal afterwards recovering and the wound healing over. The film preparations made from the effusion showed at first very numerous and afterwards only few bacilli. (*See* Chart I, G 1, p. 25.)

Experiment 24.

Guinea-pig No. 2.—The animal was inoculated subcutaneously with 0·3 c.c. of a twenty-four-hour-old potato-broth culture aërobically grown. Local effusion was well developed after eighteen hours ; it increased in quantity up to forty-eight hours and then broke through upon the skin and leaked away, the wound afterwards healing up and the guinea-pig making a good recovery. (*See* Chart II, G 2.)

Experiment 25.

Guinea-pig No. 3.—The animal was inoculated subcutaneously with 0·3 c.c. of a twenty-four-hour-old potato-broth culture aërobically grown. Local effusion was well developed after twenty-one hours. After twenty-seven hours the subcutaneous tissue, as soon as it became flaccid through withdrawal of fluid, filled up rapidly with gas, and the animal died thirty-three hours after the injection. (*See* Chart III, G 3.)

Experiment 26.

White Rat No. 1.—The animal was inoculated subcutaneously with 0·7 c.c. of a twenty-four-hour-old potato-broth culture aërobically grown. Local effusion was well developed sixteen hours after, and from the second day onwards the lesion became indurated and the œdema gradually disappeared, the animal making a perfect recovery. (*See* Chart IV, R 1.)

Experiment 27.

White Rat No. 2.—The animal was inoculated subcutaneously with 0·6 c.c. of a twenty-four-hour-old potato-broth culture. The local lesion ran the same course as in the first rat, and the animal, after being very ill for two days, made a perfect recovery. (*See* Chart V, R 2.)

Experiment 28.

White Rat No. 3.—The animal was inoculated subcutaneously with three-fifths of a twenty-four-hour-old potato-broth culture. There was less effusion than in the case of the first two rats, and by the second day it had been completely absorbed. The animal was never really ill. (*See* Chart VI, R 3.)

It is brought out very clearly in these charts that infection by the bacillus of Welch produces as a rule both a local and a general acidosis, and it will be seen—and, of course, this was to be expected *a priori*—that we have always a more pronounced acidosis in the local lesion than in the general blood stream. Where, as in Chart III, the acidæmia becomes very pronounced the animal succumbs. And where, as in Chart VI, there is no acidæmia the animal is never seriously ill.

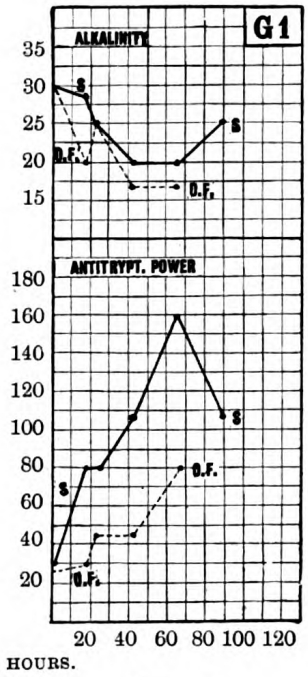

CHART I.

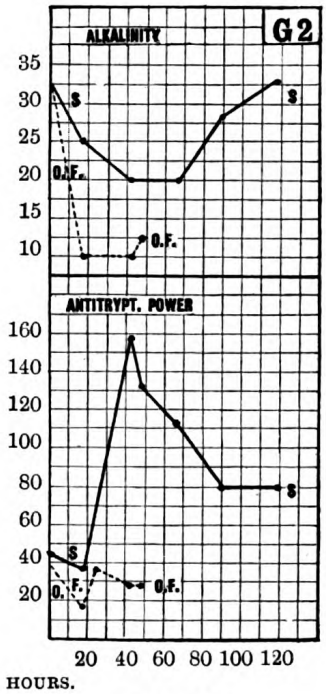

CHART II.

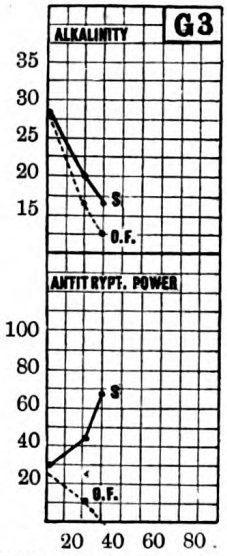

CHART III.

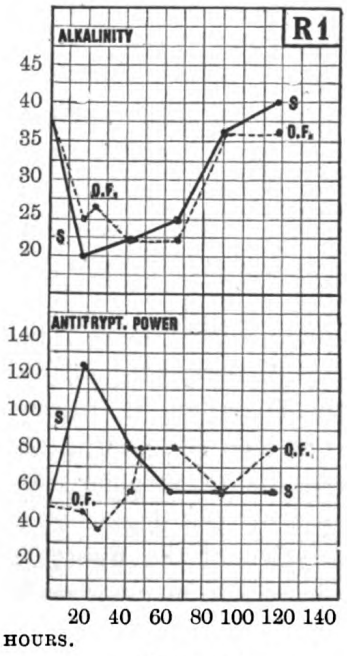

CHART IV.

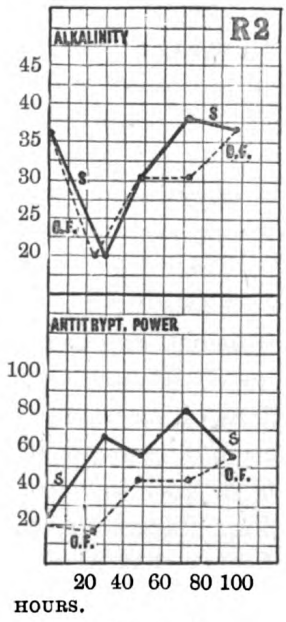

CHART V.

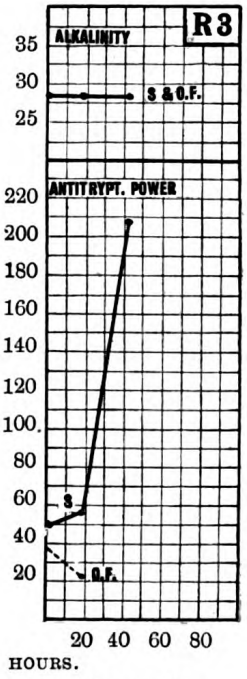

CHART VI.

Turning to the antitryptic power, we see that in all cases without exception—and when we turn back we can see indications of this also in the rabbit experiments (*vide* Experiment 21)—the curve which represents the antitryptic power of the blood rises. It rises very steeply where, as in Chart VI, the animal deals triumphantly with its infection; and it rises only very little where, as in Chart III, the animal puts up only a very feeble fight.

It also holds true of the curve of the antitryptic power of the œdema fluid in Charts I, II, IV, and V, that as the animal begins to recover it rises, following the curve of the blood, and we see in Chart III that the œdema fluid may become tryptic in the case where the animal fails to stand up against the infection.

(*c*) *Observations Made on Man.*

We have now by experiments conducted *in vitro*, and in the dead, and living animals, collected sufficient data to enable us to construe aright such observations as it may be practicable to make upon men suffering from wounds infected by the bacillus of Welch, or from that spreading tissue infection which is spoken of as "gas gangrene," or again from that sharply characterized toxæmic condition which is the ultimate outcome of that infection.

A commencement may be made by setting out in tabular form the results of a series of antitryptic measurements made by me on three consecutive days in a Casualty Clearing Station. These results relate to men all recently admitted to hospital with severe and highly infected wounds—cases of manifest "gas gangrene" being here specially excluded. I may further explain that many of the cases which were examined on the first day were examined also on the second, and similarly many of the cases examined on the second were re-examined on the third day. (*See* Table I.)

It is brought into clear view by the summary that—and I have already on previous occasions emphasized this point—every microbic infection of wounds (and the same probably holds of all microbic infections and inoculations of vaccine) is followed by a rise in the antitryptic power constituting a non-specific immunizing response—that response being greater or less in accordance with the degree of the severity of the infection. Moreover, consideration of the figures for the successive days indicates that as the septic condition develops the antitryptic power gradually increases. I next take from the foregoing table its data relating to the antitryptic power in heavily infected

TABLE I.—MEASUREMENTS OF THE ANTITRYPTIC POWER OF THE BLOOD OF NORMAL MEN, SLIGHTLY WOUNDED MEN, AND HEAVILY WOUNDED MEN, EXCLUDING THOSE AFFECTED WITH "GAS GANGRENE."

Date	Normal men			Slightly wounded men			Heavily wounded men, excluding cases of gas gangrene		
	A.T.P. of the individual men		Average	A.T.P. of the individual men		Average	A.T.P. of the individual men		Average
January 5, 1916	4·4	4·4	4·4 units	5·7 4·4 11·4 4·4	3·6 4·4 4·4	5·5 units	11·4 11·4 4·4 5·7 5·0 13·3	8·0 8·0 11·4 6·6 8·0	8·5 units
January 6, 1916	5·7	4·4	5·0 units	5.7 5·7 5·7	5·7 5·7	5·7 units	11·4 16·0 11·4 5·7	10·0 16·0 5·7	10·9 units
January 7, 1916	4·4	5·0	4·7 units	8·8 4·4 5·7	4·4 5·7 8·0	6·3 units	22·2 18·1 11·4 18·1	11·4 18·1 13·3	16·1 units
	Summary ...		4·7 units	—		5·8 units	—		11·3 units
Antitryptic index ...			1			1·23			2·4

TABLE II.—SUMMARY OF MEASUREMENTS OF ANTITRYPTIC POWER AND BLOOD ALKALINITY MADE UPON HEAVILY INFECTED PATIENTS NOT AFFECTED WITH "GAS GANGRENE" AND "GAS GANGRENE" PATIENTS RESPECTIVELY.

		Antitryptic power	Blood alkalinity
Heavily infected patients exclusive of cases of spreading gas gangrene bacillus infection	Number of patients examined	25	10
	Range of variation within the group	5·7 to 22·2 units (*vide* Table I)	N/30 to N/35
	Average for the group...	11·3 units	N/31·5
Patients suffering from spreading gas gangrene bacillus infection and intoxication	Number of patients examined	14*	15*
	Range of variation within the group	5 to 22 units (*vide* Table III)	N/40 to N/80
	Average for the group...	11·2 units	N/55
Normal men		4·7	N/30 to N/35

* The majority of these patients are those included in Table III.

patients not affected with "gas gangrene," supplement these with data furnished by measurements of their blood alkalinity; and then contrast these with data furnished by measurements of antitryptic power and blood alkalinity carried out on "gas gangrene" patients, adding also for comparison figures which apply to normal men.

These data are incorporated in Table II.

Scrutiny of this table reveals that with regard to antitryptic power there is absolutely no difference between heavily infected patients not suffering from "gas gangrene" and patients suffering from that infection. When, however, we turn to the column headed "Blood alkalinity," we see that while the blood alkalinity of the heavily infected patient corresponds exactly with the normal, in the "gas gangrene" patient—and, of course, only quite pronounced cases of "gas gangrene" were taken for examination—the blood alkalinity is very clearly reduced. In other words, the figures here brought together bring out the fact that the toxæmia of "gas gangrene" is an acidæmia.

In Table III, here concentrating attention on cases of "gas gangrene," I go more into detail and set out a series of measurements of the antitryptic power and alkalinity of the circulating blood in those cases and also measurements of the antitryptic power and alkalinity of lymph obtained from the infected tissues. At the end of the table I add, for purposes of comparison, the details of the examinations made in two cases which might—though, in point of fact, the error was in neither case committed—have been regarded as "gas gangrene" cases. I further include in the table six observations bearing on the treatment of "gas gangrene" acidæmia by the intravenous administration of alkalies.

TABLE III.

Serial number	Brief outline of the case	Data with regard to the antitryptic power and alkalinity of the blood	Data with regard to the antitryptic power and alkalinity of the lymph in the infected tissues
1	Spreading gangrene bacillus invasion in subcutaneous tissue of arm, with coppery discoloration and crepitation; amputation of arm	*A.T.P.*, 8 units	Œdema fluid from tissues close to the wound: *Tryptic.* Œdema fluid from spreading edge: *A.T.P.*, 2·2
2	Clinical features as in Case 1	*A.T.P.*, 6·6 units	Œdema fluid from tissues above the wound: *A.T.P.*, 1·6

TABLE III—(*continued*).

Serial number	Brief outline of the case	Data with regard to the antitryptic power and alkalinity of the blood	Data with regard to the antitryptic power and alkalinity of the lymph in the infected tissues
3	Multiple shrapnel wounds of leg with spreading gangrene bacillus infection in subcutaneous tissue; acute toxæmia, with rapid respiration, impalpable pulse, and cold creeping upwards from extremities; intravenous injection of 16 grm. of $NaHCO_3$; death 12 hours after onset of toxæmic symptoms	Before intravenous injection: *Alkalinity*, N/80; *A.T.P.*, 6·6 units. 10 minutes after injection: *Alkalinity*, N/50; *A.T.P.*, 6·6 units	—
4	Extensive wound of thigh; spreading gangrene bacillus infection involving knee and spreading in subcutaneous tissue of the thigh with crepitation; amputation of thigh; death 48 hours after operation	*A.T.P.*, 11·4 units; *Alkalinity*, N/50	Fluid from knee: *A.T.P.*, 2 units; *Alkalinity*, N/50. Fluid from subcutaneous tissue: *A.T.P.*, 3·3 units *Alkalinity*, N/40
5	Compound fracture of thigh with extensive flesh wound; rapidly spreading gangrene bacillus infection of tissues; acute toxæmia; icteric serum[1]; culture of the bacillus of Welch from blood 4½ hours, intravenous injection of 8 grm. of $NaHCO_3$ 8 hours, and death 14 hours after onset of toxæmic symptoms	Before intravenous injection: *A.T.P.*, 5 units; *Alkalinity*, N/50. 5 minutes after injection: *A.T.P.*, 5 units; *Alkalinity*, N/50. 6 hours after injection: *A.T.P.*, 5 units; *Alkalinity*, N/50	—
6	Compound fracture of ankle; acute toxæmia with collapse, precluding operation; injection of 20 grammes of lactate of soda; condition rapidly improved and amputation carried out; in evening patient was sitting up, next morning general condition very satisfactory, and patient made a good recovery	Before injection: *Alkalinity*, N/50. Immediately after: *Alkalinity*, N/50. 7 hours after: *Alkalinity*, N/50. Next morning: *Alkalinity*, N/40	—
7	Extensive wound in upper third of arm; gangrene with dark livid discoloration and hæmorrhagic blisters, with purple mottling extending over the shoulder; profound toxæmia; 10 grm. of $NaHCO_3$ intravenously; disarticulation at shoulder; next morning general condition satisfactory and patient made a good recovery	At time of operation: *Alkalinity*, N/70. 6 hours after: *Alkalinity*, N/60. Next day: *Alkalinity*, N/40	Œdema fluid from upper arm: *Alkalinity*, N/200. Œdema fluid from lower arm: *Alkalinity*, N/60
8	Very numerous shrapnel wounds of both legs; gangrene bacillus infection spreading out from these in the form of infiltrated copper-coloured patches	*A.T.P.*, 20 units; *Alkalinity*, N/50	Œdema fluid from infiltrated copper-coloured patches: *A.T.P.*, 6·6 units; *Alkalinity*, N/60

[1] It is a special feature of the blood in gas gangrene toxæmia that the serum is of a characteristic deep yellow colour. There is also, as in most cases of serious bacterial intoxication, a very heavy buffy coat.

TABLE III—(*continued*).

Serial number	Brief outline of the case	Data with regard to the antitryptic power and alkalinity of the blood	Data with regard to the antitryptic power and alkalinity of the lymph in the infected tissues
9	Gangrene of leg spreading upwards; amputation at middle of thigh	*A.T.P.*, 8 units	*A.T.P.* of œdema fluid from spreading edge, 2·9 units
10	Massive gangrene infection of all muscles of anterior aspect of thigh	*Alkalinity*, N/60	Clear fluid from wound: *Alkalinity* N/60
11	Hæmothorax infected with Welch's bacillus and containing many W.B.C.; icteric serum	*A.T.P.*, 13·3 units; *Alkalinity*, N/50	Pleural effusion: *A.T.P.*, 6·6 units; *Alkalinity*, N/100
12	Hæmothorax—Film preparations show 20 or more of Welch's bacillus in each microscopic field; no indications of growth in effusion when cultured, and growth on artificial media only when very large quanta are implanted	*A.T.P.*, 22 units; *Alkalinity*, N/40	*A.T.P.*, 8 units *Alkalinity*, N/100
13	Patient admitted with an enormous wound in groin and in a condition of collapse; recovered sufficiently to allow of incomplete operation; 24 hours later vomiting and very feeble, rapid pulse; intravenous injection of 20 grm. of $NaHCO_3$; next day some improvement; day after patient succumbed	*Alkalinity*, N/40 of blood collected about 18 hours after operation	—
14	Amputation, after 4 days in hospital, of thigh for gas gangrene starting from wound of leg and knee; 24 hours after patient was still very weak; 40 hours after operation 10 grm. of $NaHCO_3$ intravenously; patient succumbed 24 hours later	Blood taken at time of operation: *A.T.P.*, 16 units; *Alkalinity*, N/60. Blood taken 24 hours after operation: *A.T.P.*, 20 units; *Alkalinity*, N/60. Blood taken immediately before injection of alkali: *A.T.P.*, 20 units; *Alkalinity*, N/50. Blood taken immediately after injection: *A.T.P.*, 23 units; *Alkalinity*, N/40	Fluid from œdematous subcutaneous tissue just above level of amputation: *A.T.P.*, 13·3 units; *Alkalinity*, N/80
15	Amputation stump of upper part of thigh with gas infection of the sloughing surface; an axial incision carried up from this upon ilium; œdema fluid neutralized by lactic acid gives anaërobically in 4 hours a foaming culture of Welch's bacillus; unneutralized it gives anaërobically a scanty growth in 18 hours; heart blood obtained 24 hours later at P.M. gives a pure culture of streptococcus	*A.T.P.*, 16 units; *Alkalinity*, N/35	Œdema fluid intermixed with blood from incised tissue: *A.T.P.*, 16 units; *Alkalinity*, N/35
16	Perforating wound immediately below the knee; limb cold and œdematous; amputation with view to possibility of gas gangrene infection	*A.T.P.*, 8 units; *Alkalinity*, N/35	*A.T.P.*, 4·4 units; *Alkalinity*, N/35

Data furnished by Measurements of the Antitryptic Power and Alkalinity of the Circulating Blood and of the Lymph from the Infected Tissues in Cases of "Gas Gangrene."

Consideration of the data which are set out in Table III makes it, as I think, quite clear that we are, in the so-called "gas gangrene infection" of man, dealing essentially with the same phenomena as in our laboratory experiments. We saw, in *in vitro* cultures in serum, that the bacillus of Welch diminishes the antitryptic power of the medium and renders it acid; and we saw that the serum is by these means converted into a pre-eminently favourable medium for the growth of the bacillus. In experiments on the blood in the dead body we saw that it is these chemical changes which furnish the conditions required for the avalanche-like progress of the bacterial infection. And, finally, experiments upon living animals showed that we have in infections by the bacillus of Welch—*with respect to alkalinity*, a reduction in the fluids taken from the focus of infection, and also a reduction in the circulating blood; and—*with respect to antitryptic power*, in the circulating blood, a marked immunizing response, while we have in the infected tissues a diminished or abolished antitryptic power, especially where the animal is only unsuccessfully combating or succumbing to the infection.

Every one of these points obtrudes itself again upon our notice in the records dealing with human "gas gangrene" which are brought together in Tables II and III. We have there, to begin with, the high antitryptic response in the circulating blood and the reduced or abolished antitryptic power in the infected tissues or infected effusions. We have, in addition, diminished alkalinity in the infected tissues or infected effusions. And we have not only a local acidosis, but we have also an acidæmia. We find that acidæmia where the infection has culminated in "gas gangrene toxæmia." I mean by "gas gangrene toxæmia" that condition which is ushered in by vomiting and then shows itself in collapse, with rapid respiration, ashy-grey pallor, feeble and then impalpable pulse—the body becoming stone-cold, first the hands and feet, then the whole limbs, finally the nose, ears and forehead, the patient remaining with clear intellect and without suffering to the last.

It may perhaps, pending further investigation, be assumed with respect to this acidæmic condition that the acid production proceeds not only in the infected tissues standing in relation with the wound, but also in the liver and other internal organs to which the bacillus of

Welch may have been conveyed—general infection being favoured as soon as the alkalinity of the blood begins to be reduced by the influx of lymph charged with acid in the infected tissues.

Considerations of this kind should be present to our minds when we turn to take stock of the results of the therapeutic administration of alkalies in "gas gangrene." As shown by the records, this procedure gave distinctly favourable results only in two cases out of the six. In those two cases, however, the effect was dramatic. Probably in the other cases, as is the case in the acidæmia of diabetes and uræmia, the evolution of acid proceeded uninfluenced.

It must be left for future experimentation to determine whether better results can be obtained by earlier intravenous injection of alkali, or whether the local evolution of gas gangrene could be arrested by the injection into the tissues or, as the case may be, into an infected hæmothorax of alkali or of an *alkalinized* strongly antitryptic serum, remembering here that a strongly antitryptic serum can practically always be obtained either from the patient himself or from any other heavily infected patient.

In conclusion, I have to express my acknowledgments to my colleague Major Georges Dreyer for generous assistance in plotting out the curves and in some of the experiments; to my fellow worker the late Captain H. H. Tanner for similar assistance. My thanks are also due to Captain Haycraft for help in connexion with the study of cases of gas gangrene, and to my fellow worker Dr. Alexander Fleming for permission to incorporate in this lecture some of the results of his research work.

The Royal Society of Medicine.

President—Sir RICKMAN GODLEE, Bt., K.C.V.O., M.S.

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Chairman—Surgeon-General H. D. ROLLESTON, R.N., C.B.

SPECIAL DISCUSSION ON THE ORIGIN, SYMPTOMS, PATHOLOGY, TREATMENT, AND PROPHYLAXIS OF TOXIC JAUNDICE OBSERVED IN MUNITION WORKERS.

(By the Sections of Medicine, Pathology, and Epidemiology.)

Opened by Dr. T. M. LEGGE.

I CAN best open this discussion by a few words on the extent of the problem which industrial toxic jaundice now presents.

Before the War, industrially, it was well known as the characteristic result of poisoning by arseniuretted hydrogen gas, evolved by the chemical action on one another of acids and metals containing arsenic, as in the manufacture of zinc chloride. Its action was directly upon the red blood cells, destroying them. This classical form of toxic jaundice has not been reported among munition workers.

Before the War, also, a few cases of toxic jaundice had been observed, either in the manufacture of di-nitro-benzene or in its use in the manufacture of explosives. The main effect of di-nitro-benzene, however, was the conversion of the oxyhæmoglobin of the red blood cells into met-hæmoglobin, followed by hæmolysis, degeneration of the cytoplasm and escape of the hæmoglobin into the plasma. Effect on the blood was the salient feature, and jaundice was rare.

The pre-war conditions as to occurrence of this form of poisoning throw a flood of light on what has happened since, but before dealing with this subject, which is inseparable from T.N.T. poisoning, I will deal with the occurrence of toxic jaundice from tetrachlorethane, an ingredient, to the extent of about 12 per cent., of the dope or varnish used for covering the wings of aeroplanes.

Tetrachlorethane is a good solvent for acetate of cellulose, and came into use for the purpose shortly before the War broke out. In November, 1914, we heard of nineteen cases of jaundice in an aeroplane works at Hendon and, following on the investigation of a fatal case by Dr. Spilsbury, proof was given by Dr. Willcox that they were due to tetrachlorethane, which was a most powerful liver poison. The large number affected at one and the same time was due to the fact that a plenum system of ventilation was installed, which blew the heavy vapour into every corner of the large shed. Aeroplane works were springing up all over the country, overtime was being worked to the utmost, and all the dope used contained the noxious ingredient. Periodic medical examination at fortnightly intervals in the fifty or sixty factories was organized. Exhaust ventilation by fans so as to change the air in the doping-room twenty-five to thirty times an hour was insisted on and alternation of employment recommended. Conditions were ameliorated to such an extent that no outbreak affecting so large a number of workers in any factory occurred subsequently, but there were isolated cases and deaths, and many workers continued to be suspended at the medical examinations, because, in painting the large aeroplane wings, inhalation of the fumes could not be avoided. Pressure was brought to bear to find a substitute for tetrachlorethane, and in July of last year the War Office and Admiralty were able to announce that no dope containing tetrachlorethane was being made or used.

From first to last, at least seventy cases of jaundice from tetrachlorethane with twelve deaths came to our knowledge. No doubt, there were many more of which we did not hear, as notification of toxic jaundice was not then required. Dr. Spilsbury, I think, will tell you that he has found no difference in the liver changes found post mortem as the result of dope and T.N.T.

Concurrently with these cases in the year 1915, two or three cases of jaundice from T.N.T. came to our knowledge, and hence the Secretary of State added toxic jaundice occurring in a factory or workshop to the list of diseases to be notified to the Chief Inspector of

Factories at the Home Office, London. T.N.T. poisoning, mark you, is not notifiable unless associated with the symptom of jaundice. The reason for this is that no useful purpose would be served by knowledge of every case of illness attributable to T.N.T. Samples suffice for the purpose of notification, and toxic jaundice, and not T.N.T. poisoning, was specified, in order that as definite and clearly-marked a sign as possible should be given of the stage when notification was deemed necessary. I believe, and on this point, Mr. Chairman, I hope we may have definite expression of opinion from those who have clinical experience, that for every case of toxic jaundice there are at least thirty persons affected in minor degree necessitating absence from work.

Returning now to the pre-war conditions of occurrence of di-nitro-benzene poisoning, there were but two or three factories making nitro-derivatives of benzene, and about as many making use of them in the manufacture of explosives. The one factory where the manufacture was on the largest scale caused me more anxiety than any other in the kingdom. And why? Because it moved in a vicious circle. There was not sufficient other employment to allow of alternation of work on di-nitro-benzene with work not exposing to contact. The factory got a bad name, and no one would take employment there who could find it elsewhere. Hence casual labour—the worst possible where dangerous substances are in question, because the least resistant to its effects—had to be relied on. The workers fell ill and left, only to be replaced by others equally susceptible. Another factory attributed its immunity to the fact that nitro-derivatives formed only an infinitesimal portion of the manufacture, and the men were never kept long enough on it to suffer. No one has seen so much of the effects of di-nitro-benzene as Dr. Prosser White, of Wigan, who has examined the workers at the roburite factory at Wigan every fortnight for over twenty years. He has seen much illness, but never a typical case of jaundice. I remember, years ago, his saying to me, "These men know when they have had enough, and then they take a few days off." He showed me men who had worked thus for fifteen and twenty years. I remember the particularly dangerous factory having to close down altogether one hot summer, as they had not enough healthy men to carry on the work; and I remember another where, as a result of overtime, hot weather, and inadequate ventilation, twenty-eight cases of illness with two deaths occurred in the course of a few weeks, but with reduction of contact to four hours—the men being employed for the rest of the shift on other processes—the symptoms disappeared. In the T.N.T. factory at

Witten, in Germany, four-hour shifts were the rule. All this, then, amounts to the simple and self-evident proposition that to prevent poisoning you must reduce the dose.

Consider now what the war conditions imposed—maximum output, the greatest pressure, continuous employment, replacement of men by women's labour, and ignorance on the part of employed of the poisonous nature of T.N.T. What had been fields eighteen months ago, became factories, employing, perhaps, 25,000 persons in shell-filling alone. What has been the inevitable result? The table of cases of toxic jaundice which I have distributed shows the incidence as it has been reported month by month, a total of 181 cases, including fifty-two deaths, in the year 1916. Until May, the incidence is not striking. The factories were warming to their work. Then as work became intensified, and the weather became hotter, the number of cases continued to rise, reaching its maximum in October and showing a tendency to fall in the last two colder months. There ought, for completeness, to be columns showing the number employed in each factory and the extent of output, because this would modify the conclusion to which you might come, that where the number of cases is highest, the conditions are worst. But for obvious reasons these cannot be published. The last six factories are factories where the material is manufactured, and shows that in them the exposure is not such as to excite alarm. In the remaining factories shells, bombs, hand grenades are filled with either pure T.N.T. or a mixture of T.N.T. and ammonium nitrate containing 20, 40, and 60 per cent. of T.N.T. in either a molten or powder form.

The great fact brought out by study of the precise occupation of those who have contracted jaundice is, in the light of the work done on the subject by Dr. Benjamin Moore, that the skin is the main channel of absorption. So far as my industrial experience goes, when you are confronted with skin absorption you have a most difficult condition to meet. It is easy enough to suggest gloves, and gloves have been provided by the million. Any success in the reduction of industrial disease caused by lead as, for example, in white lead works from 399 cases in 1899 to eighteen last year, has been achieved mainly by the local application of exhaust ventilation to take away the dust and fumes at the point they are produced. This measure can be, and is being, applied in filling factories, but obviously it cannot do much to reduce the main danger from skin absorption. This is to be achieved by substituting mechanical means for hand filling and stemming, combined with clean methods of filling, preventing the contamination of the

CASES OF TOXIC JAUNDICE FROM T.N.T. INCLUDED IN RETURNS, JANUARY TO DECEMBER, 1916.
(The raised figures refer to deaths.)

No.	January		February		March		April		May		June		July		August		September		October		November		December		Totals		Grand total
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	
1	—	—	—	—	—	—	—	—	—	—	—	—	—	5^{2}	1	5^{1}	1	2	—	9^{2}	4^{3}	3^{1}	2	7	8^{3}	31^{6}	39^{9}
2	—	—	—	—	—	—	—	—	—	—	—	—	1	—	19^{3}	—	3^{5}	1^{1}	7^{2}	2^{1}	1^{1}	3^{1}	1	4^{1}	32^{11}	10^{4}	42^{15}
3	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1	—	—	2^{1}	—	2^{1}	—	1	—	1	2	6^{2}	8^{2}
4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1^{1}	1	—	1	—	1	1^{1}	3	4^{1}
5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	1	1
6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1	1
7	—	—	—	—	—	—	—	—	2	1^{1}	—	—	—	—	2	—	2	—	—	—	—	—	—	1	6	2^{1}	8^{1}
8	—	—	—	—	—	1^{1}	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1^{1}	1^{1}
9	—	—	—	—	2^{2}	—	—	—	—	—	—	1^{1}	1	—	—	—	1	—	—	—	—	—	—	—	4^{2}	1^{1}	5^{3}
10	—	—	—	—	—	—	—	—	—	2^{2}	—	7^{1}	1	2	—	1	1	—	—	8^{1}	—	1	—	—	2	21^{4}	23^{4}
11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4^{2}	—	2	—	4^{1}	—	—	—	—	—	10^{3}	10^{3}
12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1^{1}	—	1^{1}	1^{1}
13	—	1^{1}	—	—	—	—	—	2	—	—	—	—	—	—	—	1^{1}	—	—	—	1^{1}	—	2	—	—	—	7^{3}	7^{3}
14	—	—	—	—	1	—	1	—	—	—	—	—	—	—	1^{1}	—	1	—	1	—	—	—	1	—	6^{1}	—	6^{1}
15	—	—	—	—	—	—	—	—	—	—	—	—	2^{2}	1^{1}	—	—	—	1	1^{1}	1^{1}	—	2^{1}	—	1	3^{3}	5^{3}	8^{6}
16	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	1	—	—	—	1	—	1	—	—	1	4	5
17	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1^{1}	—	—	—	—	—	—	—	1^{1}	1^{1}
18	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1^{1}	—	—	—	—	—	1^{1}	1^{1}
19	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	—	3	3
20	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	2	—	2
21	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1	—	1
22	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1	—	1
23	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	1	1
24	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1	—	1
25	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1	1
Total		1^{1}	—	—	4^{2}	1^{1}	1	2	2	3^{3}	—	8^{2}	7^{2}	9^{3}	25^{4}	12^{4}	11^{5}	9^{3}	10^{4}	31^{9}	5^{4}	15^{3}	5	21^{2}	70^{21}	111^{31}	181^{52}

outside of the shells. These points, however, I leave to Dr. Moore and others to develop. T.N.T. shows itself a splendid antagonist in the resourcefulness of its attack and the variety of the symptoms produced, and will be overcome, not by one precaution alone, but by the combination of several, of which alternation of employment, frequent periodic medical examination, ventilation, and clean working are the chief.

Viscount CHETWYND.[1]

I feel some diffidence in discussing before a body of medical men, the incidence of poisoning to operatives in T.N.T., and can only do so from an administrative standpoint.

From this point of view it is obviously of the utmost importance to try to arrive at the cause, and if possible to eliminate that cause. In other words, from an administrative point of view, prevention is infinitely better than cure. Among certain people there appears to be a tendency to assume that the one idea which guides the management of filling factories is production; those who regard it in this light forget that where sickness occurs among operatives, production is bound to suffer. It is therefore in the interests of any factory that sickness among operatives should be kept down to a minimum, and if possible completely eliminated. At the present moment this is of even greater importance in view of the shortage of labour. I have therefore, from the beginning, carefully watched cause and effect, and am now able to put before you an interesting curve, the origin of which is based on an opinion I formed from the incidence of gastric poisoning and toxic jaundice in different departments of this factory, which led me to the conclusion that the dangerous forms of poisoning, such as these, were due not so much to the explosive when in the form of dust, as to the fumes arising from the material. In this connexion it must be noted that the dry powder gives off a fume, even at temperatures as low as 32° C.

The earlier work at this factory was carried on in an experimental plant, the buildings of which were of a flimsy nature, constructed of timber and breeze slabs, and each operation was carried on in a separate building, the connecting passages being roofless and open to the air. In erecting the plant no care was taken to prevent the distribution of dust, and the operatives (especially in the T.N.T. grinding mill), were

[1] Managing Director of a filling factory for the Ministry of Munitions of War.

smothered with it, their hair, eyebrows, moustache and skin being covered with dust while they were working. They, however, had easy access to fresh air, and were continually passing in and out.

The total number of men employed here rose to 242, divided into three shifts. The work was carried on for some nineteen or twenty weeks, and during the whole of that time there was not one single case of toxic jaundice, and only eight cases of gastric trouble, all of which were of a very mild nature, and only necessitated the operatives' absence from work for quite a short period.

When the melt process was started, it was similarly operated in a temporary building, in which, although the building was of relatively large cubic content, the circulation of air was very defective, and large quantities of fumes were given off by the molten T.N.T. Here gastric trouble and toxic jaundice soon showed themselves. The incidence rose to an average percentage of 9·3 per cent. of the men and women employed, the larger number of gastric cases being among the women. Fans were introduced at various points in the walls of the building, and the atmosphere materially improved, whereupon the cases dropped to a maximum of 5·8 per cent. It was noticed, however, that after a gale of wind the cases were fewer and milder, and on a recurrence of this being observed, I decided to have a curve drawn showing the barometric readings and the corresponding cases of sickness (p. 8). A copy of this curve I beg to demonstrate.

Incidentally I must mention that I had been much impressed with the considerably larger number of gastric cases among women than among men. This led me to make inquiries as to the food the women were in the habit of taking, and I found that whereas the men would have a substantial meal, the women would satisfy themselves with a bun or two and a cup of tea. I therefore decided that it was to the interests of the factory that the women should be properly fed, and that it was obviously impossible to force them to buy suitable food. The only thing to do was to make some deduction from their pay and feed them, and this was put into effect. Although the deduction made from their pay does not cover half the expense of feeding them, yet the extraordinary improvement in their health makes it a satisfactory financial transaction for the factory, as the percentage of gastric cases among the women since they have been fed, has dropped from 11·6 per cent. for the week ending September 2, to the neighbourhood of from 1 to 2 per cent., falling as low as 0·7 per cent. for the week ending January 13.

The deduction which I draw from the relationship between the number of cases and the state of the barometer, where the cases decrease with a low barometer and rise with a high one, is that the trouble is chiefly due to fumes. On experiments being made in the laboratory the fume appeared to be a nitrous oxide compound, and is therefore obviously of a heavy nature. Taking the specific gravity of the air with a barometric reading of 30 as 1, and the fume as probably nitrous anhydride (N_2O_3), the specific gravity of the latter is 2·630. Owing to the reduced specific gravity of the air with the barometer at 28, it is obvious that the fume will tend to fall to a lower stratum,

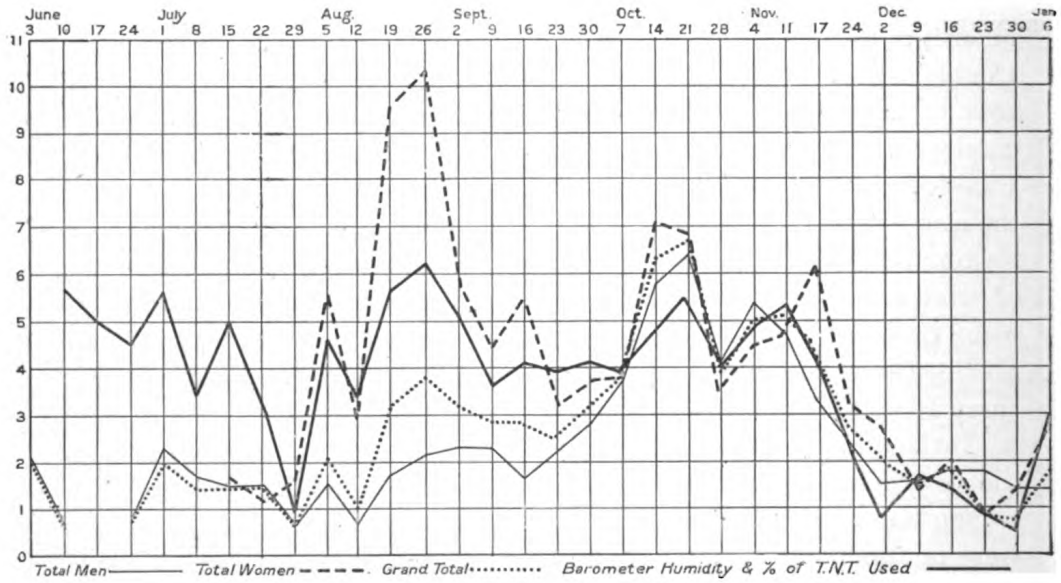

Chart showing curves of barometric readings and corresponding cases of sickness.

that is, nearer to the floor, more readily with a low barometer than it will with a high barometer.

It must be borne in mind that in the more complete and modern parts of the factory, the temperature and the humidity are both kept constant. By the system of ventilation which we have introduced, it is quite easy to maintain the hygroscopic atmosphere which is required, and we find no difficulty in keeping a difference of 7° F. between the dry and wet bulb thermometers. We also find no difficulty in reducing the atmospheric content of moisture of 90 per cent. outside to 67 per cent. inside. Inside the buildings our dry bulb thermometer constantly

reads 11° and 12° higher than the wet bulb, so that the question of temperature of the atmosphere and humidity need not be considered, as in the buildings it is corrected to a constant value.

I am therefore firmly of the opinion that the great danger of poisoning by T.N.T. is not connected with the dust (although this is undoubtedly irritating and must be suppressed), but that it is caused by a fume, possibly, as I suggest, nitrous anhydride or a compound thereof, and that to eliminate this fume and mitigate its effects, a ventilating scheme must be installed which provides a constant current of air, pure and fresh, flowing from the ceiling to the floor, extraction necessarily being effected from the floor level. This system is at present in course of installation at this factory.

With regard to the question of dermatitis, we have had some interesting experience in this factory, and although it has in the past materially affected the output of the factory, yet only in a very limited number of cases do the patients appear to suffer in general health. The rash readily subsides and heals when properly treated, and there appears to be no evil after-effect. It is, in our opinion, due to skin irritation brought about by the T.N.T. In the experimental plant above referred to, where the powder was 80 per cent. ammonium nitrate and 20 per cent. T.N.T., pure T.N.T. was invariably in use, and as stated above, although the men working in the T.N.T. grinding mill were thickly powdered all over with fine T.N.T. dust, yet we never had a case of toxic jaundice, and only very mild cases of gastric catarrh, although there was a very limited number of cases of dermatitis of a mild form. But in the melt, where crude T.N.T. was used, and where the percentage in the dust was 60 per cent. of T.N.T. and 40 per cent. of A.N. there was, during the early period, a very large number of extremely serious cases of dermatitis of the feet and ankles. In some cases the whole of the skin of the foot eventually peeled off after large blisters had formed. I attributed these cases to the process which was being carried on. The shells were filled right up to the fuse hole, and the exploder cavity was drilled by machinery. This led to enormous quantities of amatol dust being scattered about the floor and over the shell, and without doubt caused the bad cases of dermatitis of the feet referred to. As soon as this became evident I had this process stopped, and dermatitis at once decreased to a negligible quantity and was of a milder form.

It must be pointed out that we have been unable to trace any connexion between dermatitis and gastric or toxic effects. In only

a very rare number of cases have the patients suffered from both. I should also like to point out that in the new system of ventilation, light dust, which might float about in the atmosphere, will be immediately carried to the floor and extracted.

For several weeks the total percentage of cases in the dry powder process has been under 3 per cent., and these are very largely gastric cases. A great many of these again must, undoubtedly, be attributed to other causes than T.N.T. as we have evidence of considerable carelessness in diagnosis by ordinary practitioners. We have had a certificate sent in, in respect of a man suffering from hernia, that the hernia was due to T.N.T. poisoning. We also have another case where a woman with a crushed toe was stated to be suffering from T.N.T. poisoning, and I am convinced that a large number of so-called T.N.T. gastric cases have been nothing more nor less than an epidemic of gastric influenza. Again, such cases of gastric catarrh as are shown to be definitely due to T.N.T. must be subdivided into those which are simply cases of irritation of the mucous membrane, and those due to toxic poisoning; the former we find can be readily cured in a comparatively short time, whilst the latter are, of course, more obstinate.

Captain MATTHEW J. STEWART, R.A.M.C.

The aspects of the subject with which I propose to deal are (1) the morphological changes in the blood occurring in a series of fourteen clinical cases of tri-nitro-toluene poisoning, and (2) certain points in the morbid anatomy of the disease as observed in a series of seven fatal cases.

(1) CHANGES IN THE BLOOD.[1]

The fourteen cases here recorded are those of munition workers who were admitted to the Leeds General Infirmary during the months August to December, 1916, and I am indebted to the Honorary Physicians of that institution for the fullest facilities for examining them. Two other cases, both of which were rapidly fatal, were not fully investigated as to their blood condition, and are not included except in the final tables (Tables II and III, pp. 28-31). Most of the cases have been under observation for weeks or months, and as many of them are still coming

[1] Case numbers in Section I refer to Tables I and II.

up for examination, these results must be regarded as partial and preliminary. Sufficient has already been made out, however, to show that very profound changes in the composition of the blood may occur as a result of tri-nitro-toluene poisoning; indeed it might be said that such changes are the rule in cases where pronounced clinical symptoms, and especially jaundice, have manifested themselves. One case only out of the fourteen examined (No. 11), a man who, clinically, was never seriously ill, showed no blood changes; all the others had definite deviations from the normal of some sort or another.

It may be added that, although the cases presented a very varied clinical picture, some degree of jaundice was present in every instance.

(*A*) *Changes in the Leucocytes.*—Differential counts of from 400 to 600 leucocytes were made on each occasion of examining the blood, and from the total leucocyte count the absolute number of each leucocyte per cubic millimetre was worked out. An arbitrary normal standard was arrived at in the following way: Normal total leucocyte count was taken as 6,000 to 9,000; normal neutrophil percentage was taken as 60 to 75 per cent.; normal lymphocyte percentage was taken as 20 to 30 per cent.; normal eosinophil percentage was taken as 0·5 to 4 per cent. The following fairly elastic figures were therefore regarded as the limits of the normal, viz.: Neutrophils, 3,600 to 6,750 per cubic millimetre; lymphocytes, 1,200 to 2,700 per cubic millimetre; eosinophils, 30 to 360 per cubic millimetre. The leucocytic changes as calculated on this basis may be tabulated thus (*see* Table I): (*a*) Neutrophil leucopenia; (*b*) neutrophil leucocytosis; (*c*) lymphocytosis; (*d*) eosinophilia.

(*a*) *Neutrophil Leucopenia* (Charts II, III, VI, VII, VIII, and IX).—This, the most striking of the leucocytic changes, was present at some stage of the disease in nine out of fourteen cases (Nos. 1, 2, 4, 8, 9, 10, 12, 13, 14). In four of these (Nos. 1, 2, 10, and 12), two of them fatal, the leucopenia was extreme, under 1,100 per cubic millimetre; of the other five affected the highest neutrophil count was 3,175. In the two fatal cases (Nos. 1 and 2), the leucopenia was progressive and terminal, the final counts being 120 and 636 respectively (Charts I, II, and III). One case (No. 10) illustrates very well the polymorphonuclear recovery which accompanied clinical improvement in the condition of the patient. While the patient was seriously ill the neutrophils numbered only 1,080 and 1,092. A fortnight after her discharge from hospital they were 6,280 (Chart IX). In three cases (Nos. 2, 8, and 10) one of them fatal (No. 2), neutrophil leucopenia was associated with an anæmia of pernicious type (*vide infra*) (Charts I and V). A

progressive failure of the leucoblastic function of the bone marrow is therefore to be regarded as one of the most common manifestations of severe tri-nitro-toluene poisoning, but that it is not a constant feature is shown by the occurrence of cases such as that of H. R. (No. 3), details of which are given below. Whether this neutrophilic failure is due to a direct action of the poison on the leucoblastic tissue one cannot say with certainty, inasmuch as all the cases in which it occurred presented clinical evidence of an antecedent or accompanying hepatic lesion (jaundice, &c.), while both the fatal cases showed a typical advanced tri-nitro-toluene cirrhosis of the liver post mortem.

TABLE I.—SUMMARY OF BLOOD CHANGES IN FOURTEEN CASES OF TRI-NITRO-TOLUENE POISONING.

Clinical No.	Name	Age	Lymphocytosis	Polymorphonuclear		Anæmia of pernicious type	Eosinophilia
				Leucocytosis	Leucopenia		
1	L. F.	30	−	+sl.	++	−	−
2	E. B. B.	35	+	−	++	+	−
3	H. R.[1]	52	−	++	−	−	+1
4	S. T.	24	+	−	+	−	−
5	A. B.	28	+	−	−	−	+2
6	N. W.	20	+	−	−	−	−
7	E. J.	40	++	−	−	−	−
8	H. T.	19	++	−	+	+	−
9	A. T.	22	+	+sl.	+	−	−
10	M. D.	49	+	−	++	+sl.	−
11	D. T.[1]	31	−	−	−	−	−
12	M. G.	34	−	−	++	−	−
13	M. J.	18	+	+sl.	+	−	+1
14	R. N.	17	−	−	+ sl.	−	−
	[1] Males		+ = above 3,000 ++ = above 4,100	+sl. = over 6,800 ++ = over 19,000	+ = under 3,200 ++ = under 1,100	+ = Erythrocytes under 1,600,000 +sl. = under 3,000,000	+1 = over 1,000 +2 = over 400
			Upper limit of normal = 2,700	Normal limits = 3,600-6,750		In each case colour index above 1	Upper limit of normal = 360

(*b*) *Neutrophil Leucocytosis* (Chart IV).—This change was present in a notable degree in one (fatal) case only (No. 3). Here, at the first examination, the total leucocyte count was 14,200, of which 10,000, or 70·5 per cent. were polymorphonuclears, while a month later, on the day before the patient's death, these figures were 22,000 and 19,200 (87·25 per cent.) respectively. This change was unassociated with any variation

in the lymphocytes, or in the red cells or hæmoglobin, but at the first count there was an eosinophilia of 1,000 per cubic millimetre. Post-mortem examination showed the bone marrow in the shaft of the femur to be largely fatty, with a narrow peripheral zone of red. Microscopically there were found small foci of very active leucoblastic proliferation. The inspection, however, failed to reveal any inflammatory cause for the persistent leucocytosis, which stands out in striking contrast to

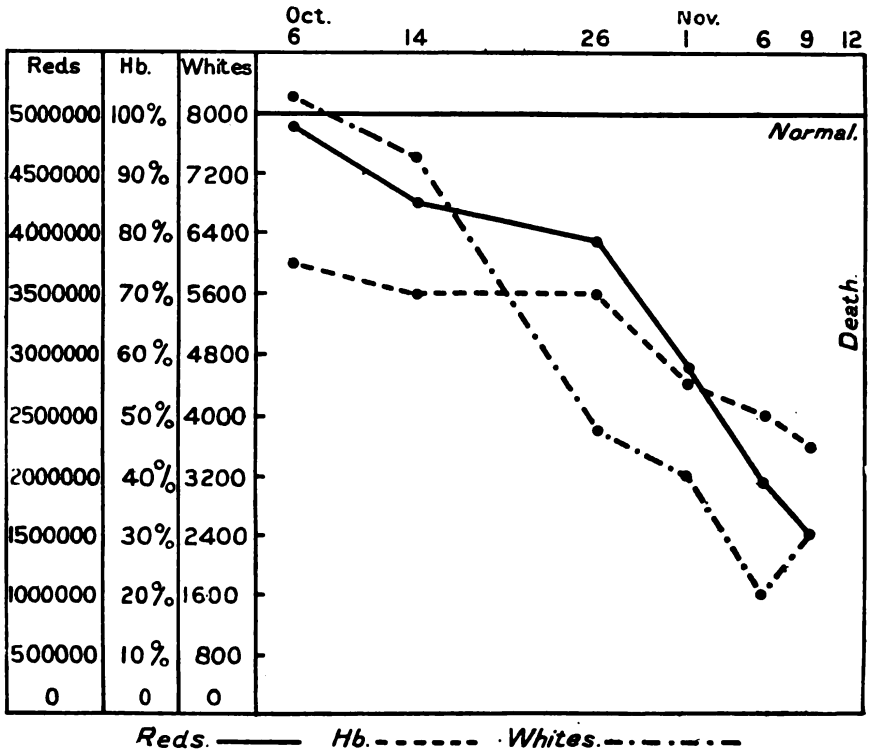

CHART I.

Case 2.—E. B. B., aged 35. To show progressive failure of red cells and leucocytes, with development of a high colour index.

the other fatal and clinically serious cases, in which the blood was examined. It should be mentioned, however, that in another fatal case, which was not investigated during life, the bone marrow showed evidence of great leucoblastic, as well as erythroblastic, activity. Here the whole duration of illness was only one month, yet the liver changes were extreme, and it seems reasonable to suppose that there had not been time

for the development of the full toxic action on the marrow. In three other cases (Nos. 1, 9, and 13) an early and slight neutrophilia was present, but was speedily followed in each instance by a pronounced leucopenia.

(*c*) *Lymphocytosis* (Charts II, VI, VIII, and IX).—This was one of the most commonly observed changes; it occurred at some time or other in nine out of fourteen cases (Nos. 2, 4, 5, 6, 7, 8, 9, 10, and 13), and varied in different patients from 3,150 to 5,100 per cubic millimetre.

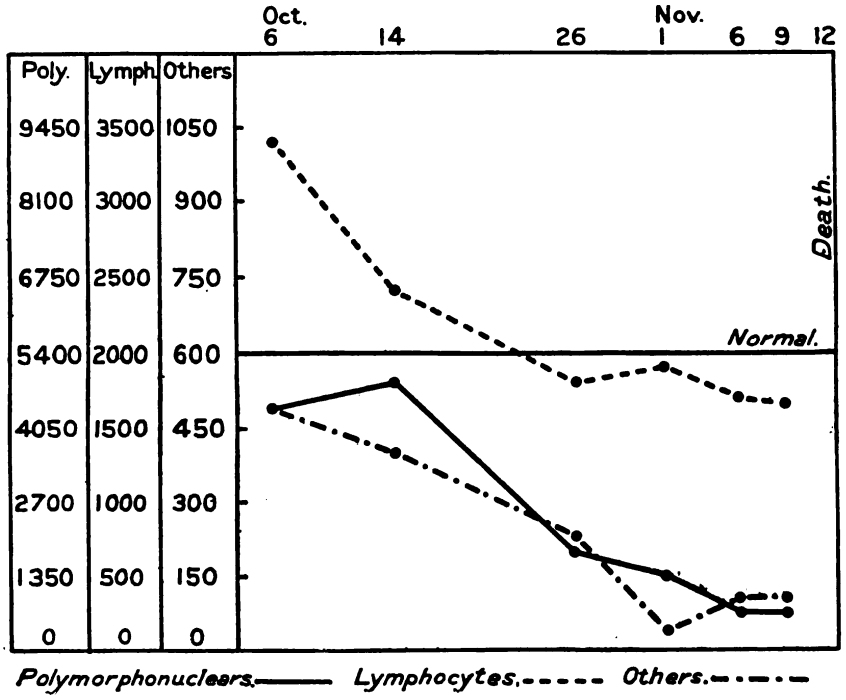

CHART II.

Case 2.—E. B. B., aged 35. To show a progressive neutrophil leucopenia, with a lymphocytosis falling to normal. (From same case as Chart I.)

Considerable variations were often seen from time to time in the same patient, but the fluctuations were irregular and did not appear to have much, if any, significance. In the remaining five cases the lymphocytes ranged within normal limits, except that in two cases (Nos. 8 and 10) there was a single temporary drop to 1,040 and 1,160 respectively. The chief point to be observed is that, even in fatal cases, and in those showing profound polymorphonuclear or erythrocytic failure, the lymphocytes

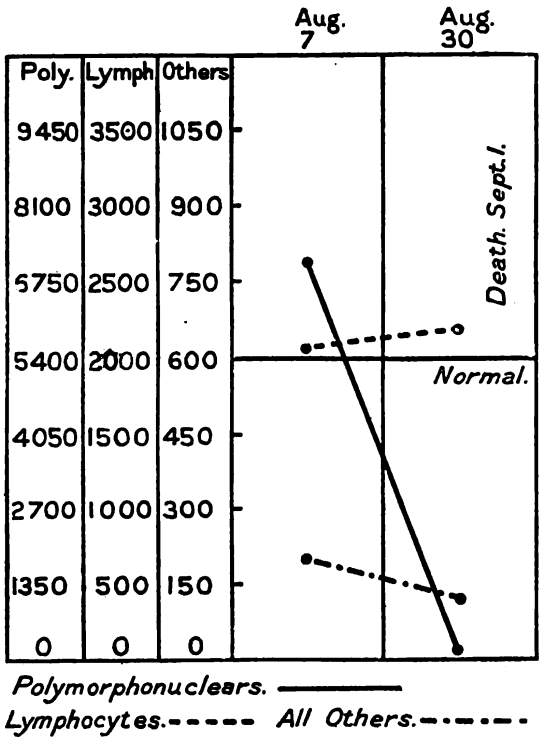

CHART III.

Case 1.—L. F., aged 30. Extreme neutrophil leucopenia with lymphocytes remaining at normal.

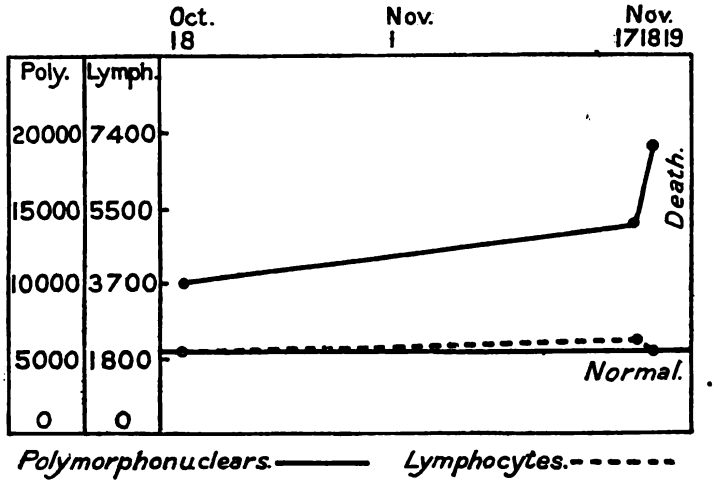

CHART IV.

Case 3.—H. R., aged 52. Marked neutrophil leucocytosis, lymphocytes remaining normal.

were maintained at or above the normal level. In two cases a lymphocytosis was the only change noted.

(*d*) *Eosinophilia.*—This was observed in three cases (Nos. 3, 5, and 13), and in two of these it was well marked, once (No. 3) accompanying a marked neutrophil leucocytosis, once (No. 13) with a slight neutrophilia. It appears to be of doubtful significance, but it may be noted

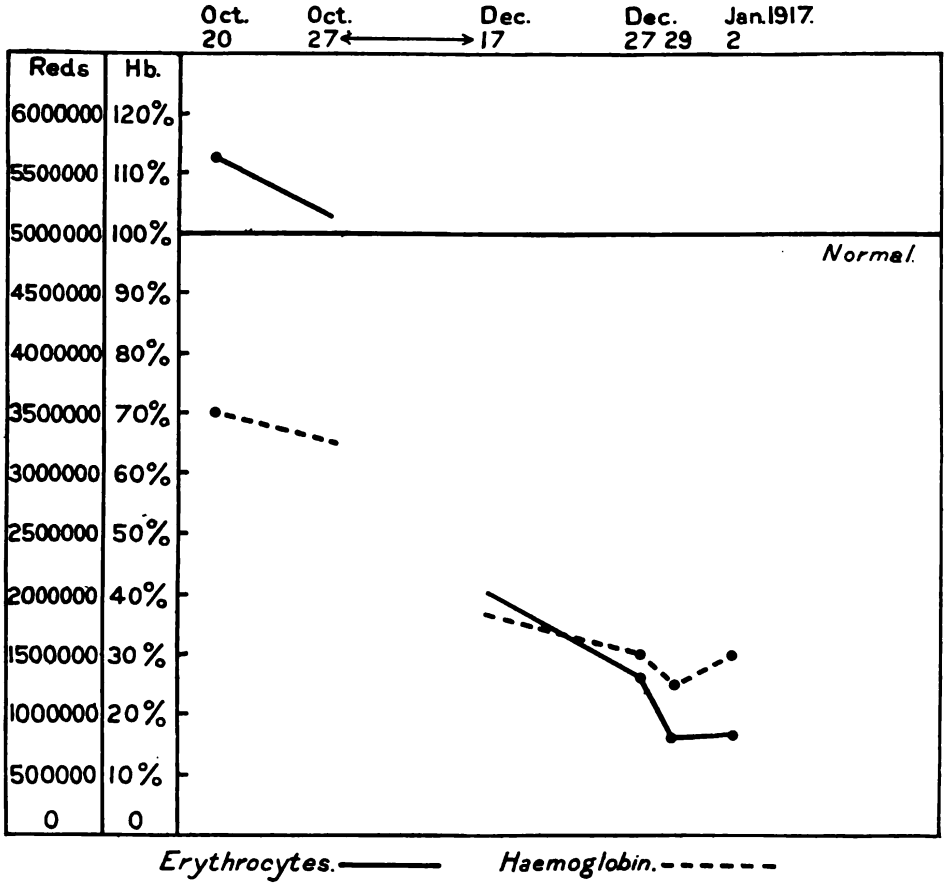

CHART V.

Case 8.—H. T., aged 19. Showing development of anæmia of "pernicious" type.

that in no case did an excess of eosinophils coexist with a neutrophil leucopenia. Altogether the number of eosinophils was found to be a very variable quantity in these cases.

(*B*) *Changes in the Erythrocytes and Hæmoglobin* (Charts I and V). —These have been much less conspicuous than the leucocytic changes.

A serious degree of anæmia was observed in three cases only (Nos. 2, 8, and 10); all the others, including two of the fatal cases, had red cell counts of over 4,000,000, but a slight grade of chlorotic anæmia was present in several. In the three seriously affected cases the anæmia was of the "pernicious" type, with colour index over one, but very varying degrees of severity were presented.

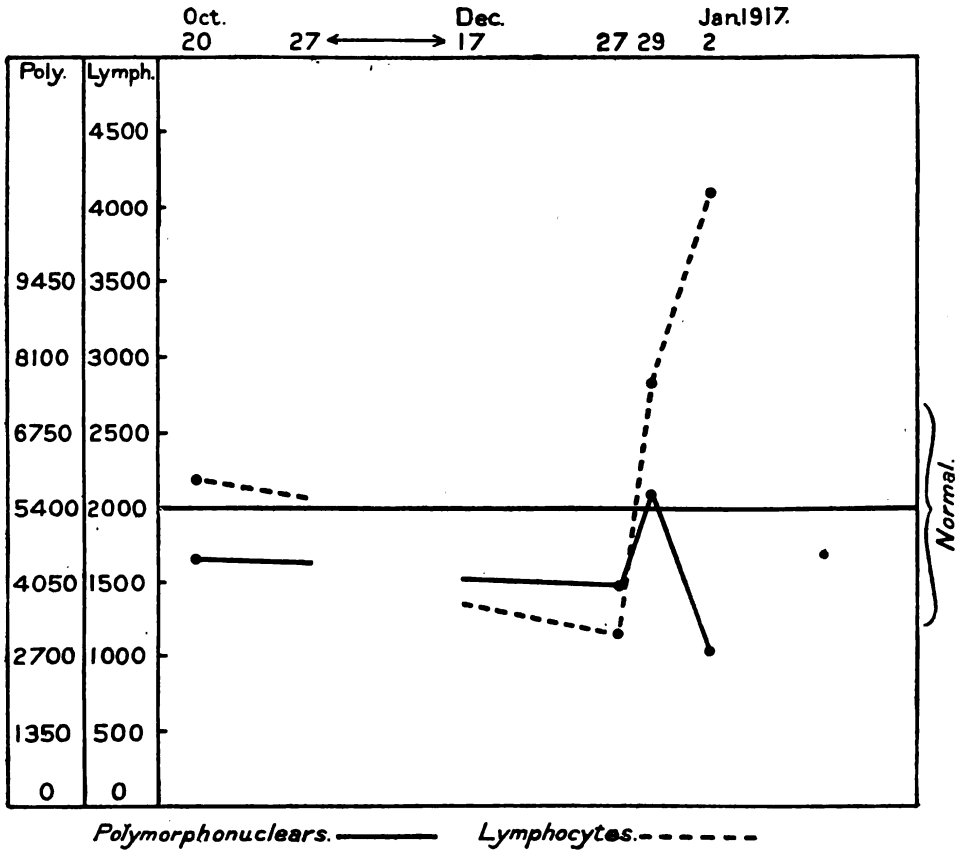

CHART VI.

Case 8.—H. T., aged 19. Neutrophil leucopenia with lymphocytosis. (From same case as Chart V.)

The most extreme degree of anæmia occurred in the case of H. T. (No. 8, Chart V), a girl aged 19, who is still under observation. Here the result of the first count, on October 20, was as follows: Erythrocytes, 5,640,000; hæmoglobin, 70 per cent.; colour index, 0·65; neutrophils, 4,427; lymphocytes, 2,220. Stained films showed no abnormal

features. When she was readmitted to hospital on December 27 the following marked alterations were found to have occurred: Erythrocytes, 1,320,000; hæmoglobin, 30 per cent.; colour index, 1·1; neutrophils, 4,050; lymphocytes, 1,160. Stained films showed very marked anisocytosis, with many megalocytes. Poikilocytosis was present to a considerable but much less extent. There was definite and considerable polychromatophilia, but no basophil punctation. Two nucleated

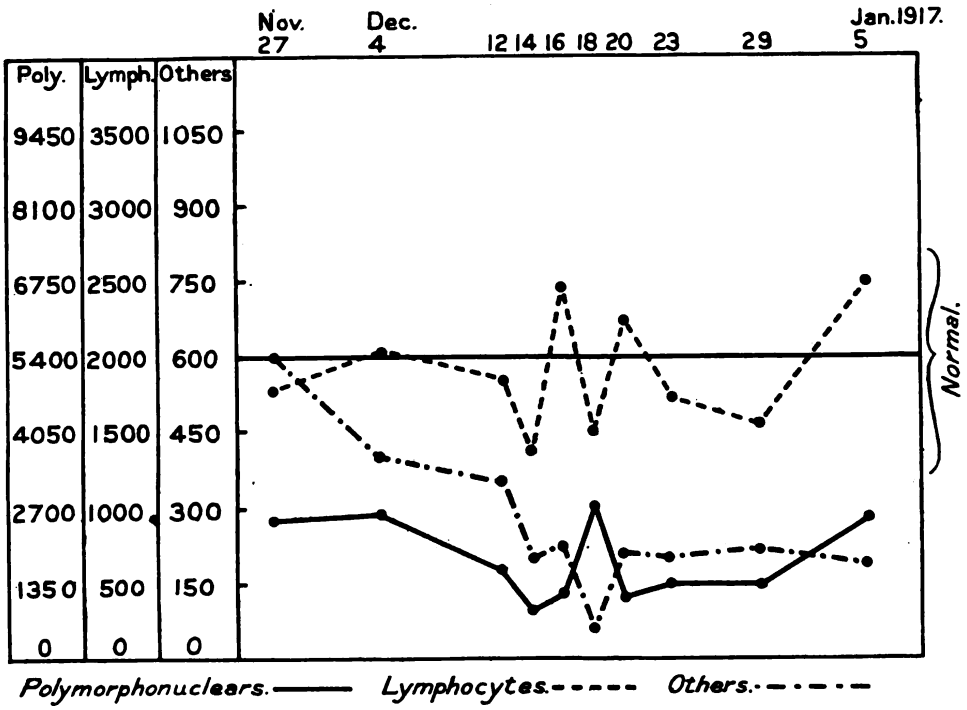

CHART VII.

Case 12.—M. G., aged 34. **Continued neutrophil leucopenia, with lymphocytes remaining about normal.**

reds were seen in the course of counting 500 leucocytes, one a megaloblast with a large reticulated nucleus and intensely polychromatophilic cytoplasm, the other a normoblast with a small, dark, bilobed nucleus, and also showing polychromatophilia. Two days later (December 29) the erythrocytic failure was even more pronounced: Erythrocytes, 810,000; hæmoglobin, 25 per cent.; colour index, 1·5; neutrophils, 5,660; lymphocytes, 2,840. Very pronounced variation in size and

slight variation in shape of the red cells were present, with numerous megalocytes. There were slight polychromatophilia and much variation in staining power. Punctate basophilia was absent. Four normoblasts were seen in counting 400 leucocytes. Four days later (January 2, 1917), definite leucocytic changes (neutrophil leucopenia and lymphocytosis) were also present, and the colour index had risen even higher: Erythrocytes, 840,000; hæmoglobin, 30 per cent.; colour index, 1·8; neutrophils, 2,800; lymphocytes, 4,116. Stained films now showed very great anisocytosis and marked poikilocytosis with slight polychro-

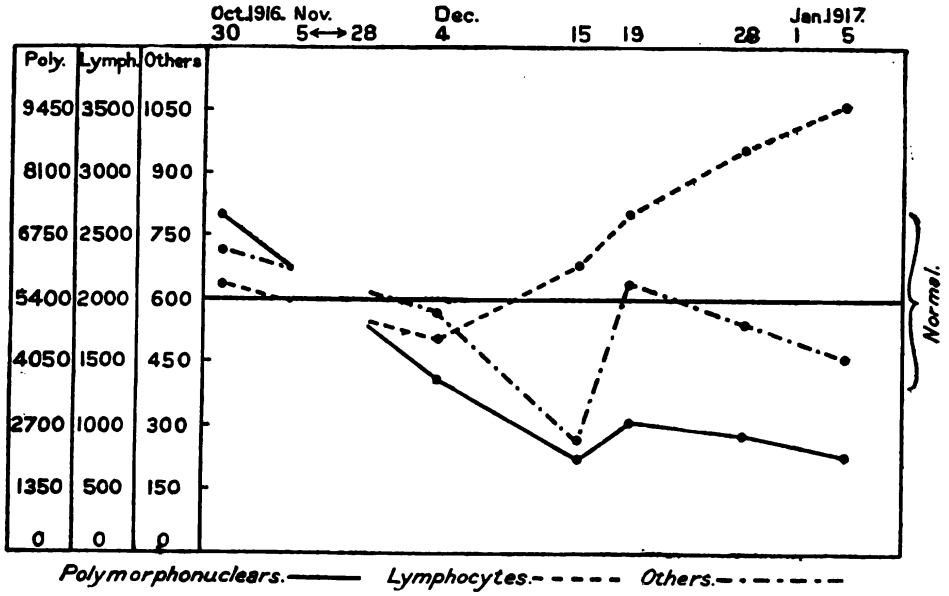

CHART VIII.

Case 9.—A. T., aged 22. Neutrophil leucopenia with lymphocytosis.

matophilia. Megalocytes were present in large numbers, and 58 nucleated red cells, mainly megaloblasts, were seen in counting 600 leucocytes. Again punctate basophilia was absent.

It is to be noted that, when admitted on the second occasion, this patient was suffering from severe uterine hæmorrhage which had been going on for seven days. Possibly this contributed in some degree to the production of the anæmia, but it seems more reasonable to regard it as a result rather than as a cause of the blood condition.

A very severe anæmia occurred also in the case of E. B. B. (No. 2, Chart I), who died of toxic jaundice after an illness of about eight weeks' duration. The first blood count, taken five weeks before death, was normal to all intents and purposes. The succeeding five counts showed a progressive and ultimately rapid decline in the erythrocytes, which fell to 1,500,000 three days before death. The fall in the hæmoglobin content was much less, so that a colour index originally 0·75 became ultimately one of 1·4. These erythrocytic changes were associated, as

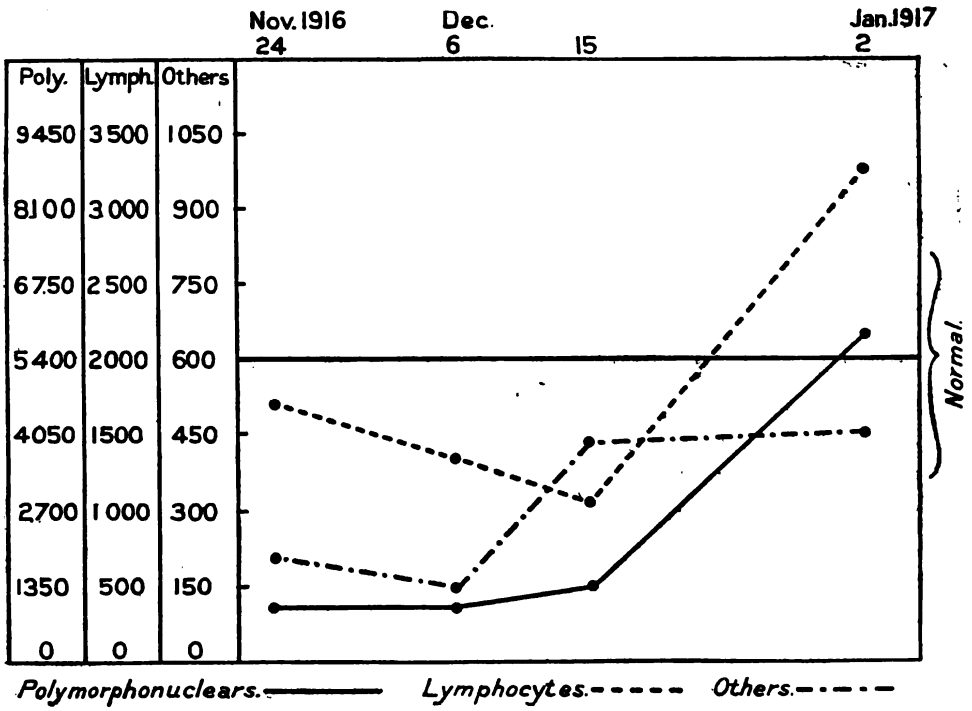

CHART IX.

Case 10.—M. D., aged 49. Neutrophil leucopenia, with recovery to normal accompanied by lymphocytosis.

in the previous case, with a profound drop in the neutrophil count (to 636 per cubic millimetre). The accompanying morphological changes in the red cells were remarkably slight. Towards the end there was increasing variation in size, but with only a slight degree of poikilocytosis. There was considerable polychromatophilia, but no basophil punctation, while erythroblasts were absent.

The remaining anæmic case (No. 10) was much slighter than either

of these two, the reds only falling to 2,960,000. Even here, however, there was a plus colour index (1·1). The red cells showed only slight variation in size and shape, but there was a preponderance of megalocytes. Polychromatophilia and punctate basophilia were absent. The drop in red cells was again accompanied by a very distinct neutrophil leucopenia (to 1,092) and the recovery in red cells which took place after one or two weeks of treatment was followed, about a fortnight later, by an even more striking rise in the neutrophil count (Chart IX).

All these cases, but especially the two last, differ from true idiopathetic anæmia in certain important particulars. Poikilocytosis and polychromatophilia were never more than slight, save only during the worst phase in Case 8, while punctate basophilia was never observed at any period. In Case 2, which was fatal, the liver failed to give the Prussian blue reaction. In the cavity of the femur red bone marrow was present in large amount, extending for 5 in. down the shaft, but microscopically this was found to be due rather to increased vascularity than to any special erythroblastic reaction.

One of the points to which I wish specially to draw attention is the fact that in not a single instance was punctate basophilia discovered. This constitutes a striking contrast to the findings of Malden in a series of di-nitro-benzene workers, where granular degeneration of the red cells occurred with great frequency (in sixteen out of twenty-one cases), and at an early stage. The same phenomenon was noticed in six out of thirteen aniline workers, and the conclusion was arrived at that this is the earliest detectable blood sign in di-nitro-benzene as in aniline poisoning.

Summary and Conclusions.

(1) In the early stages of the disease, blood changes are extremely slight, but pronounced deviations from the normal occur later on.

(2) A polymorphonuclear leucopenia, often of extreme degree, with no corresponding failure of the lymphoblastic function, was observed in nine out of fourteen cases.

(3) An anæmia of "pernicious" type, but lacking certain notable characteristics of idiopathic anæmia, especially poikilocytosis and punctate basophilia, occurred in three cases.

(4) The tentative conclusion arrived at is that the occurrence of either of these changes in any marked degree in a case of tri-nitro-toluene poisoning is to be regarded as a serious prognostic indication,

but this is a point upon which further observation should throw much light.

(5) An absolute but variable lymphocytosis was found in nine cases. It did not appear to bear any relationship to either of the foregoing conditions.

(6) A pronounced and progressive neutrophil leucocytosis occurred in one fatal case.

(7) Qualitative changes in the red cells were present in a marked degree in one case only, and punctate basophilia was never observed.

(2) Certain Points in the Morbid Anatomy.[1]

The following observations are based on the pathological findings in seven fatal cases of tri-nitro-toluene poisoning (Table III).

Liver.—The changes in the liver are remarkably constant, and constitute the most striking feature in the morbid anatomy of the disease. They are essentially of three kinds—degenerative, cirrhotic, and regenerative—and different cases vary in the extent to which each is present, as well as in the way in which they are distributed throughout the organ. The lesion would appear to lie somewhere between a subacute yellow atrophy and an ordinary multilobular cirrhosis of irregular distribution. The degenerative and other processes, once set going, are progressive, even when the patient has been removed from the influence of the poison, and in a certain proportion of cases a fatal termination ensues in from four to twelve weeks after the first symptoms. Certain portions of liver tissue escape complete destruction, and these usually show evidence of more or less regenerative hyperplasia. It may be assumed that in some cases this persistent and regenerated hepatic tissue will be sufficient to maintain the life of the individual for a considerably longer period than three months, but what the ultimate fate of such persons will be time alone can show. The after-history of surviving cases of T.N.T. poisoning will require to be carefully investigated, not only on account of their great intrinsic interest, but also for the light which they may throw on cirrhosis of the liver in general.

Certain special points may be referred to in more detail. The portions of liver in which the degenerative and cirrhotic processes are most advanced are dark red, firm, and contracted, and close inspection of the cut surface shows a very fine, miniature hepatic lobulation, either

[1] Case numbers in Section (2) refer to Table III, pp. 30, 31.

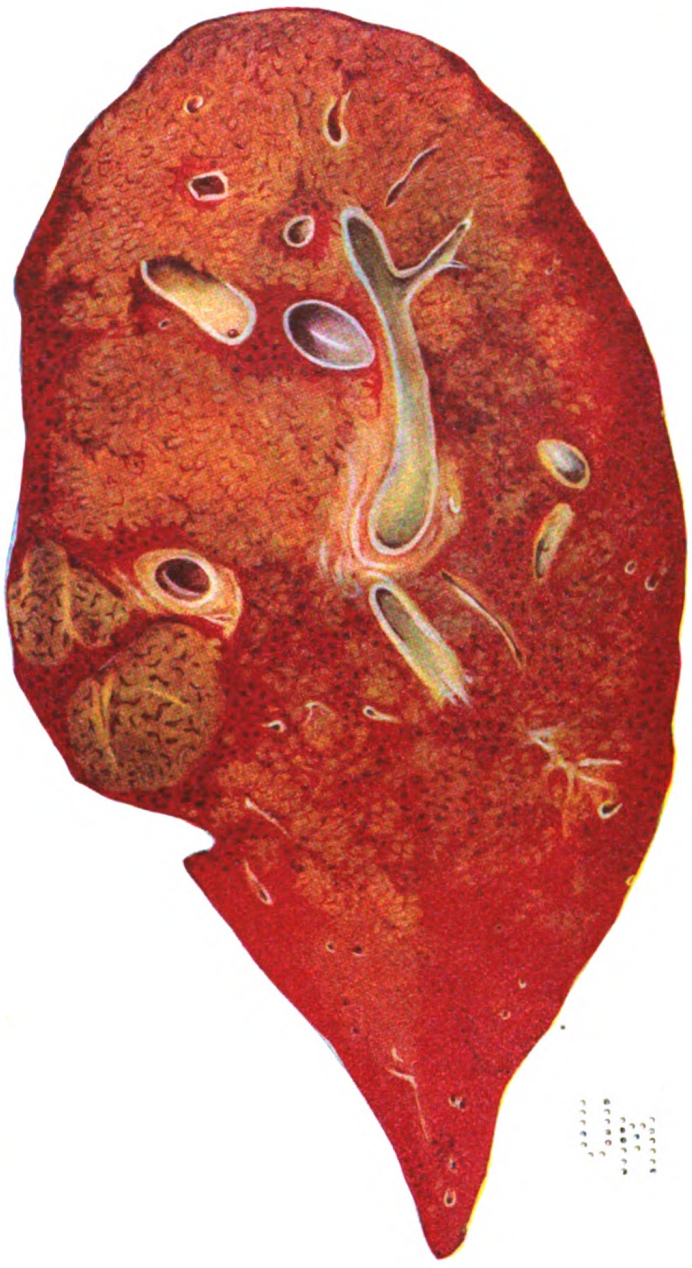

Plate 1.—Liver from a case of toxic jaundice due to tri-nitro-toluene poisoning (Case 4). Antero posterior section through right lobe, showing the typical appearance in the fresh state. The contrast between the red areas of extreme liver destruction and the yellow areas of persistent or regenerated hepatic tissue is well shown. The degenerative-cirrhotic process is most advanced in the anterior marginal region. (Drawing by Miss Ethel Wright.)

a fine deep red mottling with narrow intersecting lines of white, or tiny white dots on a dark red ground. Occasionally, however, the cut surface appears quite homogeneous to the naked eye. The areas of persistent or regenerating liver tissue are soft, yellow or greenish-yellow in colour, and tend to project, both as nodules on the surface of the organ, and from the cut surface. They show, moreover, a more normal hepatic lobulation, with the centres of the lobules a dark yellowish-brown colour, the peripheral and broader portions a pale yellow or greenish-yellow. The distribution of red and yellow tissue throughout the liver varies in different cases, but the degenerative cirrhotic process is always more advanced in the left lobe and in the inferior marginal region of the right. In most of the cases in this series these two portions of the organ were composed almost entirely of red tissue. The yellow tissue is mainly distributed in the form of large masses throughout the right lobe, with smaller intervening bands of red, and very frequently a narrow layer of red over most of the surface. Elsewhere there may be considerable intermingling of red and yellow tissue. Large rounded projecting nodules of yellow tissue are conspicuously present on the under surface of the right lobe, less often on the Spigelian and quadrate lobes, and especially a large nodule on each side of the gall-bladder.

Histologically, the yellow portions of liver show the degenerative and cirrhotic processes in their earlier stages. The degenerative changes in the hepatic cells are seen to be occurring almost exclusively in the central portions of the lobules, while regenerative changes are most striking in the intermediate and peripheral zones. A certain amount of fatty change may however be present in these latter situations also. Bile retention is practically confined to the inner third of the lobule, where it is sometimes present in a very notable degree, both within the liver cells and in the intercellular canaliculi. Cirrhotic changes are taking place both along the portal tracks and, accompanying the liver cell disintegration, in the centres of the lobules. The process varies somewhat in the two situations. In the portal tracts there is notable fibroblastic proliferation, with considerable leucocytic infiltration (chiefly lymphocytes and plasma cells), whereas in the centres of the lobules there is only a scanty fibrous reticulum, with numerous wide congested capillaries and few cells. The portal tracts are further characterized by an abundance of newly formed bile ducts. A number of small, irregularly shaped cells containing brownish pigment, and frequently also fat, are present in varying numbers in the midst of

the cirrhotic tissue, chiefly in the central areas. These are either much degenerated liver cells, or phagocytes which have taken up the pigment and fat liberated by the liver-cell disintegration.

Strands of fibrous tissue are often seen running between adjacent portal tracts, and sometimes also between these and the centres of the lobules. The amount of fatty change present varies considerably, but is never extreme. In formalin-fixed material, with Nile blue sulphate A, the fat is stained varying shades from deep blue to violet. In one case only, a number of doubly refracting acicular crystals were present, chiefly in the central zones of the lobules and in the associated cirrhotic tissue. The crystals, which appeared to be intercellular, melted only at a high temperature (between 90° and 130° C.), and on cooling they formed anisotropic globules (acicular cholesterin).

The red, completely cirrhotic portions of the liver show no recognizable hepatic tissue. They are formed simply of a mixture of the two types of cirrhotic tissue already described: (*a*) the portal tracts, with abundant fibroblasts and leucocytes, and numerous new-formed bile-ducts; and (*b*) the areas corresponding to the sclerotic centres of the lobules, consisting of a fine reticulum containing numerous dilated capillaries, with few leucocytes and no bile-ducts. Many small irregular cells filled with pigment, as already described, are present in both, but chiefly in the non-portal areas. The distinction between the two types of cirrhotic tissue is always very sharply drawn, owing to the highly vascular character of the non-portal areas, and to the fact that bile-ducts are present only in the portal tracts. It may be noted also, that while a certain amount of elastic tissue is present in the central parts of the portal areas there is none whatever in the rest of the cirrhotic tissue.

On the question of the sequence of events in the liver I am not prepared to express a definite opinion at present. The old problem again arises as to whether the parenchymal degeneration or the interstitial proliferation takes place first, of whether destruction of the hepatic cells leads to a replacement fibrosis, or a progressive fibroblastic proliferation leads to a strangling of the noble cells. One definite negative conclusion may, I think, be drawn from the cases under review—namely, that the liver changes are not secondary to blood destruction. In two fatal cases, the red cells were normal up to the time of death, and in one of these there was a leucocytosis, in the other a leucopenia. In the earlier stages, moreover, while clinical symptoms referable to the liver were still clearly present, nothing abnormal was found in the blood in five

Plate II.—Liver from a case of toxic jaundice due to tri-nitro-toluene poisoning (Case 2). Antero-posterior section through right lobe, showing the appearance of the organ after preservation by the Kaiserling process. The degenerative-cirrhotic changes are again most advanced in the anterior marginal region, while the areas of more normal liver tissue show great retention of bile, especially in the centres of the lobules. (Drawing by Miss Ethel Wright.)

cases examined. Hæmosiderin did not occur, except in one case where hæmochromatosis coexisted (*vide infra*, p. 26). Special attention is drawn to two notable points in connexion with the changes in the liver, namely (1), the fact that disintegration of the hepatic cells is taking place chiefly, if not entirely, in and from the centres of the lobules, and (2) that the degenerative cirrhotic process is most extreme in the left lobe and anterior marginal region of the right lobe—i.e., at points farthest from the blood supply.

Kidneys.—Here a very extreme degree of fatty degeneration is usually, but not invariably, present. Both the convoluted and straight tubules of the cortex, and the collecting tubules of the medulla show this change, which is patchily distributed as a rule. The fat is stained blue with Nile blue sulphate, but in one case, while the great bulk of the fat behaved thus, the epithelial cells of a certain number of convoluted tubules were found to contain only pinkish violet anisotropic globules (cholesterin-containing lipoid). In several cases the kidneys were distinctly bile stained, and all of them showed more or less congestion of the medullary pyramids. In three cases the capsules were adherent, and left a finely granular surface on stripping, but microscopic examination failed to show any appreciable degree of fibrosis. The weight of the organs together varied from 8 to 11 oz.

Bone-marrow.—The bone marrow of the femur was examined in six cases. In five of these, the red marrow was in excess, extending well down the shaft of the bone, but on microscopic examination, a definitely erythroblastic reaction was found in one case only (No. 3). Here the yellow marrow of the shaft was completely replaced by a cellular red marrow, the appearance being comparable to that seen in pernicious anæmia. Evidence of considerable leucoblastic activity was also present. Unfortunately there had been no opportunity of examining the blood during life. In another case (No. 1), where the last blood count, a week before death, showed a slight leucopenia, there was an abundant leucoblastic marrow. In the case of H. R. (No. 5), the patient with neutrophil leucocytosis, the shaft marrow was fatty, with a narrow red layer next the bone. Microscopically some small foci of active leucoblastic proliferation were seen.

Spleen.—The spleen in this series was never appreciably enlarged, its weight varying from 4 to 7 oz.

Other Lesions.—*Ascites*, to the extent of 5 or 6 pints, was present in three cases (Nos. 5, 6 and 7). Clinical examination of the fluid in one case (No. 7) showed a very scanty cellular deposit, with a preponderance

of lymphocytes. A very few red blood corpuscles and endothelial cells were also present.

Hæmorrhages in various situations were present in five cases, most frequently in the peritoneum (five cases), and pericardium (four cases); less frequently in the stomach (thrice), lungs (twice), pleuræ (twice), endocardium (twice), and skin (once). In one case (No. 1) there was very extensive hæmorrhage into the peritoneum and subperitoneal tissues, especially of the omenta, mesocolon, mesentery, and appendices epiploicæ. In the same case there was profuse terminal oozing into the stomach. In the other four cases the hæmorrhages were mainly petechial. Hæmorrhagic infarction of the lungs occurred in three cases.

Old *tuberculous mesenteric glands* were present in three cases, and in one of these there was an old caseous pulmonary lesion as well.

Association with Hæmochromatosis.—Perhaps the most interesting single case is that of A. H., a man aged 52 (No. 5) (Plate III), where the lesions of T.N.T. poisoning are associated with a well marked hæmochromatosis affecting especially the liver, pancreas and abdominal lymph glands. Unfortunately the urine had not been examined during life, and at post-mortem examination the bladder was empty. The hæmosiderin granules, which give a bright blue colour when treated with potassium ferrocyanide and hot hydrochloric acid, are most abundant in the lymph glands, where they occur within the numerous endothelial phagocytes crowding the lymph paths. In the liver the hæmosiderin granules are deposited in large numbers in the hepatic cells at the periphery of the lobules, to a somewhat less extent around the centre, while the intervening portions are free or contain only very few. Even more pigment is present in the phagocytic cells in the cirrhotic tissue, both of the portal tracts and around the central veins, while not a little is contained in the epithelium of the newly formed bile ducts. In the pancreas abundant hæmosiderin is present, both in the acinar epithelium and in the stroma, where it is enclosed in phagocytic cells and fibroblasts. The pancreas shows, in addition, numerous small foci of active fibroblastic proliferation, with slight leucocytic infiltration, and definite acinar degeneration. It is here that the largest accumulations of iron-containing pigment are found. The islets of Langerhans are large and cellular, and contain only a very small amount of hæmosiderin. The naked-eye appearance of the liver is very much altered by the coexisting hæmochromatosis. The distinction between the red and yellow tissues is less sharp, as both approximate to a brownish tint. The pancreas shows the typical coppery-red colour of hæmochromatosis, and the

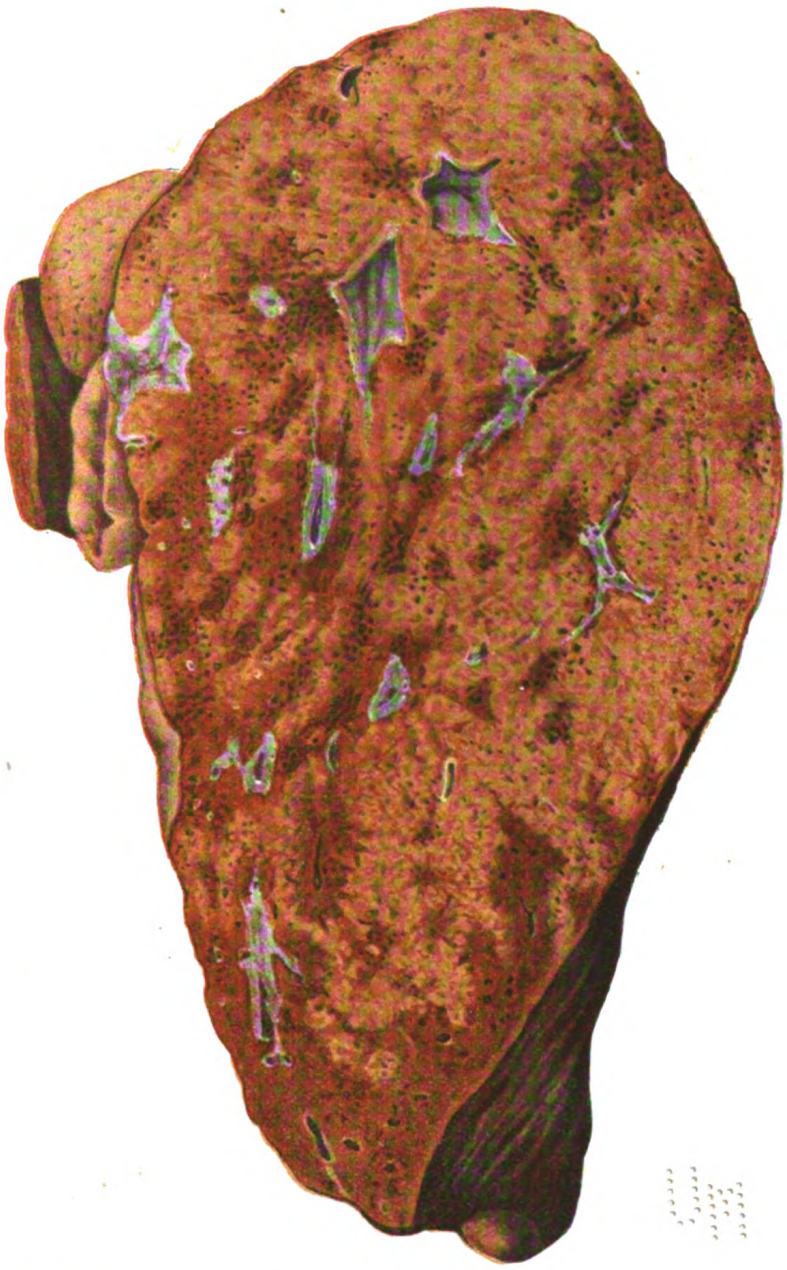

Plate III.—Liver from a case of toxic jaundice due to tri-nitro-toluene poisoning, occurring in a man the subject of hæmochromatosis (Case 5). (Kaiserling specimen.) The distinction between the red and yellow areas is less sharp, as both approximate to a brownish tint owing to the presence of a large amount of hæmosiderin. (Drawing by Miss Ethel Wright.)

abdominal lymph glands a rust coloured mottling. It may be noted that the liver shows no histological variation from the other T.N.T. cases beyond the presence of the hæmosiderin.

It is pretty certain that we are here dealing with two independent affections, inasmuch as it has been shown that a very long time (a year or more) is required for the deposition of such large amounts of iron-containing pigment, while the illness due to tri-nitro-toluene was, in this man's case, only of ten weeks' duration. It is possible, however, that the pre-existing hepatic lesion may have made that organ unduly susceptible to the action of the poison.[1]

[1] I have since made a post-mortem examination of a case of T.N.T. poisoning which exhibited features of very special interest. The patient, a girl, aged 21, who had been employed on "stemming" for about four months, died after an illness of one week only. She took ill with sickness and vomiting while going to work on the night of January 26. Next day she was noticed to be yellow, but she did not consult her doctor until the evening of January 29, by which time the sickness and vomiting had ceased. She was now distinctly jaundiced, and had become somewhat dazed, with occasional emotional outbursts. Next day (January 30) the jaundice was more intense, and there was appreciable diminution in the area of hepatic dullness. That night she became restless, with intervals of stupor, and this continued over January 31 until on the morning of February 1, she passed into a state of coma. Death occurred at 3 p.m. on February 2, one week from the first onset of symptoms. Post-mortem examination revealed a liver weighing 13½ oz. only. It was entirely red and smooth on the surface, with no projecting nodules, but on section the characteristic features of T.N.T. cirrhosis presented themselves. The red tissue, however, very clearly preponderated, although a considerable mass of yellow tissue interspersed with red was present in the upper and anterior region of the right lobe. The yellow areas did not project from the cut surface, as in the other cases I had seen, and it seemed possible that this, as well as the fact that there were no projecting nodules on the surface of the organ, might be due to the absence of regenerative hyperplasia on the part of the persisting islets of liver tissue. Such a condition would result from the very rapid and widespread character of the degenerative process, causing the death of the patient before regeneration could occur. The microscopical appearances seem to confirm this view. The two other chief points of pathological interest were the presence of an actively erythroblastic red marrow throughout the whole length of the femur, and a copious oozing of blood into the stomach. There were numerous petechial hæmorrhages into the subperitoneal tissues and mediastinum, while the lower lobes of both lungs showed a patchily distributed condition of hæmorrhagic infarction.

TABLE II.—(*A*) FATAL T.N.T. CASES.

Clinical No.	Name	Age	Duration of illness at date of first count (weeks)	Date of examination	Erythrocytes	Hæmoglobin (per cent.)	Colour index	Leucocytes	Neutrophils	Eosinophils	Basophils	Lymphocytes	Transitionals and hyalines
	A. E. H.	22	6	August 9	4,910,000	85	0·86	5,600	3,800	224	—	1,344	224
				,, 22	5,740,000	75	0·67	4,400	—	—	—	—	—
				(died August 29)									
1	L. F.	30	5	August 9	4,000,000	80	1·0	9,400	7,144	94	94	2,068	—
				,, 14	4,050,000	80	1·0	9,400	—	—	—	—	—
				,, 30	4,340,000	80	0·9	2,400	120	60	—	2,184	36
				(died Sept. 1)									
	L. B.	16	9	October 18	4,800,000	75	0·78	8,400	6,384	42	84	1,764	126
				(died October 24)									
2	E. B. B.	35	3	October 6	4,860,000	75	0·77	8,200	4,300	120	120	3,440	250
				,, 14	4,270,000	70	0·8	7,400	4,688	162	15	2,400	236
				,, 26	3,900,000	70	0·9	3,800	1,750	40	20	1,800	170
				November 1	2,900,000	55	0·93	3,200	1,270	12	—	1,890	25
				,, 6	1,950,000	50	1·3	2,600	680	8	—	1,728	104
				,, 9	1,530,000	45	1·4	2,400	636	—	—	1,656	90
				(died Nov. 12)									
3	H. R.	52	3	October 18	4,840,000	75	0·77	14,200	10,000*	1,000	—	1,960	1,000
				November 17	6,010,000	75	0·62	16,000	13,500	80	—	2,400	80
				,, 18	—	—	—	22,000	19,200	—	—	2,040	770
				(died Nov. 19)									
				(*B*) NON-FATAL CASES (SO FAR).									
4	S. T.	24	2	August 9	5,050,000	75	0·74	9,800	5,880	—	—	3,626	300
				December 21	4,870,000	68	0·7	5,600	2,320	100	—	2,800	370
5	A. B.	28	6	October 14	4,570,000	70	0·77	8,600	5,074	390	130	2,660	344
				December 16	5,400,000	80	0·75	10,000	5,650	250	200	3,150	750
				January 4	4,500,000	70	0·77	9,600	6,200	460	—	2,460	540
6	N. W.	20	7	October 18	4,230,000	70	0·83	9,800	6,000	150	50	3,500	250
7	E. J.	40	3	October 20	5,110,000	70	0·67	11,000	5,280†	220	110	5,100	220
				December 28	5,320,000	70	0·66	11,400	5,770	250	70	4,420	1,120

8	H. T.	19	2	October	20	5,640,000	70	0·65	7,000	4,427	70	70	2,220	210
				December	27	1,320,000	30	1·1	5,400	4,050	–	—	1,160	183
				,,	29	810,000	25	1·5	8,800	5,660	22	—	2,840	286
				January	2	840,000	30	1·8	7,000	2,800	14	—	4,116	70
9	A. T.	22	3	October	30	5,630,000	80	0·7	10,000	7,150	100	75	2,125	550
				December	4	4,790,000	80	0·83	6,000	3,750	240	60	1,680	270
				,,	15	4,190,000	75	0·9	4,600	2,035	115	46	2,288	115
				,,	19	5,310,000	75	0 7	6,200	2,870	140	110	2,680	390
				,,	28	4,370,000	70	0·8	6,200	2,450	120	60	3,200	360
				January	5	4,360,000	75	0·86	6,200	2,180	110	50	3,560	300
10	M. D.	49	12	November	24	4,280,000	70	0·8	3,000	1,080	60	30	1,710	120
				December	6	2,960,000	70	1·1	2,600	1,092	—	—	1,352	156
				,,	15	3,960,000	75	0·95	2,800	1,350	—	28	1,040	400
				January	2	3,920,000	70	0·9	10,000	6,280	80	40	3,260	340
11	D. T.	31	2	November	27	5,060,000	80	0·8	9,000	6,000	180	45	2,160	675
				December	8	6,340,000	80	0·63	6,600	4,200	316	26	1,790	280
				,,	15	5,830,000	85	0·73	6,600	4,420	68	100	2,000	204
				,,	23	5,660,000	80	0·7	7,800	4,760	215	60	2,500	273
12	M. G.	34	6	November	27	4,380,000	75	0·86	4,800	2,400	100	—	1,780	500
				December	4	5,440,000	80	0·73	5,000	2,570	150	25	2,025	225
				,,	12	4,320,000	70	0·8	3,800	1,534	60	—	1,824	285
				,,	14	5,030,000	75	0·75	2,400	850	72	—	1,344	130
				,,	16	4,890,000	70	0·7	3,800	1,100	95	20	2,470	114
				,,	18	4,550,000	70	0·75	4,200	2,625	—	—	1,512	63
				,,	20	4,250,000	70	0·82	3,400	1,020	17	25	2,240	170
				,,	23	4,450,000	70	0·8	3,200	1,290	64	6	1,720	134
				,,	29	4,760,000	70	0·74	3,000	1,230	38	22	1,545	165
				January	5	4,240,000	70	0·83	5,000	2,300	40	10	2,510	140
13	M. J.	18	3	December	9	6,760,000	85	0·62	11,000	6,270	1,100	—	3,080	550
				,,	18	6,500,000	80	0·61	11,200	6,860	168	140	3,640	400
				,,	27	6,070,000	80	0·66	7,600	3,860	365	45	2,950	380
				January	5	6,130,000	75	0·5	6,200	2,880	285	75	2,750	210
14	R. N.	17	1	December	11	6,610,000	80	0·6	5,000	3,175	225	--	1,550	50
				,,	20	5,440,000	80	0·74	6,600	4,175	280	82	1,750	310

* 70 neutrophil myelocytes.

† 50 neutrophil myelocytes.

TABLE III.—SUMMARY OF POST-MORTEM FINDINGS IN SEVEN CASES OF TRI-NITRO-TOLUENE POISONING.

No.	Name, Sex, Age	Total weeks at work	Weeks at work before taking ill	Total duration of illness (weeks)	Duration of jaundice (weeks)	Weight of liver (oz.)	Liver: Relative proportion of red and yellow tissue	Liver: Distribution of Red and Yellow Tissue		Jaundice	Ascites	Hæmorrhages	Bone marrow (upper half of right femur)	Other lesions, &c.
								Left lobe	Right lobe					
1	A. E. H., female, 22	9	6	9	7	24	Yellow ++	Chiefly red, with a few yellow nodules throughout it and on the under surface	Great bulk yellow with narrow red layer on surface and considerable red mass in upper part; yellow nodules project on each side of gall bladder	Intense	–	+++ Peritoneum, stomach, pericardium, lungs	Excess of red marrow which is extending down most of shaft	Left lobar pneumonia; right hæmorrhagic infarction of lungs; recent pregnancy; old tuberculous mesenteric glands
2	L. F., female, 30	7	5	8	8	32	Yellow +++	Almost entirely red, with a few small yellow nodules on the margin	Anterior marginal portion (1½ in.) red and shrunken, rest bulky and yellow; large yellow nodules on each side of gall bladder	Moderate	–	+ Skin, peritoneum, stomach	Abundant red marrow extending 2 in. to 3 in. down cavity of shaft	Hæmorrhagic infarction of lungs; fairly recent gestation; old pulmonary and mesenteric gland tubercle
3	C. P., female, 49	12	9	3 to 5	3	20	Red +++	Preponderatingly red	Preponderatingly red; yellow nodules especially on quadrate and Spigelian lobes	Intense	–	—	Red marrow throughout whole shaft (upper half)	—

4	L. B., male, 16	6	3	10	7	29	Yellow + (slight)	Practically all red	Yellow only slightly preponderates over red; red portion chiefly anterior marginal region and anterior surface; yellow nodules project each side of gall bladder	Slight	−	++ Lungs, peritoneum, pleuræ, pericardium, endocardium	Abundant red marrow largely replacing yellow	Early hæmorrhagic infarction of lungs
5	A. H., male, 51	17	10	12	4	24	Yellow ++	Mixture of red and yellow	Yellow greatly preponderates but narrow layers of red all over surface; large yellow nodules project from Spigelian and quadrate lobes	Very slight, face only	+	—	Not examined	Hæmochromatosis of liver, abdominal lymph glands and pancreas, &c.
6	E. B. B. female, 35	16	9	8	7	29	Red +	Almost entirely red	Red and yellow about equal; red tissue chiefly in inferior marginal region; large yellow nodules project from Spigelian and quadrate lobes	Slight	+	+ Endocardium, pericardium, pleuræ, peritoneum	Abundant red marrow filling upper 5 in. of cavity of shaft	Old tuberculous mesenteric glands
7	H. R. male, 52	10	8	7	7	32	Yellow + (slight)	Mixture of red and yellow	Anterior marginal zone and inferior surface red; rest of lobe shows mixture with narrow red layer over most of surface	Moderate	+	+ Pericardium, peritoneum, stomach	Shaft marrow mostly fatty but with a narrow rim of red next the bone	—

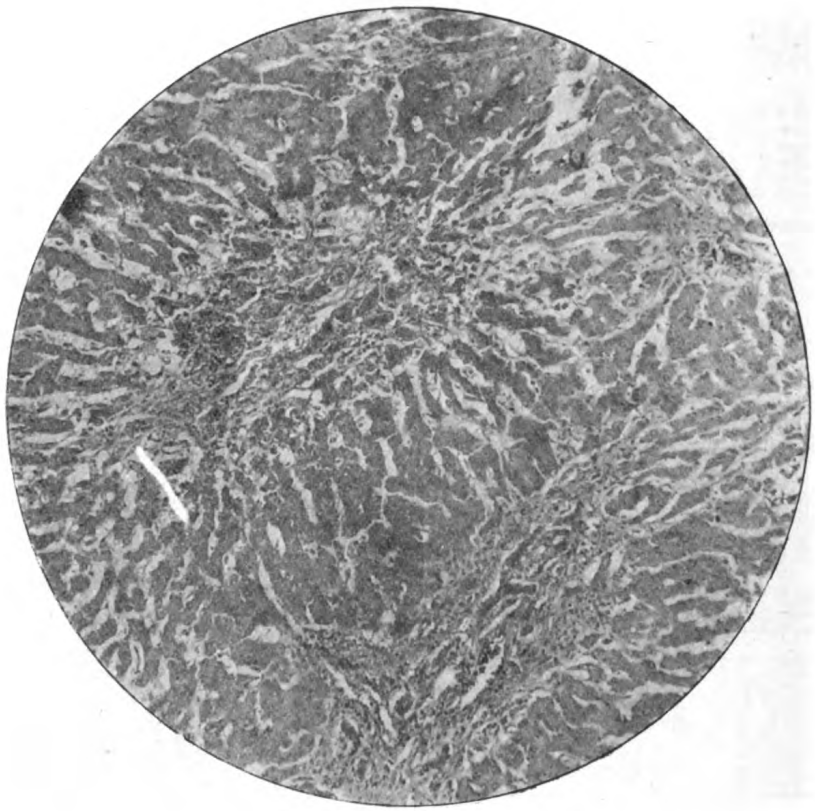

FIG 1.

Liver in T.N.T. poisoning (Case 1).[1] Section of a yellow portion of the organ showing the early degenerative and cirrhotic changes. In the left upper quadrant is seen the centre of a hepatic lobule, where the degenerative changes in the liver cells are proceeding apace. In the right lower quadrant is a portal tract, which is the seat of fibroblastic overgrowth, bile duct proliferation, and round cell infiltration.

[1] Case numbers refer to Post-mortem Series (Table III, pp. 30, 31).

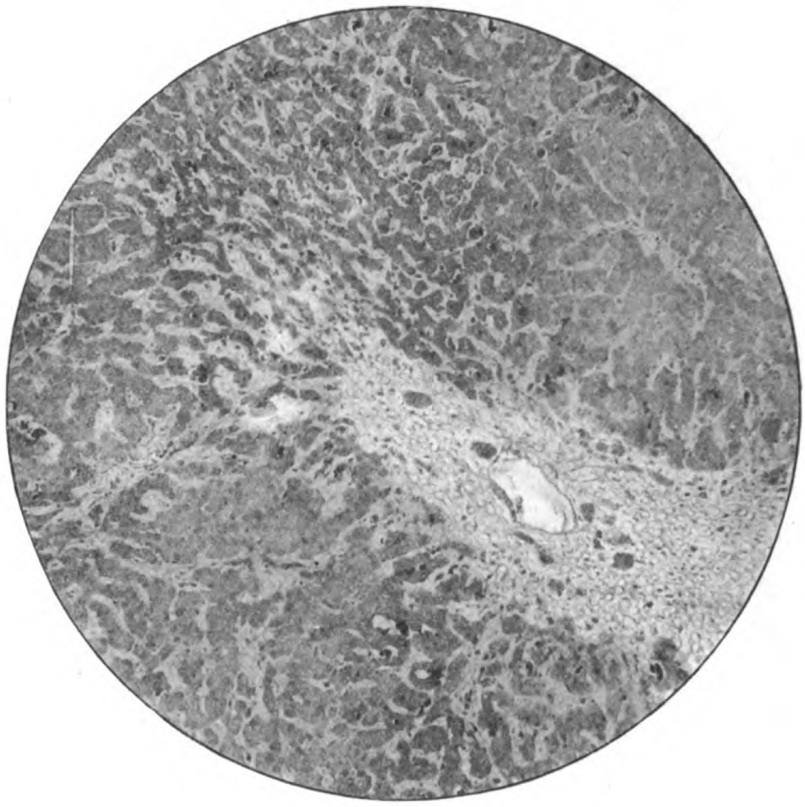

FIG. 2.

Liver in T.N.T. poisoning (Case 2). Section of a "yellow" portion of the organ showing extreme biliary stasis in the central zone of the hepatic lobule. The shrinkage and disintegration of the liver cells in this situation are also well shown.

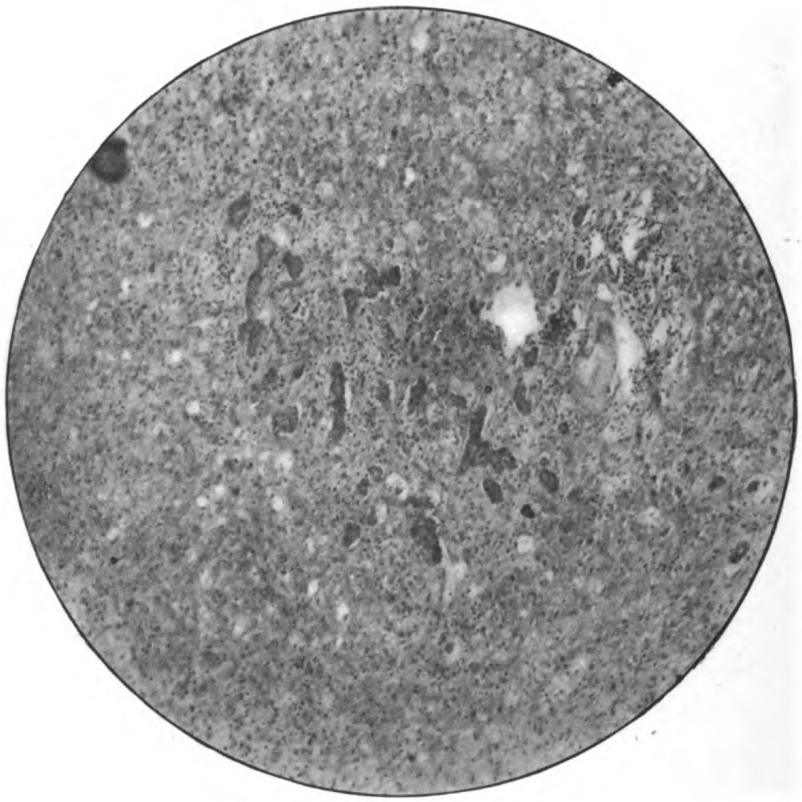

FIG. 3.

Liver in T.N.T. poisoning (Case 2). Section of a "red" portion of the organ showing complete absence of normal liver tissue. In the centre of the field is a greatly enlarged portal tract with numerous newly formed bile ducts and much round-cell infiltration. The rest of the section is composed of a loose fibrous stroma containing numerous dilated capillaries (not well shown).

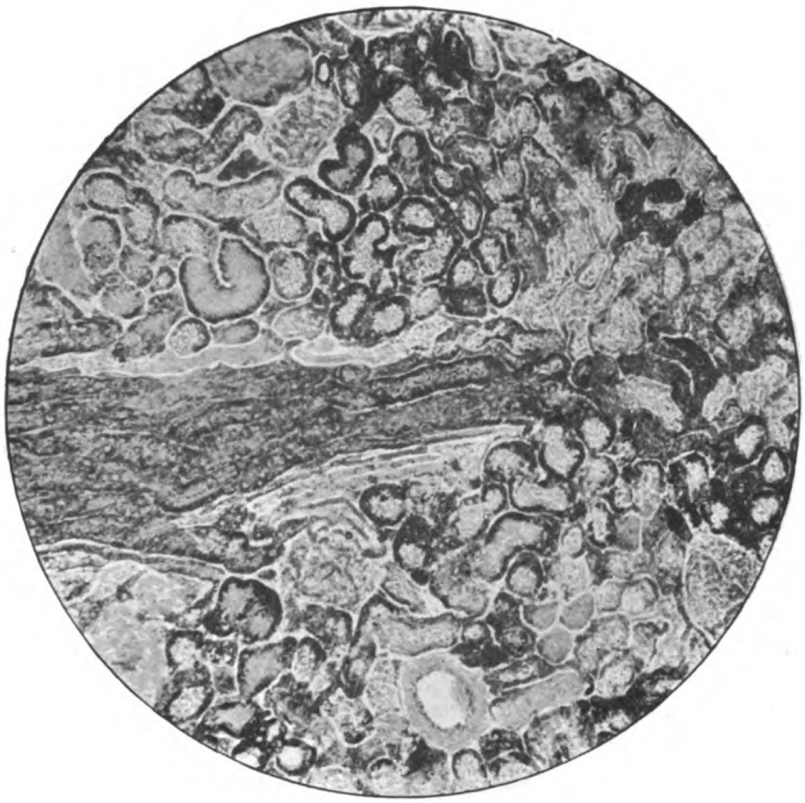

FIG. 4.

Kidney in T.N.T. poisoning (Case 4), stained for fat by scarlet R. An extreme degree of fatty degeneration is present, both in the convoluted and in the straight tubules. In the former the fat globules are situated round the periphery, in the latter they are distributed more uniformly throughout the cells.

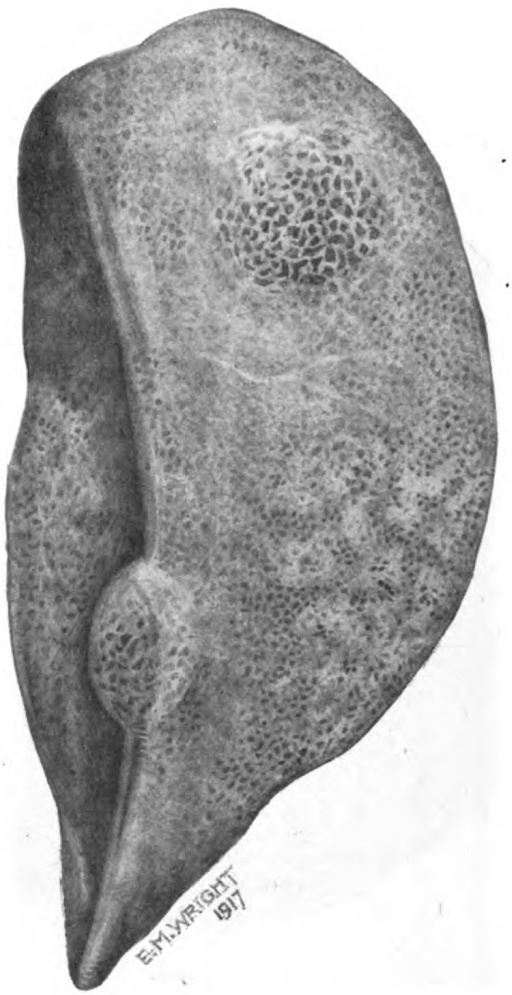

FIG. 5.

Liver in T.N.T. poisoning (Kaiserling fixed specimen), (Case 4), showing the right hand margin of the right lobe on which there is a large projecting (yellow) nodule. Another nodule on the antero-superior surface shows well the large lobular pattern referred to in the text, and some irregular, pale, slightly projecting areas are seen on both surfaces of the organ. The intervening smooth flat tissue is dark red in colour.

Dr. BENJAMIN MOORE, F.R.S.

The subject which we are discussing to-night is of enormous importance, on its own account, not merely from the number of people who die—because they are a comparatively small fraction of those who work on the material—but on account of the large loss of labour at a period of stress in the country. In several factories concerned in the manipulation of high explosives, the degree of absenteeism is very high, and the greatest factor in the production of this is this so-called "minor" T.N.T. illness. Therefore, from the national standpoint, minor illnesses due to T.N.T. poisoning ought not to be left out of account. The amount of national expenditure in sickness compensation is very large, and even more important is the temporary loss of labour of many employees. So we must not be content to speak of this "minor" illness as simple gastric catarrh of unknown origin. The disability these workers suffer from is not simply that they feel tired and want a holiday: such an idea may be largely left on one side. In many cases one can trace this illness on into the serious jaundice which ends in the post-mortem room, and in the specimens which you see on the table.

Nor does the importance of the subject end there, because it is my fixed belief, from having lived and worked in several of these factories, and getting to be as well known, and no better known, than the ordinary workers in them, and having seen how the major portion of this illness is produced, that this poisoning can be eliminated by instituting proper executive measures. The importance of this action increases still more when it is added that as soon as we have eliminated this illness, we shall also have reduced to a minimum the risk of such fires or explosions as happened last Friday. The two things are most intimately connected, and due to the same common cause.

Before the present extensive manufacture of T.N.T. that substance had a most innocent reputation. For instance, Prosser White says, in the chapter he wrote in a text-book on these poisons, "that it is an innocuous, non-toxic substance, which has never been known to produce illness." When the first death due to T.N.T. poisoning was detected by Dr. Collis, of the Home Office, he asked me to carry out a series of laboratory experiments on the toxicology of the substance. For the first five or six months the experimental results supported all that was

stated by Prosser White, for it was found impossible to kill a single animal with the substance, however heroic were the doses given. Meanwhile workshop illnesses were beginning to accumulate more rapidly. In order to approach workshop conditions more closely, animals were kept in the fumes of Woolwich Arsenal, in the dustiest part of the works, for months, yet they throve, they increased in weight, and bore healthy offspring. In places where one could scarcely stand the smell of the molten explosive, under much heavier exposure than the workmen, these animals were kept daily for nine months without harm.

The first light on the subject came to me when on a visit to a factory which was particularly clean, and where there was no fume whatever, and very little dust in the air. So I said, it cannot be the dust or fume in this case: what can be the explanation? I noticed the hands of the workers: they were oily; there was powder on the table, and the workers were handling pellets. I carried out experiments, mostly on myself and my assistants, to determine whether T.N.T. could enter the body through the skin. On two separate occasions I rubbed some of the substance into my hands, and I had a sharp attack of gastritis on each occasion, yet my assistants had not much of it: I was one of the susceptible individuals. I also had much of it in my urine, while my assistants only had a small amount, and that explains a good deal which has been obscure in regard to ætiology and clinical history. You can send patients away with minor jaundice, and they will come back in four or five days with it more developed, and in that way a fatal case may develop from a minor one.

We were still, however, met on all sides by the cry of dust or fumes being the cause. The obvious reason for this almost universal belief in the toxic effects being due to dust and fume swallowing and inhalation lies in the smell of the melting pans, and the intensely bitter taste, resembling bile, of T.N.T. when swallowed. It is an exceedingly insoluble stuff, and very bitter; and if a particle, so minute that it can be only seen with a microscope, gets on to the back of the mouth a bitter taste will be experienced from it for over an hour. The people in the workshops who are being poisoned by it are getting it through their skin; they are not taking it in by the mouth and nose, but they are misled by their senses of taste and smell and think they are taking it up by the mouth and nose. Therefore I determined to analyse the air in the shop so as to find out the actual amount a worker would take in by mouth and nose during a shift. In one particular national shop

I went in and stayed there the whole twelve-hour shift, from six in the evening till six in the morning, with Dr. Wyon, and we aspirated the air at twice the rate of breathing of the ordinary workmen through a dust and fume absorption apparatus, and so found the quantity, something like 5 or 6 mgrm. per head per shift was the result, that is, about the size of a pin's head. We have taken ourselves ten times that quantity for one or two weeks, and without having any injury or symptoms except that we got it in our urine, showing that it was well into the system.

A determination of the amount of nitrous fume taken out was also made and showed only about one part in a million; in flour mills where bleaching of flour is carried on, and in many industrial occupations, there is many times more nitrous fume present without producing any deleterious results.

From the point of view of the prevention of these things, and especially for us as medical inspectors, I put it to you the shells ought to be filled with a scrupulous regard to cleanliness, and none of the T.N.T. mixture allowed to foul the outsides, and that all managers, foremen and operatives must be impressed with the need for cleanly working in T.N.T. manipulation, just as much as for less stable explosives, such as black powder and tetryl: then it will be found that very little else will be needed, and here comes in with force the remark, that "Prevention is better than cure." The truth of this statement is actually demonstrated in present workshops, for where least care is taken over clean working conditions, there it is that both minor T.N.T. illness and also toxic jaundice abound, whereas where great care is taken in the avoidance of spilling T.N.T., illness is practically absent; this is clearly shown by the returns, and there are three national factories, each employing thousands of T.N.T. operatives where illness scarcely exists.

Then there is the question of the alternation of employment. That is a very good measure, and I rank it next to cleanliness of workmanship as a preventative. But to you, inspectors engaged in giving medical advice at these factories, and others, I put it strongly: Do not be misled over alternation of employment unless it be coupled with the insistence on clean hands and those precautions I have mentioned. These people can go off work for a fortnight, and all that time you may think they are outside the influence of the substance, and yet they may be absorbing it all the time. At a factory in which I was working, I examined three or four girls returning to work upon T.N.T after a fortnight's absence

at other work, and they were slightly icteric, so I told them they must not go. I had their urines examined, and they were heavily charged with T.N.T., showing that T.N.T. had been attacking their systems all through the supposed period of intermission. My colleague, Dr. Wyon, has made a similar examination, and found in a large scale examination at another factory that about 65 per cent. of these people on their return, after the period off, have T.N.T. in their urine: it was passing through their system when they were supposed to be free of the substance. To carry out alternation properly, the underclothing must be changed: but you know the habits of many of these people, they keep underclothing on for a much longer period than you who are here would care to do. And if you look at the roots of the hair on the scalp you will find a thick layer of the substance. There is one point of prophylaxis there: use the best organic solvent for the substance you have, and in that way get the workers as clean as possible. If that is done, then in four or five days you may get them clear. When I experimented on myself by rubbing the stuff into my hands, though I got my hands clean at once, it was ten clear days before the substance had disappeared from my urine.

It may also be pointed out that certain occupations hitherto supposed to be T.N.T. free, are not really so. For example, pushing a T.N.T. soiled truck.

There is one additional remark I should like to make in regard to Dr. Legge's paper. I do not think we can exculpate the two factories at the top of his list, which possess such a very much heavier incidence than the others, from there being something wrong in those factories. There are other factories with quite as many workers where the incidence rate is very much lower, indeed, almost zero. There is one near London which employs as many hands, and there are two provincial factories, each employing several thousand T.N.T. workers, in which there have been scarcely any cases. When one visits those places, the reason for the difference becomes obvious, so clear, that executive action should be taken at once. The shells are filled by women in these almost immune factories, and *the greatest care is insisted on* that no T.N.T. shall find its way outside the shell: those who do so are censured. On the contrary side, from my own experience, I know that in one large factory where the incidence of this disease is very high, in fact, about the highest in the whole country, there are fifty or sixty women employed on nothing else but cleaning off the outside of the shells the T.N.T. which ought never to

have been there. This is not merely waste labour, for it is also among those women and girls (shell-cleaners) that the highest incidence of the jaundiced cases are seen. This effect is not due to the dust breathed in the air: you can get a dust, and you can get bits chipped off and trodden down on the floor, but it is mostly below the level of the mouth as it is a heavy dust: it is getting it on the hands which is the source of the mischief. There is no exhaust system of ventilation which will adequately prevent the T.N.T. dust from getting about;[1] but if you can point out clearly the rationale of the disease to the workers and their overseers, and get them to avoid spilling the stuff, and if you can invent a process to ensure that the dust does not get on to the shells, and so on to the workers' hands, and if you make it a matter of a penalty if the material is spilt about the floors and benches, we shall, to a great extent, have solved the problem, and have prevented, in large measure, both the occurrence of explosions and the incidence of this sickness, both of which we all deplore.

Dr. Bernard H. Spilsbury.

This communication is mainly a summary of the results of the naked eye and microscopical examination of material obtained from fatal cases of poisoning by tetrachlorethane, di-nitro-benzene, and tri-nitro-toluene. In many of these cases putrefaction, which is rapid, was advanced when the investigations were made, owing to the delay incident to a Coroner's inquiry; the study of the detailed changes has been rendered more difficult, and the specimens which I am showing have suffered from this cause.

The effects of these three poisons are comparable in that the most marked changes are found in the liver, these consisting essentially in a fatty degeneration of the liver cells, followed by necrosis and disintegration of all the cells in large areas. In many cases no healthy tissue is found; the necrotic areas are distributed irregularly and may form the bulk of the organ; where large groups of lobules are completely destroyed it is not easy to determine in what part of the lobule the changes have commenced. These poisons also produce a varying

[1] The amount of dust in the air of the T.N.T. workshops has been actually determined in two factories and found to be excessively small and quite inadequate to account for the illnesses.

degree of fatty degeneration in the kidneys and generally in the heart muscle.

The cases of tetrachlorethane poisoning are five in number. In all there was a great reduction in size of the liver, which in one case weighed only 17 oz. Four of the cases were in young women; the disease ran a rapid course and the changes in the liver were almost confined to large areas of complete disintegration with fatty degeneration in the remaining liver tissue; in areas where destruction was incomplete the peripheral zone of the lobules showed less advanced changes; some of the specimens showed a round-celled infiltration of the necrotic areas, but no fibrosis was found. No attempt at hypertrophy of the remaining liver tissue could be recognized. The fifth case was that of a man in whom the disease ran a longer course and who died seven weeks after the first appearance of jaundice. The liver showed less reduction in size and weighed 31½ oz. The areas of necrosis in the liver were very extensive, and replacement fibrosis was pronounced, the only remains of the liver tissue in these areas being a little fatty debris. But in this case the remaining liver tissue showed very active processes of hypertrophy, these areas forming rounded projections on the surface of the organ. No fatty changes were found in these areas, but an accumulation of bile pigment in the cells and distension of the bile capillaries, owing to obstruction in the larger ducts. In this case the active toxic process appeared to have ended, and the fatal result was due to the contraction of the newly formed connective tissue.

A series of investigations were made by Dr. Willcox and myself in order to determine which constituent of the varnish, to which the illness of these persons was attributed, was the toxic one. We found that rats, killed after exposure for one week to the vapour of tetrachlorethane, showed a distinct fatty degeneration of the liver cells, especially in the central zones of the lobules, the changes being comparable to those seen in the liver in fatal cases of delayed chloroform poisoning. The degeneration had not progressed to necrosis, and the animals at the time of their death did not appear to be seriously ill. There was some fatty degeneration in the kidneys and heart muscle of these animals.

I have examined the liver and kidneys from one fatal case of poisoning by di-nitro-benzene. The liver was of normal size, deeply bile-stained, and showed a coarse form of multilobular cirrhosis rather irregularly distributed. The newly formed connective tissue included many round cells and large numbers of apparent bile ducts, which were

probably the atrophic remains of liver parenchyma. The remaining liver tissue showed active hypertrophic processes with areas of atrophy and necrosis only where they were subjected to the compression of the fibrous tissue. No fatty changes were found in the organ, which resembled the liver in the last case of tetrachlorethane poisoning. No fatty degeneration was found in the kidneys.

Lastly, I have investigated seven fatal cases of poisoning by trinitro-toluene. All these were in women, aged from 19 to 45. In all the cases there was a considerable reduction in size of the liver, the weight of which varied between 21 and 36 oz. In all but one of the cases the organs showed irregular, but very extensive, areas of destruction of tissue, these areas being dark red in colour and fairly firm, in contrast with pale, sometimes yellow, soft nodules in which the remains of the liver tissue were found. The red areas consisted of round-celled infiltration, with commencing fibrosis in some cases, dilated blood-vessels, and fatty debris of the disintegrated cells or shrunken fatty and bile-stained cells, and, occasionally, the peripheral zones of the liver lobules, all the cells showing advanced degenerative changes. In the yellow areas fatty degeneration of the liver cells was always present and in most of the cases was advanced, especially in the central zones of the lobules; bile-staining of the cells and dilatation of bile-capillaries could be recognized in some of the cases; there was also evidence of a preceding hypertrophy of the liver cells. In the seventh case the liver did not show the sharp colour contrast between the red and pale areas, but had a uniform deep red colour at the right extremity and faded gradually into a yellow colour in the left lobe; the microscopical changes were essentially the same as in the other changes though the distribution was more uniform. This liver was the heaviest in the series.

In all of these cases there was advanced fatty degeneration in the kidneys, even the cells of Bowman's capsules exhibiting the change in some of the cases. There was also fatty degeneration of the heart muscle. All the cases showed some jaundice, in all of them petechiæ and larger hæmorrhages were found, especially in the serous membranes, but also in the endocardium, and in some of the cases in the skin. In three of the cases there was also chronic gastritis.

Dr. P. N. Panton.

The following observations upon the blood condition among workers in tri-nitro-toluol are partly included in a preliminary report to the Ministry of Munitions, and on the completion of the investigations will be made the subject of a report in full.

(1) Fifty cases, all women, and all employed at the same factory, were examined to see what blood changes, if any, were present among those actually at work. The ordinary routine blood examination revealed nothing of importance. The red cells, hæmoglobin and colour index were unaffected. The morphological characters of the red cells were normal. No such changes were found as those described by Dr. Malden among the workers in di-nitro-benzene.[1] Many of the women examined were slightly cyanosed, a few showed marked cyanosis, a feature also present in the di-nitro workers. The leucocytes showed an increase in the total numbers. In forty cases at work more than one month the average number of leucocytes was 10,000 per cubic millimetre, in nine cases employed one month or less the average number was 7,500. The relative numbers of the white cells were not greatly altered, but many cases with high counts showed a distinct relative and absolute increase in the polynuclear neutrophils. The eosinophils in a considerable number of cases were above the normal number.

(2) An additional 100 cases were examined at the same factory for the following points :—

(*A*) *The Incidence of Cyanosis.*—It is unfortunate that on the days on which this examination was made the weather was very cold and bitter, and it was often impossible to decide between the blue lips of cyanosis due to poisoning and those due to atmospheric conditions. Of 100 cases taken at random, and all actually at work at the time, seventy-eight were noticed to be cyanosed, and of those eighteen to be distinctly cyanosed. It is probable that the former number exaggerates the percentage of toxic cyanosis. The cause of the cyanosis has been taken to be the presence of met-hæmoglobin in the blood. While this may be perfectly correct, I am not aware that it has been proved. The amount of this substance is insufficient to give a spectrum with the ordinary small spectroscope, and proof at present rests upon the use of a test devised

[1] *Journ. Hyg.*, 1907, vii, p. 672.

by Haldane. This test is extremely simple to perform, but in my experience in these cases, most difficult to interpret. Moreover, the test I found to be given also by the blood of an animal poisoned by pure NO, and in view of the fact that both toluol and amatol powders give off in small quantities gases smelling strongly of nitrous oxide, the possibility of NO hæmoglobin cannot be ignored without spectroscopic proof. In these 100 cases thirty-six gave a positive Haldane test, but this number, owing to the difficulty of interpreting the results, cannot be taken as definite.

(*B*) *The Presence of Bile in the Serum.*—A sample of blood was taken from each of the hundred workers, introduced into a serum tube, and allowed to stand until the next day, when the colour of the serum was examined by daylight. In twenty of the cases the serum was bile-tinged. This would appear to show that in a high proportion of those at work some action of the poison upon the liver was taking place. Allowance must, however, be made for the fact that among ordinary members of the community a small percentage of bile-stained sera are found, particularly among those subject to constipation. All of these employees were women, but even so, a percentage of twenty bile-stained sera would seem unduly high. No case was noticed to be jaundiced, and only three sera were at all deeply bile-tinged.

(3) Nineteen cases, instances of actual poisoning among T.N.T. workers, were examined. Of these fifteen were the subjects of toxic jaundice, two had symptoms of poisoning without jaundice, and two were examples of severe anæmia.

(*A*) *Toxic Jaundice Cases.*—The following points were noted. Bile pigment in serum: This was present in thirteen of the fifteen cases at the time of examination. The other two cases had both been mild and were now convalescent. Of the positive cases one was clinically free from jaundice and two were doubtful. One case had been jaundiced for three months. It is well known that bile pigment may be demonstrated in the serum for a considerable period before and after jaundice is clinically evident, and it is desirable that no case should be allowed to leave hospital until the serum is bile-free. It is not, however, desirable to take off work employees whose serum shows a trace of yellow colour in the absence of other symptoms. Perfectly healthy workers would be interfered with if this course were adopted. Fragility of the red cells: This was tested in five cases. In one convalescent case and in one case of poisoning without jaundice the fragility was normal. In three jaundiced cases the fragility was very slightly below normal, the

condition found in most jaundiced states other than hæmolytic icterus. Morphology of the blood: The ordinary routine examination of the blood reveals practically no changes in the majority of toxic jaundice cases. Of these fifteen cases, many of whom were recently and deeply jaundiced at the time of examination, thirteen showed practically no deviation from the normal, and nothing to suggest that any destruction of red cells or hæmoglobin was taking place. The two exceptional cases are considered with the instances of severe anæmia [(3) (C)].

(*B*) *Cases of Poisoning without Jaundice or Severe Anæmia.*—Of these two cases one showed nothing abnormal. The other showed a more severe anæmia than was clinically evident and a high colour index. This patient was distinctly cyanosed after five days in hospital, and her blood gave a definitely positive Haldane test.

(*C*) *Cases of Severe Anæmia.*—These four cases are considered together, although two were jaundiced and two were not. In three of them the blood condition was practically identical, the fourth was a jaundiced case in which the blood changes were less advanced. The type of anæmia present was that known as "aplastic anæmia," and the blood changes found were entirely typical of this condition. That is to say, there was a severe anæmia with a high colour index. Nucleated red cells were absent. Morphological changes in the red cells were extremely slight, and with the exception of occasional macrocytes the red cells might be passed as normal. An extreme leucopenia was present with a relative lymphocytosis. The blood count of one case may be given as an example. Red cells, 1,637,000 per cubic millimetre; hæmoglobin, 35 per cent.; colour index, 1·1; white cells, 1,400 per cubic millimetre. Differential count: Polynuclear neutrophils, 20 per cent.: small lymphocytes, 50·5 per cent.; large lymphocytes, 26·5 per cent.; large hyalines, 3 per cent. This patient, examined on November 27, 1916, died on January 19, 1917. Another case in which the blood was examined by Dr. Jacob on October 1, 1916, was seen by me much improved, but still with typical blood changes, on December 7, 1916. He was then under observation as an out-patient. A third case was of great interest, since about eight months previously he had acquired toxic jaundice, from which he recovered, and three months later returned to work in T.N.T. He was noticed to be jaundiced again, and taken off work, and his appearance at this time was that of a typical pernicious anæmia patient with a slight icteric tinge. Bile was present in this patient's serum, but not in great amount. His blood condition was typical of aplastic anæmia.

These cases of toxic jaundice without blood changes, of aplastic anæmia without toxic jaundice, and of both anæmia and jaundice occurring in the same patient, demonstrate that those working in T.N.T. are exposed to poisons which may, though rarely, act upon the liver, or more rarely still, upon the blood-forming organs, or on both. It is conceivable that more than one toxic substance is responsible, and I am conducting certain experimental work from this point of view.

In making the examinations above referred to, I have received every assistance from the Factory Manager and from the medical staffs at various hospitals who have most generously given me leave to examine their cases. My colleagues, Dr. Oliver and Dr. Vaidya have assisted me with the work.

Dr. Hubert M. Turnbull.[1]

The material from which the following observations upon lesions found in fatal cases of poisoning by tri-nitro-toluene were made was obtained from three cases on which I performed the necropsy, and from eight cases from which organs or portions of organs were sent to me. For permission to perform the necropsies I am indebted to Major P. S. O'Reilly, R.A.M.C.; for the material sent to me I am indebted to Professor Benjamin Moore, Dr. Legge and Dr. Collis of the Home Office, and Dr. J. A. Wyon. For notes on the cases from which material was sent I am also indebted to these gentlemen, especially to Dr. Legge, who has taken very great trouble in obtaining for me histories of occupation and illness.

The cases may conveniently be divided into three groups:—

(I) Seven cases in which death was apparently due to hepatic insufficiency and in which severe jaundice was associated with extensive destruction of the liver.

(II) One case in which there were multiple cutaneous hæmorrhages and slight universal jaundice.

(III) Three cases in which there was severe anæmia, but no jaundice.

[1] Director of the Pathological Institute of the London Hospital.

Group I.—Cases of Severe Jaundice.

Duration of Work and Illness.

Case 1.—Male, aged 14. Engaged in filling gaine bags with tri-nitro-toluene from December 29, 1915, to February 13, 1916. He then left, and died on March 4, 1916.

Case 2.—Male, aged 14. Engaged from December 30, 1915, to February 7, 1916, in filling bags with trotyl (crude tri-nitro-toluene) powder. On February 7 he consulted the doctor and was transferred to other work. He saw the doctor again on February 15, and was admitted to hospital. He died on April 7, 1916.

Case 3.—Female, aged 15. Was employed first on January 27, 1916. The exact nature of her work from January 27 to February 22 is uncertain; she may have filled bombs with ammonal powder (17 per cent. T.N.T.). From February 22 she was engaged in stencilling shells at the end of a room in which others were filling shells with a 1 in 4 mixture of tri-nitro-toluene and ammonium nitrate. She complained of sickness in the middle of March, and left work, jaundiced, on April 3. She died on April 14, 1916.

Case 4.—Male, aged 25. Was first employed in filling shells with molten tri-nitro-toluene on February 28, 1916. On April 28 he left work with gastric symptoms. He recovered, and on May 15 resumed work. On May 17 he was found to be jaundiced, and was taken to hospital. He died on July 6, 1916.

Case 5.—Male, aged 35. Nature and duration of work not stated. Was seen by the doctor on July 12 for headache, shortness of breath and abdominal pain. On July 20 he was deeply jaundiced and unconscious. He died on July 22.

Case 6.—Female, aged 20. For four or five months engaged in pressing shell charges of tri-nitro-toluene, and probably also in varnishing. Felt ill on July 11, 1916, and was off work from July 11 to 17. On July 17 she returned to work, and complained of headache. She was taken off work on July 18, and died on August 9, 1916.

Case 7.—Female, aged 25. Engaged for five weeks tying exploders of tri-nitro-toluene. On May 17, 1916, was seen by the doctor. Her conjunctivæ were yellowish. She gave a history of having become sick and having vomited constantly a week before; this attack of sickness was followed by loss of appetite. She was taken off work on May 17. On May 22 she returned to work, being employed in the bag stores. On May 26 she was again sick and her conjunctivæ were found to be very yellow. She was taken off work, but refused to come into hospital until June 2. She died on June 18, 1916.

I was permitted by Major O'Reilly to perform the necropsy on this case on June 19, 1916.

Analysis of Lesions.

(*A*) *Macroscopic:* (1) *The Liver.*—In all cases the liver showed the severest lesions. I obtained the whole liver in all seven cases except Case 1; in this case the left lobe had been removed from the specimen.[1] The livers were all greatly reduced in size. Externally they showed extensive areas of depression, over which the capsule was slightly thickened and opaque. There were also projecting areas, over which the capsule was transparent and revealed a lobular pattern. There was one relatively large projecting area on the anterior surface, and a variable number of small projecting areas which appeared as small, isolated, nodules in the sunken areas. The cut surface showed similar areas of depression and raised areas, both raised areas of considerable latitude, and small, projecting, isolated nodules. The cut surface of the depressed areas showed small, grey points, corresponding to portal systems, set close together in a smooth, firm, flat, red ground. The raised areas and nodules were of soft consistence, and in them a lobular pattern could be recognized. The lobules were, with few exceptions, abnormally large. Their peripheries were bright yellow; the centres of the majority were a darker yellow, of others bright red. After fixation the shades of yellow were transformed to shades of green. Between the lobules were sunken, slaty grey lines in which portal systems could be identified. In all the cases, except Case 5, the largest area showing a lobular pattern lay in the anterior aspect of the upper part of the right lobe. This gave a very characteristic shape to the livers. In Case 5, however, it lay chiefly in the lower part of the right lobe. In Cases 5 and 6 one-third, Cases 1 and 2 one-half, and Cases 3, 4, and 7 two-thirds, at least, of the right lobe appeared to have been entirely destroyed. In the six cases in which the left lobe was present, the whole lobe was greatly shrunken and consisted of the firm, depressed tissue with the exception of a few small nodules of lobulated tissue. The Spigelian lobe was either completely or almost completely destroyed, except in Case 4. The weights of the livers were: Case 1 (male, aged 14), 17 oz.; Case 2 (male, aged 14), 20¼ oz.; Case 3 (female, aged 15), 21½ oz.; Case 4 (male, aged 25), 26¼ oz.; Case 5 (male, aged 35), 31 oz.; Case 6 (female, aged 20), 30½ oz.; Case 7 (female, aged 25), 28 oz.

[1] The livers from Cases 2, 3, 4, 5 and 7, and a segment from Case 1, were demonstrated at the meeting of the Royal Society of Medicine on January 23.

(2) *The Gall-bladder.*—In five of the livers sent to me the contents of the gall-bladder were present. The bile was in all these cases thick, slimy and dark brown or green; in two cases (3 and 4) it contained numerous, dark, semisolid particles, the largest of which measured 0·6 cm. in diameter. In Case 7, on which I performed the necropsy, the bile was thin, glairy, and of pale amber colour; on pressing the gall-bladder a little, thin, creamy fluid passed into the duodenum before bile escaped. In no case could I detect, with the naked eye, evidence of inflammation in the wall of the gall-bladder.

(3) *The Hepatic Portion of the Inferior Vena Cava.*—In Cases 4 and 5, thin patches of grey, granular thrombus lay upon the intima of the vein.

(4) *The Kidneys.*—In five cases I obtained one or both kidneys, in a sixth, portions of the kidney only. The kidneys were enlarged, rounded and flabby. The capsule was stripped easily, leaving a smooth surface. The cortex bulged greatly on section, and its breadth was increased in relation to that of the medulla. The cortical pattern was straight, abnormally broad labyrinths alternating with narrow pyramids of Ferrein. The labyrinths were yellow, or, if fixed, green. The pyramids of Ferrein were slaty grey. The weights of the kidneys were: One kidney: Case 1 (male, aged 14), 3¼ oz. Both kidneys: Case 4 (male, aged 25), 11½ oz.; Case 5 (male, aged 35), 15 oz.; Case 6 (female, aged 20), 11½ oz.; Case 7 (female, aged 25), 13¼ oz.

(5) *The Myocardium.*—In the case on which I performed the necropsy, the myocardium of the left ventricle on section bulged, and was soft, somewhat greasy and of pale coffee colour. I obtained a portion of myocardium, fixed in formaldehyde, from Case 6; it was of clay colour. The weights of the heart were: Case 6 (female, aged 20), 9 oz.; Case 7 (female, aged 25), 10½ oz.

(6) *Pancreas.*—The pancreas seen at the one necropsy (Case 7), and portions sent from four other cases, showed no abnormality to the naked eye, except various degrees of post-mortem auto-digestion and putrefaction.

(7) *Spleen.*—The spleen, in Case 7, was somewhat rounded and firm. The cut surface was flat; it showed distinct trabeculæ and small, indistinct Malpighian bodies in a pulp which was red, tinged by yellow. It weighed 6 oz. (female, aged 25). A portion of spleen was sent, fixed in formaldehyde, from Case 6. The pulp was red; the trabeculæ were distinct; the Malpighian bodies were not visible. The organ weighed on removal 7½ oz. (female, aged 20).

(8) *Suprarenal Bodies.*—The suprarenals in Case 7 showed a yellow cortex with an inner zone of brown pigmentation, and a scanty medulla of slaty grey colour. The suprarenals were forwarded from Case 2; they resembled the above, except that the medulla of the left was softened. The right suprarenal was adherent to the liver of Case 3. The cortex was yellow, with a narrow inner zone of brown pigmentation; the medulla was abundant and of a slaty grey colour.

(9) *Brain.*—The brain in Case 7 weighed 2 lb. 13 oz. The convolutions were flattened. There was icteric staining of the choroid plexuses, and of the leptomeninges round some of the veins entering the superior longitudinal sinus. The ventricles contained a few drops of clear, colourless fluid. The cut surface of the cerebral substance was moist; the small quantity of blood which exuded

from the severed vessels diffused rapidly over the cut surface (œdema). The grey matter was grey, the white matter white; there was no alteration in the anatomical pattern. Portions of cerebrum and cerebellum were forwarded from Cases 2 and 3. I could detect no abnormality apart from slight injection of the leptomeninges.

(10) *Bone Marrow.*—In Case 7 (female, aged 25), I found red cellular marrow in the upper three quarters of the diaphysis of the right femur. Dr. Wyon kindly examined for me the marrow of the femur in Case 6 (female, aged 20). Red marrow was present in the head, neck and upper half of the diaphysis; a few small areas of red marrow were present in the remainder of the diaphysis.

(11) *Hæmorrhages.*—In Case 7, hæmorrhages were present in the following positions: Many petechial hæmorrhages, measuring up to 0·8 cm. in diameter, over the small vessels in the great omentum, gastrohepatic omentum, appendices epiploicæ, mesentery, and peritoneal reflexions onto the colon; a few similar hæmorrhages in the parietal peritoneum of the left wall of the abdomen; many petechial hæmorrhages in the lipomatous tissue replacing the thymus; petechial hæmorrhages, about 0·4 cm. in diameter, in the areolar tissue of the anterior and superior mediastina; petechiæ in the prævertebral fascia of neck; pinhead hæmorrhages in the visceral pericardium on the posterior surface of the heart, most numerous on left heart; one pinhead, subendocardial hæmorrhage on the left side of the interventricular septum; several hæmorrhages, averaging 0·5 cm. in diameter, in the visceral pleura, especially on the posterior surface of the lungs; cut surface of lungs mottled with deep red hæmorrhages (areas of bronchopneumonia were present in both lungs); several pin-point petechial hæmorrhages in an area of mucosa, 3 cm. in diameter, on the anterior surface of the body of the stomach; a shallow erosion (0·5 by 0·3 cm.), with a thin layer of altered blood in its base, in the superior border of the duodenum, one centimetre beyond the pyloric sphincter; altered blood in jejunum; numerous pin-point petechiæ in the mucosa of the uterus; two patches of petechial hæmorrhages round injected vessels in the ileum; deep red coloration of external and cut surfaces of cervical glands. In Case 4 (male, aged 25), Dr. Collis informed me that petechial hæmorrhages in the pericardium and endocardium, and larger hæmorrhages in the lungs were found. In Case 6 (female, aged 20), Dr. Wyon informed me that there were many petechiæ in the anterior mediastinum, and several in the mesentery. I did not obtain notes concerning hæmorrhages in the remaining four cases.

(12) *Other Macroscopic Appearances.*—Apart from *icteric staining*, the distribution of which corresponded to that usually found, and the condition of the *intestinal contents*, I found no other abnormalities in Case 7. The stomach contained 2 oz. of thin fluid in which there was altered blood. The duodenum contained a little, pale lemon chyme. The jejunum contained a considerable quantity of thin reddish-brown fluid and a few black, solid particles of altered blood. The ileum contained a little, lemon yellow chyme. The cæcum contained solid fæces of a pale green colour. The colon and rectum contained solid, clay coloured, almost white, fæces.

(*B*) *Microscopic:* (1) *Liver.*—The lesion in the liver may be described in general as a degeneration and necrosis of parenchyma associated with infiltration and fibrosis. The condition is that which is usually called "yellow and red atrophy." Different portions of the liver are destroyed to a different extent. The destruction of parenchyma is greatest and complete in the firm, sunken areas; it is least and incomplete in the soft, raised areas and nodules. Comparison of the histological changes in different cases and in different portions of the liver in individual cases, gives a series of pictures illustrating the pathological process.[1]

The stages of the process are clearest *in the areas in which destruction of parenchyma is least.* The process commences with a degeneration and necrosis of portions of the parenchyma which are furthest from the arterial and portal venous supply. The degeneration thus lies round central and other hepatic veins. It may also extend from lobule to lobule at the points furthest from the portal systems, that is to say along lines which pass through the centre of the intervals between the portal systems bounding the lobules. The degeneration which precedes necrosis is partly fatty, partly dropsical, and partly hyaline. In most cases fatty degeneration is conspicuous; it is greatest in the cells in the periphery of the necrotic areas. The more severe and acute the degenerations and necroses are, the less appears to be the part played by fatty degeneration. In the degenerate areas the trellis fibrils are swollen; the capillaries become dilated and engorged as the cells in the hepatic columns between them shrink or disappear, and small hæmorrhages frequently occur. Many neutrophil leucocytes are present in the capillaries and a considerable number passes into the degenerate intercapillary tissue. This early degeneration and necrosis is accompanied by great infiltration of the portal systems by cells, the great majority of which are neutrophil leucocytes. Infiltration with neutrophil leucocytes was very conspicuous in Case 1; the patient had been ill for twenty days. This infiltration extends from the portal systems along their perilobular branches. It also extends between the capillaries and hepatic columns into the periphery of the affected lobules. Later, multiplication of fibroblastic nuclei is seen in the degenerate areas and the collagen fibrils become more numerous, particularly those close to the central veins. As this fibrosis increases the cells of the infiltration become those of a chronic inflammation;

[1] Twenty-two microscopic sections, illustrating the pathological processes in these livers, and two illustrating similar changes in a case of poisoning by tetrachlorethane, were exhibited.

neutrophil leucocytes give place to lymphocytes, plasma cells and eosinophil leucocytes. The number of plasma cells was very great in Case 4. In this case the patient had been ill for seventy days. An endophlebitis commences in the hepatic veins, the intima becoming thickened and infiltrated with the above cells. The elastic fibres of the walls of the veins become separated, swollen, and to a large extent disintegrated. The necrosed hepatic cells disappear, though some remain as vacuolated "ghosts," in which fat granules may be present. As the necrosed cells disappear granule cells containing fat increase in number. These granule cells are endothelial cells, fibroblasts, and, to a less extent, neutrophil leucocytes. Meanwhile fibroblastic proliferation accompanies the infiltration in, and about, the portal systems and their branches. The neutrophil leucocytes in the infiltration give place, here also, to lymphocytes, eosinophil leucocytes and plasma cells. The spread of the infiltration and fibrosis into the periphery of the lobules broadens the portal systems, whilst the spread along their perilobular branches unites portal systems with one another, and with the strands of degeneration and fibrosis extending from or uniting central areas. The hepatic cells enclosed in the portal fibrosis may undergo fatty degeneration and necrosis, or they are replaced by "pseudo-bile-canaliculi." The elastic fibres in the portal systems are separated and, to a large extent, disintegrated. The small portal systems may disappear almost entirely, their vessels collapsing; I have not detected endophlebitis of portal veins or endarteritis of hepatic arteries. The most advanced, final fibrosis in all seven cases is of very slight density. The fibrils are very delicate and are increased only slightly in number. The fibrosis is usually slightly denser in, and about, the portal systems and their perilobular branches than in the areas of central necrosis. The fibrosis in the central necrosis is densest immediately round the hepatic veins.

In the areas of complete destruction of parenchyma the same processes can be traced. Here, however, the hepatic cells in the peripheral zones of the lobules are destroyed as well as those of the centre. No parenchyma remains except groups of small hepatic cells forming club-like, blind extremities to pseudo-bile-canaliculi; these groups lie in the periphery of the infiltration and fibrosis in and about the portal systems and their perilobular extensions. The infiltrations have the same characters as those already described. The cells therein show the same variations according to the stage of the process; neutrophil leucocytes occur at first but give place to lymphocytes, eosinophil

leucocytes and plasma cells. In these areas, also, degenerate and necrosed, fatty, hepatic cells give place to fat-granule cells. In general the areas of complete destruction contain relatively little fat and few fatty hepatic cells. The great bulk of the fat is contained in phagocytic cells. In the cases in which it is most abundant it is contained chiefly in cells which appear to be endothelial; in the cases in which it is most scanty it is contained chiefly in fibroblasts. As in the areas of incomplete destruction, necrosed, fatty, hepatic cells and fat-granule cells are much less numerous in the portal zone than in the central zones. The variations in the density of fibrosis originating in different portions of the lobule are more conspicuous. The fibrosis in the portal zone is usually slightly denser and contains slightly better developed collagen fibrils than the zone immediately round the central veins. In the area between these two zones multiplication of fibroblasts and fibrils is much less. The most advanced fibrosis is slight in degree.

Iron Pigment.—In sections subjected to potassium ferrocyanide and warm hydrochloric acid no iron was demonstrated.

Light thrown upon the Pathogenesis of "Common or Portal Fibrosis" by Study of the Processes in Tri-nitro-toluene Poisoning.—As described above, the areas which showed a lobular structure to the naked eye are found under the microscope to be areas of parenchyma cut up by fibrous strands of greater or less breadth. These strands usually anastomose, so that a reticulum is formed. They are derived in part from fibrosis of parenchyma which has undergone necrosis at spots furthest from the afferent blood-vessels, that is to say furthest from the portal systems, in part from fibrosis which has followed reactionary cellular infiltration of the portal systems and their perilobular branches. The distribution of the fibrous reticulum resembles that which is found in "common or portal" fibrosis. I have long held that the distribution of the fibrous reticulum in "common or portal" fibrosis could not be explained on the assumption of a primary inflammatory lesion of the portal systems. Such an assumption does not, for instance, explain the frequency with which the fibrous trabeculæ enclose, and extend from, hepatic veins. The study of the reticular fibrosis in these livers poisoned by tri-nitro-toluene gives an explanation of the distribution of the fibrosis in "portal fibrosis." The portions of the parenchyma furthest from the afferent blood stream degenerate, just as they do in so-called "back-pressure atrophy" and in the toxic central necrosis, with parenchymatous regeneration, which is found occasionally in the liver in tuberculous and other chronic infections. If the central

degeneration and necrosis is severe, an active inflammatory reaction leading to fibrosis is stimulated both in the necrosed areas and in the portal systems. The fibroblastic reaction is greatest in those parts of the liver in which the greatest number of fibroblasts are normally present, that is to say, first in the portal systems and secondly in the adventitia of the hepatic veins. In some portions of the sections of the liver in tri-nitro-toluene poisoning the fibrosis of the central necrotic areas is inconspicuous when compared with that of the portal systems. In cases of toxic central necrosis, with regeneration, in tuberculous and other chronic infections, there may be no fibrosis in the destroyed portions of parenchyma although the corresponding portal systems are obviously fibrosed. Further, in tri-nitro-toluene poisoning whole lobules at the side of the portal systems may be necrosed, so that if the fibrosis reached an advanced stage, a very broad strand of fibrosis would appear to be entirely portal. These observations explain why the part taken by fibrosis of portal systems may be so prominent a feature in the picture of certain cases of "common or portal fibrosis" of the liver.

Regeneration of Hepatic Parenchyma.—Examination of the parenchyma in the areas showing a lobular pattern shows that regeneration is slight or absent. The degree of regeneration corresponds approximately to the duration of the lesions as estimated by the density of the fibrosis. The greatest evidence of regeneration is present in Case 3. Here the pseudo-lobules are rounded, and the arrangement of the cellular columns is abnormal; in some of the isolated nodules there is an increase in the amount of parenchyma in the remnants of lobules. In Case 2 slight regeneration is shown by the increased number of cells in some of the pseudo-lobules, and by occasional columns of large hepatic cells arranged in a somewhat concentric manner at the sides of portal systems. In Case 1 there is similar evidence of regeneration in places, but it is still less pronounced. In Case 7 one or two small nodules of irregularly arranged hepatic columns at the side of portal systems point to regeneration. In Cases 4, 5 and 6 I do not think that there is definite evidence of regeneration. It is of interest that in Cases 3, 2 and 1, in which regeneration was most obvious, the patients were the youngest (female, aged 15; male, aged 14; male, aged 14).

Progression of Destruction of Parenchyma.—I attempted to determine histologically whether different lesions in individual livers were of different date by comparison of the degree of fibrosis, of the extent to which fatty hepatic cells had been replaced by fat-granule-cells, and of the nature of the cellular infiltration. By this method, differences,

often very slight, in the date of onset of destruction in different portions of the liver are indicated in all cases. It is of much greater importance to ascertain to what extent the poisoning of the liver by tri-nitro-toluene progresses after the removal of the patient from work with that chemical. A histological estimation of this, by criteria similar to those mentioned above, may obviously be erroneous. Thus, although early, active changes, for instance recent fatty degeneration and necrosis of hepatic columns at the borders of central necroses, suggest that the poison has been acting shortly before death, there is a possibility that these changes are not due to the poison but are secondary to the alterations in the structure of the liver. The recent, active changes in these livers differ, however, from the secondary changes in ordinary, chronic, portal fibrosis. I made an estimate of the degree of recent poisoning in each liver and then, as a control, I compared the degree of fatty degeneration present in the kidney. I estimated that the greatest degrees of recent poisoning of the liver are present in Cases 4, 7, 6 and 1. In Case 7 I do not think there can be any doubt that the poisoning progressed up to the date of death. The greatest degrees of fatty degeneration in the kidney are also found in Cases 7, 1 and 6; in Case 4, however, less fatty degeneration is present in the kidney than in any other case. Very little evidence of recent poisoning is present in the livers of Cases 3, 5 and 2. In Cases 5 and 2 the fatty degeneration in the kidney is relatively slight, but is greater than in Case 4; the kidney from Case 3 was not sent for examination. On comparison, therefore, the estimated amounts of recent poisoning in the liver and kidney correspond closely, with one conspicuous exception, Case 4. This exception is perhaps sufficient to prove my estimations of active poisoning of the liver at the time of death to be of little or no value. I append, nevertheless, the estimations of active poisoning of the liver in a list, arranged in four degrees of decreasing magnitude, accompanied by notes on the duration of cessation from work with tri-nitro-toluene.

Cases 4 and 7: Absence from work—eleven days and thirty-two days respectively.

Cases 1 and 6: Absence from work—nineteen days and twenty-two days respectively.

Cases 3 and 5: Absence from work—eleven days and ten days respectively.

Case 2: Absence from work—fifty-nine days.

Fatty degeneration of the myocardium might also give an indication of the presence of recent poisoning. Unfortunately, the myocardium

was available for investigation in Cases 6 and 7 only. Fatty degeneration was extensive in both cases and was greater in Case 7.

Bile Canaliculi and Ducts.—In the parenchyma of the areas in which destruction has not been complete a greater or less number of intercellular canaliculi are distended by bile, in all but one (Case 4) of the seven cases. The distended canaliculi are seen much more frequently in the hepatic columns next the central necrosis and fibrosis, than in those near the portal systems. Bile is present in only one or two of all the portal ductules examined. Almost all the portal ductules are collapsed, and show a very narrow lumen or no lumen. In the portal ducts bile is not visible. There is catarrhal desquamation in the ducts in Case 2. Desquamation is also present in other cases, but in these no significance can be attached to it in view of the degree of post-mortem disintegration. Albuminous substance and occasional neutrophil leucocytes are present in the ducts in Case 3. In a report of Case 2, on May 5, 1916, I expressed the opinion that the confinement of dilated biliary canaliculi to the central portions of pseudo-lobules, whilst the portal bile-ducts showed marked catarrhal desquamation, and the portal ductules narrowing or obliteration of their lumina, is in favour of the assumption that the jaundice is the result of obstruction. The evidence given below of catarrhal inflammation in the gall-bladder and common bile-duct also favours the view of obstructive jaundice. When, however, destruction of hepatic cells is active, it is impossible to exclude escape of bile into the blood in consequence of parenchymatous disintegration. It can, however, be said that there is no evidence that the jaundice is of hæmolytic origin. Fatty degeneration is frequently present in the epithelium of the ductules and of their continuations as pseudo-bile-canaliculi with bulbous extremities. The fatty degeneration is found most frequently, and is greatest, in the cells forming the bulbous extremities of the pseudo-bile-canaliculi. The frequency of its occurrence and its intensity decrease as the large ducts are approached. The epithelium of the large ducts is very seldom affected by fatty degeneration.

(2) *Gall-bladder.*—The gall-bladder was examined microscopically in two cases. In Case 3 no abnormality apart from desquamation of the epithelium could be detected. Some of the soft concretions within this gall-bladder were examined. They were found to have a matrix of mucus in which lay desquamated epithelial cells of goblet shape. In Case 7 the epithelium was absent. The wall was infiltrated with a considerable number of lymphocytes, endothelial cells and plasma cells,

and with a few neutrophil leucocytes; there was no thickening nor fibrosis of the wall. In this case, when the gall-bladder was pressed, some creamy fluid passed from the common bile duct into the duodenum before any bile appeared. These two cases, therefore, give evidence that mucous catarrh or severer inflammation may occur in the gall-bladder and common bile-duct.

(3) *Kidneys.*—No portion of kidney was forwarded for examination from Case 3. In the remaining six cases fatty degeneration is present. In Cases 1 and 7 it is very pronounced; it is greatest in the first and second convoluted tubules and the ascending limbs of Henle; it is less in the glomerular endothelium and in the collecting and discharging tubules. In Cases 6, 2 and 5 it is present in the same positions but in less amount, the amount in Cases 2 and 5 being considerably less than in Case 6. In Case 4 there is still less fatty degeneration, and it is almost confined to the second convoluted tubules and the ascending limbs of Henle. A few hyaline casts were present in all six cases, chiefly within descending limbs of Henle. A few casts composed of necrosed epithelium were also present in some cases. In no case was there evidence of an active inflammatory reaction.

(4) *Myocardium.*—The myocardium of the left ventricle was examined in Cases 6 and 7. There is extensive fatty degeneration of the muscle fibres in both cases. It is greater in Case 7 (section demonstrated).

(5) *Pancreas.*—Portions of the pancreas were examined in five cases. In Case 1 fatty granules are present in the epithelium of the ductules of Boll, in the centro-acinar cells, in the epithelium of the duct of Wirsung and, very few, in the chief cells of the acini (section demonstrated). In Case 3 fatty granules are present in the cells of the islands, in a few of the chief cells, and in a very few of the cells of the ducts of Boll. In Case 6 fatty granules are present in the cells of the islands, round the nuclei of the chief cells and in a few endothelial cells of capillaries. There is mucous catarrh of the duct of Wirsung. In Cases 2 and 7 post-mortem necrosis and infiltration by aërogenous bacilli prevented the preparation of sections suitable for the demonstration of fat.

(6) *Spleen.*—Portions of the spleen were obtained for examination in two cases only. In Case 6 the organ is greatly engorged. There is a considerable excess of neutrophil leucocytes, many plasma cells are present and there is a proliferation and desquamation of endothelial cells. Only one or two granules of iron pigment were found in a large

section. The spleen has the characters of an engorged, mildly septic spleen. I was informed that no septic condition was found at the necropsy. In Case 7 there are a few central necroses in the Malpighian bodies, a slight proliferation and desquamation of endothelial cells, and a few plasma cells. Only one or two granules of iron pigment were found in a large section.

(7) *Suprarenal Bodies.*—Microscopic examination was made of the right suprarenal in Case 3, and the left suprarenal in Case 2. In Case 3 there is no abnormality. In Case 2 there are some small areas of necrosis in the zona reticulata, and a few cells in the zona fasciculata are necrosed.

(8) *Brain.*—In sections of the cerebrum of Case 2 the meninges and cerebral substance are engorged. There is fatty degeneration of endothelial cells lining capillaries; a few granule cells containing fat are present in the adventitia of cerebral vessels. In Case 3, sections show congestion of the leptomeninges and cerebral substance, fat granules in the endothelium of many capillaries and fat granules in the muscularis of a few arterioles.

Group II.—Case of Slight Jaundice.

Case 8.—Male, aged 52. Worked with liquid amatol at coppers from May 15, 1916, to June 29. On June 30 he was sent home ill and died on August 17, 1916. Many petechiæ appeared on the skin before death, and melæna two or three days before death.

I have been informed that at the necropsy there were slight universal jaundice, petechiæ all over the skin, large petechiæ all down the intestine, a perforated duodenal ulcer, but no peritonitis.

The following was the condition of the organs forwarded to me :—

Macroscopic: (1) *Liver.*—Weight on removal, 2 lb. 14 oz. This liver, and microscrospic sections therefore are demonstrated. When received, the organ was partially fixed by formaldehyde. It was generally reduced in size, felt very soft, crepitated and floated in water. Numerous bubbles of gas escaped on pressure under water. The antero-inferior margin was round except above the fundus of the gall-bladder; here it was thin and sharp, and was continued upwards as a sunken area for a distance of 1·3 cm. The left margin was also sharp, a sunken area extending therefrom to the right, for from 0·3 to 1 cm. Between the right and left lobes was a vertical sunken area, in which the antero-posterior measurement of the liver was reduced to 2·5 cm.

There was also an irregular, slightly sunken area on the anterior surface of the left lobe. On section, the sunken portions of the antero-inferior and left margins, and the sunken areas on the anterior surface of the left lobe and between the two lobes, were found to correspond to areas in which yellowish points, obviously portal systems, were closely set in a flat, reddish ground. This atrophied tissue extended to a depth of 0·5 cm. at greatest, beneath the sunken areas on the left lobe and between the lobes. The cut surface of the rest of the liver showed a small lobular pattern. The centres of the lobules were dark yellow or green, the peripheries bright yellow; between the lobules very narrow, sunken, grey lines could occasionally be recognized. The general appearance of this liver was, therefore, very different from that of those in Group I.

(2) *The gall-bladder* contained dark amber, slimy bile.

(3) *Left Kidney.*—The kidneys together weighed 9½ oz. on removal. The left kidney was small. The cortex was bulged, and measured 0·7 cm., whilst the medulla measured 1·1 cm. The cortical pattern was straight, the labyrinths being pale green, the pyramids of Ferrein yellowish. The medulla was pink, tinged with yellow; the vasa recta were red.

Portions of (4) the *myocardium* of the left ventricle (heart 11½ oz. on removal), (5) the *spleen*, and (6) the *pancreas* were received, partially or completely fixed in formaldehyde. Large gas bubbles were visible in the spleen and pancreas.

(7) *Right Femur.*—Total length, 43 cm.; shaft, 32·5 cm. In upper 23 cm. of shaft scattered areas of red marrow, in a more abundant fatty marrow. Red marrow floats. Remainder of marrow fatty.

(8) *Lumbar vertebra* and (9) *Rib:* red marrow throughout.

Microscopic: (1) *Liver.*—The sunken areas correspond to areas of complete parenchymatous destruction such as has been described in Group I. The density of the fibrosis corresponds to a slightly later stage of the process. A few necrosed, fatty cells are still present, however, and there are no newly-formed elastic fibres. Many hepatic veins are closed by endophlebitis. The remainder of the liver is traversed irregularly by trabeculæ, which occupy the position of elongated portal systems and fibrosed degenerate central areas. The majority of these trabeculæ are very narrow. The fibrosis appears to be of the same density as in the completely destroyed areas. There is evidence of considerable regeneration. In the pseudo-lobules there is an abnormal number of hepatic cells when compared with the large vessels, the majority of the cells are remarkably large and are frequently multinuclear, groups of somewhat concentrically arranged columns of large hepatic

cells are also present at the side of many portal systems; many of the large cells merit the term multinuclear giant cells. There is no evidence of progressing hepatic destruction. No free iron was found in sections treated with potassium ferrocyanide and warm hydrochloric acid.

(2) *Left Kidney.*—There is slight fatty degeneration of the epithelium of the second convoluted tubules and in a very few cells of the ascending limbs of Henle. Hyaline casts are present in several descending limbs of Henle and in a few discharging tubules. In some of the large collecting tubules are casts of bile-stained epithelium.

(3) *Myocardium of Left Ventricle.*—There is no fatty degeneration.

(4) *Pancreas.*—Putrefaction is so great that examination for finer changes is impossible.

(5) *Spleen.*—There are very many eosinophil leucocytes and many plasma cells. There are also considerable proliferation and desquamation of endothelial cells, particularly those of the capillary veins. There are many cells, chiefly endothelial cells of capillary veins, which contain coarse granules of iron pigment. There is no increase in the fibrillar reticulum of the pulp.

(6) *Marrow.*—A portion of marrow from the femur is almost entirely lipomatous. There are a few very small groups of free cells. These have undergone putrefactive necrosis. In these groups are a few cells containing coarse granules of iron pigment. It is possible to recognize the absence of erythroblastic groups and plasma cells.

Remarks on Case 8.

The distribution of the fibrous trabeculæ resembles closely that in common portal fibrosis, but the very early character of the fibrous tissue and the entire absence of newly-formed elastic fibres proves that this is not an ordinary portal fibrosis found by chance in a worker with tri-nitro-toluene. The trabecular fibrosis appears to be of the same age as the fibrosis in the few, small, completely destroyed areas. Apart from the clinical signs, the macroscopic and microscopic peculiarities of this case entitle it to be separated from the cases in Group I. In the absence of any evidence of anæmia, the hæmorrhages in the skin would appear to indicate toxæmia from hepatic insufficiency. Death may have been directly due to the duodenal ulcer. The destruction of the liver is very much less than in the cases in Group I. Further, the histological appearances of the liver suggest that all destruction by tri-nitro-toluene had ceased, and that regeneration had been extensive. The

case resembles, therefore, one in which adequate compensatory hypertrophy has ultimately failed, but the only histological evidence of secondary degeneration in the regenerated tissue is found in the presence, in the pseudo-lobules, of an occasional hepatic cell showing fatty degeneration.

Group III.—Severe Anæmia, Jaundice absent.

Case 9.—Female, aged 38. Engaged in filling shells with tri-nitro-toluene; duration of work not stated. On May 3, 1916, she became ill, suffering from a sore throat and a high temperature. The symptoms resembled those of a type of influenza prevalent at the time. Then a series of minute hæmorrhages in the throat occurred, which caused a constant discharge of blood. At the same time two or three purpuric patches appeared on the neck, chin and chest. The temperature was still above normal. On May 24, hæmorrhage from the throat had ceased. There was alarming anæmia and weakness. The severity of the anæmia suggested pernicious anæmia. In a film, however, no abnormality was observed except anisocytosis. The anæmia and the morphological characters of the blood were said to resemble those of the other two cases in this group. There were never at any time either any jaundice or any gastro-intestinal disturbance. Death occurred on June 2, 1916.

Condition of Organs.

Macroscopic: (1) *Liver.*—Professor Moore informed me that the liver weighed on removal 2 lb. 5 oz., and showed a greatly depressed area between the right and left lobes. Four small portions were forwarded to me in formaldehyde; the solution was stained a pale greenish brown. In two portions, one having been taken from the depressed area mentioned above, there was a zone of firm, homogeneous, grey tissue beneath a thick, opaque, white capsule; the parenchyma beneath showed grey portal systems in a greenish ground. The other two portions had a thin, transparent capsule, beneath which was parenchyma showing grey portal systems in a greenish ground.

(2) *Kidney.*—The left kidney weighed 7 oz. on removal. A portion was forwarded to me in formaldehyde. In this portion the labyrinths were clay coloured and the pyramids of Ferrein slaty.

(3) *Marrow.*—No examination was made of the bones and marrow.

Microscopic: (1) *Liver.*—Sections are demonstrated. In the zone of grey tissue present in two of the portions sent for investigation large portal systems and hepatic veins lie close together. The scanty tissue between them is fibrous, and contains small portal systems and hepatic

veins, pseudo-bile-canaliculi and a few necrosed, fatty hepatic cells. The collagen fibres of the portal systems and walls of the hepatic veins are greatly swollen and hyaline. The elastic fibres of many of the small portal systems and hepatic veins are destroyed to a greater or less extent, the remnants being swollen. At the borders of the large portal systems there are a few delicate newly formed elastic fibrils. There is no discernible endarteritis or endophlebitis in the portal systems. From the deep surface of the zones of grey tissue trabeculæ of fibrous tissue of a similar density pass for a short distance into the subjacent parenchyma. The distribution of these trabeculæ resembles that of a common or portal fibrosis. The capsule is evenly thickened over the zone of completely destroyed parenchyma. In the remainder of the parenchyma in the above two portions of liver and in that of the two portions with a thin capsule, there is a severe fatty degeneration of the centres of the lobules. This degeneration differs from that in the cases of toxic jaundice, in that the columns are preserved, nuclei are almost invariably present in the cells, and the trellis fibrils are not altered. The fatty degeneration is similar to that found in cases of profound anæmia. I could not detect icterus in the sections. No iron was revealed by treatment with potassium ferrocyanide and warm hydrochloric acid.

(2) *Kidney.*—There is great fatty degeneration of the first convoluted tubules and ascending limbs of the loops of Henle. There is a little fatty degeneration of the second convoluted tubules. There are a few hyaline casts in the descending limbs of Henle.

Case 10.—Male, aged 32. The following is an abstract from notes kindly sent to me by Major O'Reilly. The patient had been employed in munition work for nine months. During the first six months he was engaged in the manufacture of amatol and in pouring molten amatol into shells. For the remaining three months he had weighed and pressed dry tri-nitro-toluene. On April 30, 1916, he had an attack of vomiting and of pain in the stomach. This passed off and he continued working. From May 6 to May 13 he suffered from headache, giddiness and loss of appetite. He was admitted to hospital on May 13, 1916. He was then very anæmic and bile salts were present in the urine. On June 1 he left the hospital at his own request to attend as an out-patient. A blood film showed, then, great anisocytosis, leukopenia, absence of poikilocytosis and absence of nucleated red corpuscles. On June 6 he was readmitted. In examinations of the blood made by Dr. Wyon the number of red corpuscles varied from 1,178,000 to 700,000, and the colour index from 0·6 to 1·4; the average colour index was abnormally high. He died on July 9, 1916.

Condition of Organs.

Major O'Reilly kindly permitted me to perform the necropsy. I hope to publish the naked-eye and microscopic findings in detail elsewhere. The following is a summary:—

Macroscopic.—Profound anæmia. No jaundice. Petechiæ in mesentery, left dome of diaphragm, parietal and visceral pericardium, mucosa of pharynx, body of stomach, mucosa of urinary bladder, visceral pleura of diaphragmatic surface of right lung, renal pelves, and lower part of ascending colon. Thin, freely movable film of red clot (1·5 by 1 cm. diameters) in subdural space over right upper Rolandic area. A little blood in subarachnoid space over pole and inferior surface of left temporal lobe, outer surface of antero-inferior part of left frontal lobe, lower part of right ascending frontal convolution, both occipital poles, upper part of left ascending frontal convolution and posterior extremity of left superior frontal convolution. Petechiæ in leptomeninges all over cerebellum. A few petechiæ in substance of cerebrum, several in cerebellum and pons. Anæmia and œdema of brain (2 lb. 9½ oz.). Hydropericardium (3 oz.). Milk spots upon visceral pericardium. Severe, diffuse fatty degeneration of myocardium, with fatty tigering of both ventricles (heart 16½ oz.). Slight atheroma. Œdema of lungs; œdematous collapse of posterior border of right lower lobe. A few delicate fibrous pleural adhesions over outer surface of left lung. Hydrothorax (6 oz. right; 6 oz. left). Rusty brown liver (3 lb. ¾ oz.). Spleen (2¾ oz.) of normal appearance. Anæmia, œdema and parenchymatous degeneration of kidneys (12¾ oz.). Mucous catarrh of stomach. Bile-stained chyme and fæces. Fatty *marrow* throughout right femur, with the exception of a few small pink areas in the spongiosa of the neck. A few small vascularized patches in the fatty marrow of the right humerus. Mottled fatty and red marrow in the bodies of the lumbar vertebræ and in the ribs. Watery, red blood. Very little post-mortem thrombus. Well nourished, well developed, muscular man.

Microscopic.—In the liver the centres of the lobules show a fatty degeneration and necrosis, which has the characters of a degeneration due to anæmia; the hepatic cells in the peripheral zones are loaded with granules of free iron. In the kidneys there is parenchymatous necrosis and degeneration in which fatty degeneration plays a small part. There are a few nucleated red corpuscles and a very few myelocytes in the spleen and lymphatic glands, but there are no definite areas in these organs of myeloid activity. In the spleen there is a considerable number of cells containing coarse granules of iron pigment but extremely few phagocytes containing erythrocytes. In the brain there is fatty degeneration of the endothelium of capillaries. In sections of the marrow of the femur, humerus, and the body of a lumbar vertebra,

such blood-forming marrow as is present shows a relative excess of erythroblastic activity and a great decrease in the number of megakaryocytes. In the marrow there are numerous plasma cells and large phagocytes. The latter contain pyknotic nuclei, erythroblasts, erythrocytes and coarse granules of iron pigment. In the blood I found a few normoblasts, and in the tissues and blood a very few megaloblasts.

Case 11.—Male, aged 37. He had been engaged in ammunition work for fifteen months. He had, like the patient in Case 10, been employed in fusing amatol, being put on other work at regular intervals. I have not yet obtained any history of the illness, but know that the workers in this factory are examined carefully every week. The patient was admitted to hospital on November 16, 1916, and died on January 20, 1917. Dr. P. N. Panton made examinations of the blood and diagnosed aplastic anæmia.

Condition of Organs.

Major O'Reilly again kindly gave me permission to perform the necropsy. The condition found at the necropsy was very similar to that found in Case 10. The following is a summary :—

Profound anæmia. No jaundice. Purpuric spots in skin of abdomen, left chest, back and dorsum of left hand. Hæmorrhage into conjunctiva and iris of left eye. A few petechiæ on posterior surface of great omentum, on outer surface of parietal pericardium and in areolar tissue of posterior mediastinum. Petechiæ in muscle of right dome of diaphragm, serosa of gall-bladder, renal pelves and termination of jejunum. Minute petechiæ in mucosa of centre of œsophagus ; hæmorrhage into, and thrombus upon, mucosa of lower 12 cm. of œsophagus. Streaks of red and altered blood in stomach. Numerous large petechiæ in visceral pericardium over right auricle, one upon right and one upon left ventricle. One hæmorrhage (0·4 cm. diameter) in right lung. Numerous minute petechiæ in anæmic, œdematous cerebrum and medulla, very numerous in cerebellum (brain 2 lb. 14½ oz.). Hydropericardium (4 oz.). Diffuse fatty degeneration of heart (15¾ oz.), fatty tigering of left ventricle. Slight atheroma. Œdema of lungs; œdematous collapse of lingula, anterior extremity of left lower lobe, and upper half of posterior border of right lower lobe. Hydrothorax (3 oz. right, 2 oz. left). Rusty brown liver (3lb. 4 oz.). Malpighian bodies not visible in smooth, red pulp of spleen (2¼ oz.). Œdema and anæmia of kidneys (12¼ oz.). Mucous catarrh of stomach. Bile-stained chyme and fæces. Pale pink tinge in fatty *marrow* in upper 5 cm. of shaft of right femur. Pale pink and yellow, fatty marrow in neck, a few pink areas (largest 0·3 cm. diameter) in marrow of shaft, and pink marrow (? hæmorrhage) in lower 3 cm. of shaft of right humerus. Very pale pink marrow in lower two-thirds of manubrium, in sternum, and in bodies of lumbar vertebræ. Mottled pink and grey marrow in ribs. Watery, bright cherry-red blood. Very little post-mortem thrombus. Well nourished, slightly built, muscular man.

Remarks upon the Cases in Group III.

The exact nature of the anæmia in Case 9 cannot be proved, owing to the incompleteness of the post-mortem examination. According to the examination of the blood before death the anæmia was similar to that in Cases 10 and 11. The liver differed in that free iron was absent; it differed also in containing areas of destruction of parenchyma similar to those found in cases of tri-nitro-toluene jaundice, but of older date than any found in the specimens of Groups I and II. On observing the greenish tint of the portions of liver sent to me, and of the fluid in which they were sent, I considered the liver to have been icteric. The coloration may, however, have been due to contamination by bile from the opened gall-bladder.

Cases 10 and 11 are cases of aplastic, hæmolytic anæmia. I define aplastic anæmia as a chronic anæmia in which the amount of blood-forming tissue is not increased above the normal, but is actually diminished. By hæmolytic anæmia I mean an anæmia in which there is in the liver an excess of iron pigment in consequence of hæmolysis, not of phagocytosis, of red corpuscles. Theoretically aplastic anæmia might be caused by (1) an inherent inability of the tissues to react, as they ordinarily do in cases of chronic anæmia, with an increase of blood-forming activity to restore cells lost from the blood stream, or (2) a destruction of the blood-forming cells in the tissues, with or without destruction of the circulating cells. Definite evidence of destruction of the blood-forming cells in the marrow, in Case 10, is given by the presence of numerous phagocytes containing erythroblasts, nuclei derived possibly from other cells, erythrocytes, and coarse granules of iron from ingested erythrocytes. The large deposit of iron in the hepatic cells I consider to be due to hæmolysis and not to the phagocytosis. Phagocytosis appears to have little or no influence upon deposit of iron in hepatic cells; I have found in diseases of the blood no constant relation between amounts of iron deposited in hepatic cells and degrees of phagocytosis; I have seen a case of anæmia in which phagocytosis of red corpuscles, associated with the formation of coarse granules of iron, was strikingly great throughout almost all the organs, but iron could only be found in small quantity in a few hepatic cells. Hæmolysis would probably occur in the circulating blood as well as in the blood-forming tissues.

The aplastic anæmia in Cases 10 and 11 would appear, therefore, to have been caused by a destructive agent acting upon the cells in the

blood-forming organs and also upon the circulating erythrocytes. As to the nature of this destructive agent, I was requested in October to report whether I considered that the anæmia in Case 10 was due to poisoning by tri-nitro-toluene. I expressed the opinion that it was almost impossible not to regard tri-nitro-toluene, or some chemical associated therewith, as the cause, because there was no lesion to which the anæmia could be attributed; severe anæmia could be caused by similar chemicals and it was very difficult to regard as accidental the occurrence of profound anæmias, clinically similar and both apparently of the very rare aplastic type, in no less than two (Cases 9 and 10) out of ten fatal illnesses which appeared during work with tri-nitro-toluene. There can now be no doubt that aplastic anæmia can be caused by tri-nitro-toluene, or its impurities, compounds or derivatives, because in addition to the occurrence of Case 11 Dr. Panton has informed me that in systematic examinations, made for the Medical Research Committee, of the blood of munition workers he has since found other cases of aplastic anæmia among workers with tri-nitro-toluene.

Case 9 appears to be a link between the cases in which tri-nitro-toluene, its compounds or derivatives, cause hepatic destruction and those in which they cause anæmia.

The study of the lesions caused by tri-nitro-toluene in the liver should be of great assistance in the elucidation of the causes of examples of similar atrophy of unknown ætiology which are found from time to time in the post-mortem room; they are certainly of assistance in elucidating the early changes in ordinary cases of portal fibrosis, and should throw light upon the ætiology of such cases. The study of the effect of tri-nitro-toluene upon the blood and the blood-forming organs should go far to clear up the cause of various forms of so-called idiopathic anæmia, and should indicate the relations of the different forms to one another.

Dr. Israel Feldman.

My name was put down to give a report of the cases that came under my care, and I was to speak in the clinical category; but I think it would be more profitable if, with your permission, I were to discuss the ætiology in connexion with the cases I have seen.

In view of what Dr. Moore said in reference to the site of absorption

of the T.N.T., I should like to emphasize a point which has occurred to me—namely, that from the point of view of the discovery of the actual causative agent, one runs the danger of concluding that the form taken by the actual poison which is causing this series of symptoms is identical with that specific product of T.N.T. which can be identified by what is known as "Webster's test"; this conception originating from and being based upon the well-authenticated fact that people who come into contact with the T.N.T. eliminate a substance in the urine, which is not pure T.N.T., but which, by its reaction to Webster's test, is shown to be a product of T.N.T. Now from my clinical and experimental observations, I would suggest that, whilst the substance producing the toxæmia is undoubtedly a product of T.N.T., it is apparently *not* that product of T.N.T. which can be identified by its giving a positive Webster reaction.

May I support this view by an account of a case which is at present in Poplar Hospital. The history is, that the patient had worked for two months at a munition works, and then she hurt her finger and was sent away. One week later, her finger having improved, she returned to the works, when she was told that her services were not then needed, but would she call again later. On the strength of that she remained away seven weeks. At the end of that period she had an attack of abdominal pain, for which she did not seek treatment. One week later she presented herself at Poplar Hospital, in the ordinary routine, complaining of abdominal pain, and as I noticed that she was jaundiced and ascertained that she had been working in a munitions factory, she was admitted into hospital. On admission, her hands were quite definitely stained yellow, although she had been away from contact with T.N.T for eight weeks. She was jaundiced all over, had abdominal pain and diarrhœa, and was obviously a case of toxic jaundice due to T.N.T. Now Dr. Moore would suggest that the reason why this patient began to get these acute symptoms at the end of eight weeks was that during all this time she was continuing to absorb T.N.T. from her hands, and other parts of her skin, which had become mechanically stained. Now those who come in contact with T.N.T., and in one way or another are actively absorbing it, excrete a urine which definitely gives a positive Webster reaction. Now I am fully conversant with the tests, and have been working in the laboratories of the Physiological Department and of the Medical Research Committee at the London Hospital, and I am greatly indebted to the Committee for much help received. Now the urine of this patient showed no trace of either unchanged or changed T.N.T., although this was tested for immediately on her admission—i.e.,

when she was exhibiting definite symptoms. I also tested her fæces immediately after admission, but they, too, did not contain any trace of the substance. This observation is confirmed by the negative results obtained in four other cases of the kind which have come into Poplar Hospital. This definite absence of recognizable T.N.T. product in the urine in the cases which suddenly show definite symptoms after a period of absence from contact with the T.N.T., suggests to my mind that the acute symptoms (and for that matter also the chronic) are due to a product of T.N.T. which has so far not been recognized as a separate entity. This product apparently possesses the power of accumulating in some part of the body and there lying latent, and under certain conditions is either activated to toxicity or is set free from some controlling reservoir. It might be suggested that the onset of symptoms is due to a gradual or sudden failure on the part of the body to eliminate that product of T.N.T. which gives Webster's test. This, however, is ruled out by the post-mortem examination of a patient who died from toxic jaundice at the Poplar Hospital. In this case I could find no trace either of unchanged or changed T.N.T. (Webster's test) in any of the organs, after adequate extraction in the recognized manner. In addition, there is the evidence obtained from animals. These have been inuncted with T.N.T., and its elimination recognized in the urine. Two have died in the course of the experiment, presumably as a direct result of toxic absorption, but here, again, extracts of the organs failed to reveal a chemical indication of the T.N.T. or its products.

The importance of these observations, to my mind, lies in the suggestion that the substance which is producing the symptoms of toxic absorption is a compound or product of T.N.T. which is not recognizable by Webster's test, but which so far has eluded recognition not only chemically but even by an empirical test.

Another point of interest has reference to the site in the body which is attacked by the poison, whatever be its exact nature. This is exemplified by the case of a patient who was admitted into the Poplar Hospital with very well-defined acute symptoms. Ten days ago she developed delirium quite suddenly. At 3 a.m. I was called up because this patient had got out of bed, and was not in her right mind. She became worse, developed twitchings, was semiconscious, and was roused only with difficulty. She had incontinence of both urine and fæces, developed œdema of the legs and ascites, and her knee-jerks disappeared. The jaundice was intense. The window just above her bed was broken by the great explosion which occurred on Friday last,

and, of course, she sustained a very severe shock. Now the remarkable feature is that by the next morning she had completely regained consciousness, and was quite natural. She still had incontinence of urine, but the incontinence of fæces had disappeared. On Sunday she was much improved, and to-day (Tuesday) I examined her just before coming here, and she is practically in the same condition as she was before the explosion; there is no œdema, no ascites, and the knee-jerks have returned. She is quite rational. Her appetite is voracious. One cannot speculate as to what may be the ultimate prognosis in this case, but this very definitely-marked effect of a severe shock upon the course of the disease, as it reveals itself in changes in the central nervous sytem, may perhaps afford a clue to the mode of action of the absorbed poison.

Dr. Benjamin Moore, F.R.S.

There is one point I should like to answer. Dr. Panton says that if he keeps bottled up a specimen of T.N.T., such as is used in the works, he can smell the nitrous fumes upon opening the bottle. It is here to be remembered that the sense of smell can easily detect about one part in two or three hundred thousand, and I have not found in these factories anything like the amount of nitrous fumes which are obtained when a few cubic centimetres formed by the action of copper upon nitric acid are discharged into the atmosphere of a room. I have had considerable experience of these nitrous fumes, because I was engaged in a case of investigation of flour-bleaching, and the smell in T.N.T. factories is nothing to what obtains near the bleaching plant in an ordinary flour mill, and in the latter there is no complaint of illness. As I said, for twelve consecutive hours we have extracted all nitrous fumes, where most of the melting is going on, and found the amount present infinitesimally small. I want to insist, upon such clear experimental evidence, that the poisoning is not due to nitrous fumes. Neither is the effect due to associated impurities. It is the absolute T.N.T. which gets into the body, in whatever way it enters in. I am speaking now of proof, in the sense that physiologists use the term, I am not criticizing Dr. Panton, but there are a number of people who get on one's nerves by talking of fumes, the amount of which they have never determined, nor made any attempt at finding out how poisonous their imaginary fumes are. It is highly desirable that such persons should

read the scientific proofs already published, and either controvert or accept these, instead of erecting scientific bogies.

Another point is with regard to the T.N.T. reaction in the urine. This still puzzles me immensely, especially as to severe cases still going to the bad after the urine is clear of all T.N.T., and I do not want Dr. Feldman to think I have clear-cut ideas about this. After rubbing the powder on my hands the T.N.T. reaction was obtainable for ten days in my urine: and if a physician had sent me away for ten days on account of minor illness, the poison would still go on hammering at my liver, and, probably, after it has pushed pathological changes past a certain point the action will go on independently even in absence of T.N.T. If we could only see the livers of these cases we should probably find they were hard hit at the beginning; this was probably so in the case which Dr. Feldman described. When the amount of liver tissue changed gets to the physiological limit, there is not enough normal liver left to keep the person alive. I am not contending that for eight weeks poisoning is going on from these reservoirs, but it is very important, when you get a bad case, that you should cut it adrift from all sources of T.N.T. as quickly as you can. We have had cases in which the jaundice came out in five or six days, and in such cases the reservoir has much to do with it.

In those cases where jaundice appears after seven or eight weeks' removal from T.N.T. work, it is probable that the living tissue was badly hit at the point of time of cessation of work, and that thereafter the attack persisted for say a fortnight, during which period the last attack passed any possible recovery point, and degeneration progressed spontaneously, leading to appearance of jaundice and ending in death.

There is no question that the urinary reaction in many individuals can persist for a full fortnight on apparently alternated work, as we have shown in many cases in actual workers.

Dr. E. L. Collis.

I should like to draw attention to one point which has not yet been mentioned in relation to T.N.T. poisoning—namely, the period of employment, i.e., of exposure, of those affected. The condition has been spoken of as if anybody, at any period of their work, is liable to go down. That is probably true to some extent, yet T.N.T. was handled before the War broke out, and men were employed very much as

to-day, though many fewer in number and not handling it so continuously. Now these men have continued to work straight through, and not one of them has gone down with T.N.T. poisoning. The diagram showing the period of employment of those affected, which has been circulated by Dr. Legge, shows a peculiarity: the peak of the curve occurs in the third month of employment, by the fifth month the cases are almost disappearing, and it is fair to say that if we had only had to deal with those few cases occurring after six months of work we should never have recognized that T.N.T. was a poison at all. How this is to be explained it is hard to say. Two theories may be suggested: One, that this curve indicates the elimination of the susceptible, but that

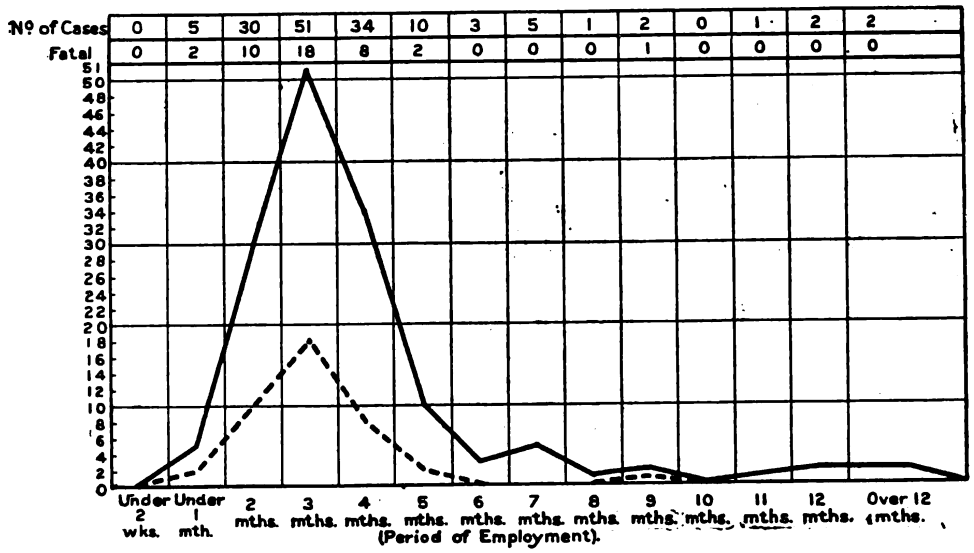

Diagram of duration of employment with exposure to T.N.T. o (1) 146 cases (including fatalities) of toxic jaundice; and of (2) the 41 cases which terminated fatally.

hardly seems probable. The other—and there is something to be said for it—is that after a time the workers attain a certain degree of immunity against the poison. In any case, I think that those who are studying this disease should consider this point, and in any inquiries which are carried out, comparison ought to be made between the blood and other conditions of these people who have been employed a long time on the work with apparent immunity, and those of others who have only recently commenced to work with the substance, some of whom succumb. No one during the discussion has yet drawn attention to this point.

Dr. W. J. O'Donovan.[1]

Interesting as are the clinical results of T.N.T. absorption it is important to remember that the problem presented through the handling of this explosive by thousands of workers is not mainly one of clinical symptoms and diagnosis but is the largest problem of preventive medicine that has yet arisen from any manufacturing process.

A great light is thrown on the ætiology of both cirrhosis of the liver and the severe anæmias by the post-mortem blood changes found among T.N.T. workers, but it was realized in the summer of 1916 that the health of munition workers was being menaced on so extensive a scale that every step that analogy could suggest had to be taken with great rapidity to prevent or minimize absorption, and we were fortunate in having both the preventive and clinical Home Office experience with di-nitro-benzene and aeroplane dope workers at the disposal of the Ministry of Munitions.

It is to be borne in mind that in this country non-occupational acute yellow atrophy in civil life apart from phosphorus poisoning is no new thing. The following deaths have been reported to the Registrar-General at Somerset House from this cause, and the figures recorded are too constant to be due to faulty diagnosis:—

	Male	Female	Total
In 1911	17	26	43
In 1912	16	40	56
In 1913	16	33	49
In 1914	30	49	79
In 1915	22	30	52
In 1916 (figures similar bu incomplete).			

The ill-effects that T.N.T. workers suffer from can be classified under five main headings: (1) Dermatitis; (2) an early irritative gastritis; (3) affections of the blood or the blood-forming organs; (4) a toxic, or symptomatic, gastritis; (5) toxic jaundice.

The *dermatitis* is, in my experience, a diminishing feature among employees. Susceptibility plays a large part; most workers are never attacked, whereas a few are severely affected at every exposure, even of slight duration. An erythema, eczema, or cheiro-pompholyx eruption may result, septic secondary infection is common and thrombo-phlebitis

[1] Ministry of Munitions.

is an occasional complication. Itching is often intolerable and the lesions are often very resistant to treatment; as might be expected, the hands and wrists and ankles, where rubbing occurs, are the commonest sites, but I have seen facial and intercrural attacks. Yellow staining of the skin is common on the palms of the hands and soles of the feet, and the hair of workers and is an index of some failure in the measures taken to ensure clean working.

The *irritative gastritis* is a symptom that many suffer from in their first week of work upon T.N.T. Vomiting in the early morning and occasionally after food, together with some loss of appetite are the only symptoms. This is, I think, due to the swallowing of T.N.T. to which the stomach easily becomes tolerant. A purge, a day or two's holiday and rarely, a short course of bismuth, suffice for a complete cure. Many of these cases, however, must be due to psychic causes and it is strange that the distribution of free hot cocoa or milk has greatly lessened the incidence of this symptom in many factories. During the first few days of working, lachrymation and irritation of the fauces are often noted also.

Toxic Gastritis.

This is a far more disabling affection. I saw hundreds of these cases last summer, but the numbers have fallen off to an extraordinary degree with the onset of the winter season. Pain is the chief and often the only symptom. The pain is epigastric or in the lower chest, quite local, and varies from tolerable discomfort to great severity. It is colicky in character and has no definite relation to meals. Neither warm food nor starvation relieve it; vomiting is not a common coincident symptom and as a rule gives no relief; rest is a palliative. Persistent nausea and aversion to food are usually present, and loss of weight goes hand in hand with this. Constipation is the rule; diarrhœa is rare. The signs that these people show are few; in marked cases their general apathy and muscular weakness is confirmation enough of these symptoms. The pallor of such cases and their miserable, drawn, wizened faces and dull sclerotics often form a striking feature among a row of men or women waiting to see the factory doctor. Their tongues are clean, and this point is of great help in differential diagnosis. High-coloured urine (not met-hæmoglobinuria) and frequency is commonly noted by the patient. Abdominal examination reveals nothing, though general epigastric tenderness will be found in severe cases. Cases of gastritis showing cyanosis of lips or tongue are as a rule severe; symptoms which

show themselves from a fortnight to nine or ten months after employment have often existed for a week or two before medical help is sought and two to six weeks may elapse before the patient is fit to resume work. Relapses are not common, but if severe, should be sufficient warning that any particular worker should be permanently kept from any form of T.N.T. manipulation.

The convalescence of these patients is often unduly prolonged by the fear of returning to work at shell-filling; and, if these cases are not followed up, they frequently show a pronounced tendency towards chronic invalidism.

The *differential diagnosis* of toxic gastritis is important and not always easy. Many cases show no physical signs and many workers legitimately desirous of a holiday are well acquainted with the symptoms. The art of medicine, the critical judgment that practice only gives in assessing accurately the value of a patient's story, are here invaluable. The morning vomiting of the alcoholic and even of the pregnant are often passed as due to T.N.T. The situation in the lower abdomen of colic due to constipation, and its usual prompt relief on purgation, form a guide to a right conclusion in many cases. Dyspepsia due to oral sepsis and gross errors in diet are pitfalls only for the unwary. In a minority of these gastric cases the pain comes on up to an hour after food, which is slightly relieved by vomiting; the absence of pain, awakening the patient at night, the short history of weeks instead of years, and absence of periods of freedom from symptoms, enable one to distinguish these cases from cases of gastric ulcer, in which nocturnal pain and a lengthy but intermittent history of pain after food are outstanding symptoms. The neurasthenic after a time reveals himself by his negativistic attitude to all suggestions as to improvement and his maintained weight in spite of his continued pain and anorexia. "His speech bewrayeth him." But there is no excuse for the cases of dysmenorrhœa, appendix abscess, gastric and duodenal ulcer and of cancer of the stomach that are certified as due to T.N.T., and which add heavily to the work of the factory medical officers in examining these cases of strangely prolonged absence from work.

Blood Changes. — Newcomers to a shell-filling factory are often struck with the pallor of many workers. To investigate this, Dr. Panton, at the request of the Ministry, undertook an extensive examination of the bloods of factory workers, with a strikingly negative result. Prolonged working on T.N.T. seemed, if anything, to be a slight stimulant to hæmopoietic action, and the pallor is probably a vasomotor

phenomenon unrelated to any blood changes. I have seen three workers with symptoms directly referable to their blood condition:—

J. B., male, aged 60, worked four months in a melthouse loading shells into trucks. For fourteen days he complained of continuous epigastric pain with anorexia but no vomiting; breathlessness and palpitations ensued, and he was admitted into Nottingham General Hospital on August 27, 1916, a sturdy built, pallid man, feet swollen, no adenopathy, no oral sepsis, clinically a case of typical, severe, secondary anæmia. His blood was examined by Dr. Jacob, pathologist to the hospital, and Dr. Panton, and under ordinary treatment he has steadily improved.

October 1.

			Stained film
Red blood corpuscles ...	1,410,000	Polymorphoneutrophils	22·0 per cent.
Hæmoglobin	25 per cent.	Small lymphocytes ...	74·0 ,,
Colour index	0·9	Large hyalines	4·0 ,,
White blood corpuscles ...	5,200	One nucleated red cell seen.	

December 7.

			Stained film
Red blood corpuscles ...	2,225,000	Polymorphoneutrophils	51·5 per cent.
Hæmoglobin	40 per cent.	Small lymphocytes ...	11·5 ,,
Colour index	0·9	Large lymphocytes ...	14·5 ,,
White blood corpuscles ...	16,000	Large hyalines	22·0 ,,
Nucleated red cells absent.		Myeloblasts	5·0 ,,

A second, even more interesting example of what has of late been termed "aplastic anæmia" is furnished by the patient A. K., lately under the care of Dr. Phear, in the Royal Free Hospital:—

A. K., a male, T.N.T. worker, aged 38. Previously perfect health. Jaundice definite in June, 1916, resumed work (trucking ammonium nitrate) on September 16. January 8, epistaxis, pallid, yellowish conjunctivæ. On January 12 I admitted him to the Royal Free Hospital; breathless and feeble, S.M. at all areas, collapsing pulse, retinal hæmorrhages, sallow, lemon skin and sclerotics and a blood picture of severe erythrocyte destruction and no marrow reaction.

Dr. Panton will report later in detail on the blood of these and other cases.

I performed a post-mortem on A. K., aged 38, at the mortuary, Maidenhead, on February 17, 1917. Well nourished, lemon tinted, pallid man, purple lips. Rigor mortis present. Subcutaneous fat deep yellow; muscles bright red. Peritoneum smooth and glistening, no free fluid. Diaphragm, fourth space right, fifth space left. Fibrous peri-cæcal adhesions; 4 in. of appendix coiled in R.I.F. Pleura: No free fluid; obliterating fibrous adhesions left side; obliterating fibrous adhesions right upper lobe. Pericardium smooth: 3 oz. clear straw coloured fluid. Numerous sub-pericardial visceral petechiæ. Left ventricle firmly contracted; right ventricle flabby. Pulmonary artery

contained elastic pale pink clot; left auricle fluid blood; left ventricle dull light brown muscle; endocardium showed tabby-cat striation. Right auricle pink jelly clot; right ventricle natural; coronary arteries patent; atheroma, small plaques along commissure of aorta. Lungs: Left—pink, soft, well aerated; calcareous nodule below scar in posterior part of left lower lobe. Right—œdematous throughout, aerated throughout. Mesentery: Moderate amount of fat. Spleen: 2½ oz.; no adhesions; wrinkled surface, sharp edge; on section pattern distinct. Bile duct, hepatic artery and portal vein patent. Stomach contained ½ pint grey fluid; mucous membrane smooth; no ulcer, no scar; pin-point hæmorrhagic erosions on greater curve. Liver: 34 oz.; no adhesions; deep brown colour; rounded anterior edge; a 2 to 4 cm. wide vertical scar deforms right lobe in anterior and lower surface: a vertical cleft runs down the right lobe almost bisecting the organ; under surface of all lobes shows scattered shallow puckerings; ostia of hepatic veins patent; on section it cuts toughly; greater area is of natural pattern with a nutmeg-like yellow-brown fine mottling; an area of tough fibrous tissue with no apparent structure extends 0·2 to 0·5 cm. below surface of the greatest scar. Gall-bladder: ½ oz. black-green viscid fluid. Suprarenals firm; on section natural pattern. Kidneys: 12 oz.; in both capsules strip easily, on section firm, œdematous; demarcation clear, cortical pattern distinct, no cortical atrophy, a little pelvic fat. Skull: Natural thickness, sinuses, no clot. Brain: 48 oz.; convolutions natural, ecchymoses over right frontal, right temporo-sphenoidal, and both occipital lobes; arteries, ventricles, grey nuclei, corpus striatum, pons, medulla and cerebellum, natural. Middle ears dry. Testicles natural. Bladder: ½ pint clear urine, smooth mucosa; prostate on section usual pattern. Rectum: Scybala. Colon: Scybala. Small intestine: Bile-stained mucus. Femur: Very faintly pink; firm, fatty marrow throughout. Glands: Sub-maxillary lymph glands, 1 cm., red; inguinal glands, 1 cm., light pink; femoral glands, 1 cm., light pink; axillary glands, minute; bronchial glands, 1 cm., anthracotic; paratracheal glands, 0·3 cm., bright red. Pancreas firm, on section natural pattern. Glands at head of pancreas, 2 cm., pink, firm. Upper abdominal glands up to 1 cm., bright pink. Lower abdominal glands up to 0·5 cm., pink. Tongue: Brown fur, on section usual pattern. Tonsils not enlarged, small concretions. Œsophagus natural. Thyroid gland natural. Trachea red, sub-mucous hæmorrhage on right vocal cord. Recent blood-clot round pallid gums.

Both this and a third case (S. S.), and a fourth anæmic case (R. R.), showed a phenomenon which cases of toxic jaundice also occasionally show—namely, a prolonged latent period between the exposure to T.N.T. and the development of symptoms. R. R. weighed T.N.T. in a press-house for four months until November 9 when he was removed, distinctly jaundiced, into Nottingham General Hospital. He was re-admitted with weakness and swelling of the legs on January 26, 1917. Red blood corpuscles, 3,300,000. Hæmoglobin 45 per cent. These cases are extremely rare, not more than seven (with three deaths) have

occurred in the whole country, and none has shown signs of changes in the central nervous system.

Cyanosis is common among T.N.T. workers in all forms of occupation; in its slighter forms, opinions vary as to the frequency of its incidence, but in September last, at one factory it was discoverable in about one in ten of the workers. Generally, the cyanosis is quite symptomless, but it may be very evident in severe cases of toxic gastritis; men have been known to their foremen as blue for months, and have, meanwhile, worked hard and remained free from symptoms. Breathlessness on exertion may be elicited but is not the rule. It is strange that a rarely reported condition of an attack of collapse and dyspnœa, spoken of as "gassing" (I have only heard of two of them and have seen none) is not more common, at least, among those with a definite pathological fixation of hæmoglobin by a met- or NO-hæmoglobin change.

Toxic Jaundice.

Two points call for consideration before I touch upon the symptomatology of cases of toxic jaundice. First, the extent of this calamity—for it is nothing less—being harmful or fatal to the individual and bringing an atmosphere of apprehension into every factory where T.N.T. is handled. Secondly, what predisposing causes do we know of, or what premonitory signs are there to warn us? In all, about 100,000 workers are, or have been, in contact with T.N.T. at one time or another, and fifty-three are known to have died, giving a mortality rate of about 0·05 per cent. In all, 181 cases of toxic jaundice were reported to the Home Office in the year 1916. The incidence of sickness of all kinds due to T.N.T. in various factories shows great variations; a factory with an 11 per cent. T.N.T. sickness in August, 1916, has shown a steady fall to 1 per cent., and the actual mortality from toxic jaundice appears also to be lessening. In August, 1916, there were thirty-seven cases with eight deaths. In December, 1916, there were twenty-six cases with two deaths.

As to the ætiology of this condition, I am very much in the dark. It was early shown that young adults were frequently attacked and showed a high death rate; in consequence, employment in T.N.T. below the age of 18 is, wherever possible, prohibited. It has been suggested that alcohol, syphilis, adenoids, obesity, and bad feeding are predisposing causes, but no evidence is available pointing in this direction. No post-mortem is recorded with mesaortitis, the most constant

syphilitic lesion, and all the post-mortems I have seen have, apart from the effects of T.N.T., showed a remarkably healthy condition of all the viscera. The youngest case of toxic jaundice reported was a boy, aged 14; the eldest, a man, aged 52.

The *duration of employment* on T.N.T. before the onset of jaundice varies from three days to seventeen months.

S. C., male. Examined and passed as fit for work on January 2, 1917. No previous illness, no physical defects. January 2: Worked 4 p.m. to 7 p.m. January 3: Worked 6.30 a.m. to 7 p.m.; diarrhœa in evening. January 4: Worked 6.30 a.m. to 6.30 p.m.; diarrhœa and griping abdominal pain. January 6: diarrhœa, pale stools, general icterus, appetite excellent; recovered.

One case was reported as jaundiced after one and a half weeks' work at pellet pressing, in August, 1916, and in January, 1917, two were reported after two weeks' work, one working on bag filling and the other in a melthouse. Dr. Legge has pointed out graphically, however, that the greatest incidence of jaundice falls about the third month of employment.

A Latent Period.—An interesting observation, is the long interval that may elapse between employment on T.N.T. and the development of any signs or symptoms of its ill effects—e.g.:—

C. M., a boy, aged 16. Worked in a melthouse from May 23 to end of June, 1916. He was discharged for threatening to blow the place up. He worked on his father's farm from the end of June to August 28, and during the middle of this period felt sleepy for three days. On August 28 he saw his doctor for vomiting, on September 1 he was jaundiced, and on September 9 he died.

Two days later I did a post-mortem in his cottage: Body well nourished, well developed: general icterus. Dura mater bile stained, meninges congested. Heart, 10 oz.; sub-pericardial petechiæ, post-mortem degeneration of friable soft muscle. Lungs: Acute bronchitis, broncho-pneumonia in left lower lobe, recent subpleural small hæmorrhages, old adhesions at bases. Stomach contained a pint of brown fluid, intestines contained bile-coloured fæces, mesentery numerous petechiæ, caseo-calcareous paracæcal glands. Kidneys, petechiæ in hilum, severe cloudy swelling. Bladder petechiæ, bile in urine. Liver, 18½ oz.; yellow, small, raised nodules on exterior and red cut surface, gall-bladder contained yellow bile. Other organs natural.

Premonitions.—The early signs and symptoms of toxic jaundice are of paramount importance, since the earlier these cases are removed from their work the better the prognosis. Of the last thirty cases which I have come across, fifteen had a premonitory period of a day to a month, most had about a week of dizziness, tiredness, headache,

and an overpowering desire to sleep through the day; dyspepsia with frequent vomiting and increasing upper abdominal pain was present in varying degrees in most of these cases. In the remaining fifteen cases, however, *there was no warning*. They were sent to the doctor by their charge hands or were picked out at medical inspections by the factory or visiting medical officers. One whom I picked out on a railway platform, on his way home after work, had deeply jaundiced conjunctivæ and general icterus, and he resented strongly an interference with his continued employment. In many cases an absolute diagnosis of icterus is difficult in the early stages, so many workers have transient loss of the whiteness of their sclerotics from ill-health or other causes, and here an old laboratory test has been used with great advantage. A little blood of a suspected worker is drawn into a collecting tube and allowed to coagulate; the serum above the clot is occasionally a vivid yellow colour, and it is advisable to remove at once away from T.N.T. work anyone giving such a positive reaction. Dr. Castellain has used this test extensively and with very satisfactory results. Since, then, toxic jaundice may appear "like a thief in the night," all overlookers in every factory, and those holding any position of responsibility, should, and in practice often do, maintain a constant attitude of suspicion towards the colour of the people around them. When jaundice is established and the patients are in hospital, as a general rule, they are free from distress and have a constant desire to be out and about. Dr. Barnes has aptly compared this to the "Spes phthisica."

Vomiting is sometimes intractable, often recurring at each attempt at solid food. The appetite is generally very good except in severe cases where the cholæmic state is very obvious. Profuse hæmatemesis has been noticed in one case, and I have seen post mortem in another case the small intestine loaded with recent and slightly altered blood, although I could discover no lesion of the mucosa. Constipation is very common and the stools are white and hard, though natural coloured stools may be passed and viscid bile in fair quantity is often to be found at post-mortem examinations.

Abdominal pain when present is referred to the liver region, and in two out of five severe cases from the same factory I elicited marked tenderness on pressure on the liver area, but this is unusual. One of these cases recovered.

Liver Dullness.—This is a variable area, depending on the obesity, the degree of emphysema and of flatulence in a particular case. Never-

theless I have observed a definite diminution of liver dullness in two of five cases, and its complete absence before death in two fatal cases. In one of the above five cases which eventually recovered, the liver when first examined could be felt a finger's breadth below the right costal margin; a slight increase is often noticed in the area of dullness of early slight cases.

Ascites I have only seen in two cases, one died and the other was gravely ill, but discharged herself from hospital still with ascites.

The *pulse-rate* varies from case to case: Two patients similarly jaundiced may have pulse-rates of 48 and 88.

Personally I have not seen *pruritus* in any case of toxic jaundice.

Pyrexia.—As a rule these patients show a normal temperature; an irregular pyrexia of 100° to 102° F. is not uncommon, and does not invalidate a diagnosis of T.N.T. jaundice. The diagnosis of slight cases of toxic jaundice from ordinary catarrhal jaundice is, however, in my opinion, at present beyond our powers. The first chart below shows a mild pyrexia in a case which died, the second the pyrexia in a case which recovered.

A. N., single, aged 38. No previous illness. Onset of deep symptomless jaundice after three months' work filling shells, with fortnightly alternation. The jaundice appeared on September 28, 1916, during a short holiday, three days after exposure. On September 30 she had lower abdominal pain and diarrhœa. On October 2 she felt fit and returned to work, but I sent her immediately into Poplar Hospital under Dr. R. A. Rowlands and Dr. I. Feldman, House Physician. October 2: On admission she was deeply jaundiced and well nourished. Urine: Specific gravity 1015, showed albumin a trace, bile salts and pigment present; no reducing action of Fehling's solution. No reaction to the test for T.N.T. in urine (Webster). The sediment showed oxalate, leucin and tyrosin crystals. Fæces, no T.N.T. The only other physical sign of note was a systolic at the pulmonary area. October 9: Sudden drowsiness at midday and incontinence of urine appeared, œdema of legs. October 10: General muscular twitchings. October 11: Deeply unconscious; ascites; death at 5.30 p.m.

With Dr. Rowlands's permission I did the post-mortem at 11.30 on night of death: Rigor mortis absent; deep general icterus; œdema of ankles; small blood-clots on roots of teeth; purple bruises 1 cm. in diameter on front of chest. Skull: Natural thickness, dura stained yellow, fluid red blood in sinuses. Abdomen distended, one pint of straw-coloured ascitic fluid. Thorax: No free fluid; a few fibrous adhesions behind right lower lobe of lung. Pericardium: 1½ oz. of straw-coloured fluid, a few purple subpericardial petechiæ. Heart: Left ventricle pink, firmly contracted; right ventricle flabby, contained dark red jelly clot; no endocardial petechiæ;

valves all thin and flexible; coronary arteries patent; yellow staining of interior of systemic and pulmonary aortæ; atheromatous flecks in arch of aorta. Lungs: No bronchitis; a little collapse in posterior part of left lower lobe. Tongue, œsophagus, tonsils, trachea, and thyroid gland natural; thymus replaced by fat. Diaphragm at level of fourth rib, right and left. Mesentery: Numerous black and purple petechiæ. Gall-bladder contained 1 oz. of dark slimy fluid; the bile duct, portal vein and hepatic artery were patent. Liver: 40 oz.; sharp flabby anterior edge, no adhesions, hepatic veins patent, surface deep chocolate, numerous slightly projecting, discrete and clumped yellow nodules, 1 mm. to 3 mm. in diameter; on section a mottled red and yellow surface which shows sunken red areas traversed by fine interlacing blue lines, but the larger area of the cut surface consists of raised, generally coalescing yellow pinhead nodules. All lobes were equally affected.

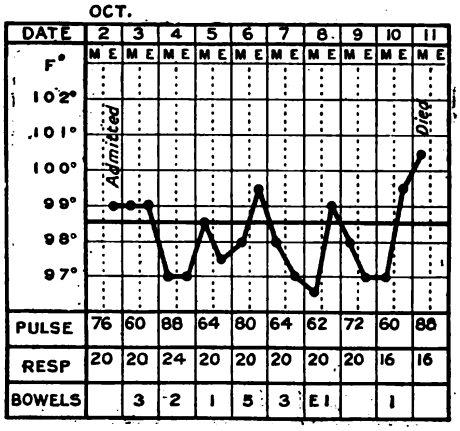

CHART I.—A. N.

Microscopical (P. N. P.): Lobular arrangement still exists, well marked fatty degeneration of liver cells; no actual necrosis; an increase of interlobular connective tissue. Pancreas, spleen, suprarenals, uterus and appendages natural. Kidneys: 12 oz. together, capsules strip easily, on section demarcation of cortex from medulla clear, cortical pattern distinct. Microscopical: Fatty degeneration of tubular epithelium, no interstitial change. Sections of liver and kidneys stained for spirochætes gave a negative result (P. N. P.)

G. R., aged 18, single. Worked five months filling shells, with fortnightly alternation. October 22: Felt drowsy, went on working. November 13: Noticed she was slightly yellow and felt slight abdominal pain. November 20: Admitted to Royal Free Hospital under Dr. Carr. No other physical signs save jaundice, bile in urine. November 22: More jaundiced, more drowsy, vomited, very constipated. November 25: Still vomits frequently. December 7: Light-headed in night. December 14: Urine 1012, marked reduction of Fehling's

solution and gas-bubble with yeast, no di-acetic acid found. December 15: No reduction. December 19: Jaundice almost gone. January 26: Sent to convalescent home, looking and feeling well.

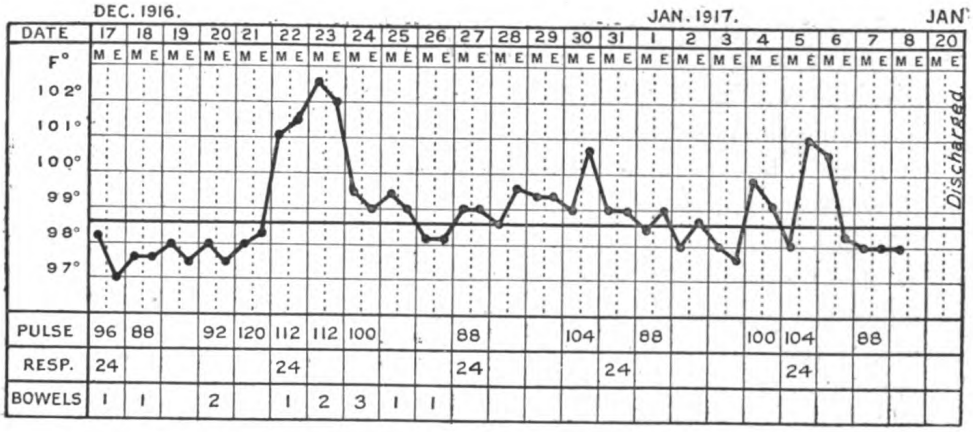

CHART I.—G. R.

H. K., aged 32, married; no previous illness. Worked in T.N.T. September 16 to November 30. Admitted into Nottingham General Hospital under Dr. Jacob, on December 4, and discharged himself on December 13, 1916. Slight general icterus, stools natural, liver dullness natural.

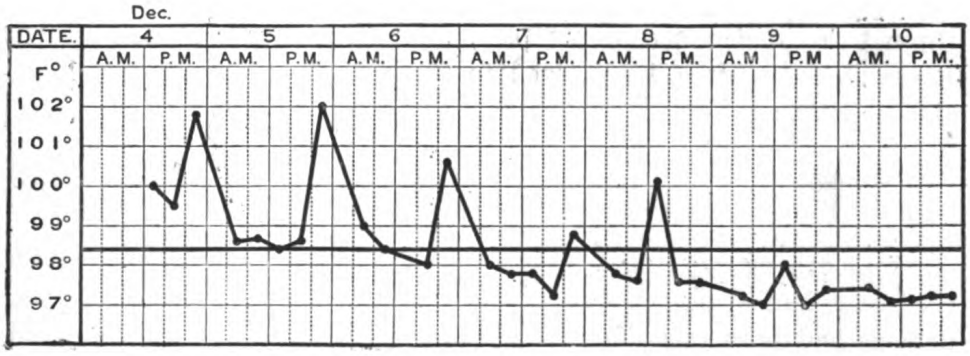

CHART III.—H. K.

Seen on March 17, 1917, still weak, short of breath on exertion, occasional attacks of severe epigastric pain at any time; sclerotics faintly yellow.

The prognosis of toxic jaundice is very uncertain; youth and continued exposure after jaundice has set in are bad features, but cases that have become delirious or stuporous have recovered. Early hospital

treatment is of great importance. When fatal symptoms supervene their onset is usually sudden, patients sitting up, eating well, and with no distress of any kind may suddenly become noisy and convulsed or sink into coma. It is not the T.N.T. that is the definitive cause of death in toxic jaundice. The acute or chronic degeneration may leave the sufferer with a certain amount of hepatic insufficiency; it is then a matter of waiting for the gradual accumulation of autogenous toxins to determine the onset of a cholæmic state.

Of more interest and of more widespread importance is the question as to what morbid process is occurring in the viscera of those ill from T.N.T. but never reaching the jaundiced state. In my opinion, based upon the frequency of toxic gastritis compared with the rarity of jaundice, the absence of premonitory symptoms in so many jaundiced cases and the restriction of most cases of jaundice to the period about the third month of employment, it is probable that toxic jaundice is only one of several distinct bad effects of T.N.T. absorption, and the fear of a widespread incidence of hepatic cirrhosis is unfounded.

Finally, I feel that I should express frankly how much I feel the country owes to Dr. Legge of the Home Office. Early in March and in August, 1916, amid much opposition, he pointed out that the skin was a path of absorption, and the danger of this has been confirmed and emphasized by the experimental work of Dr. Moore and his assistants. In organizing the attack upon this problem Dr. Legge, through his experience of the past, and Dr. Fletcher of the Medical Research Committee, have given to the Ministry of Munitions invaluable assistance.

Dr. J. A. P. Barnes.

A month or two ago I collated my clinical records of some 1,176 persons I had examined during the year then ended. Each of these persons had been re-examined every fortnight for varying periods from two to twelve months. My experience was, in the main, in accordance with the official statement published by the Ministry of Munitions on December 16 last. But some other interesting facts also emerged. They are as follows:—

(1) Some occupations would appear to favour the absorption of the T.N.T. more than others: (*a*) Of those whose business it is to fill hand grenades with ammonal, I note 12 per cent. develop jaundice (4 per cent. were severe cases) [275 persons]. (*b*) Of those who fill bags with

T.N.T., using a "rammer" for the purpose, 10 per cent. develop jaundice or cyanosis (3 per cent. were severe cases) [266 persons]. (*c*) Of those who "tie" bags of T.N.T., using vaselined silk for the purpose, 7 per cent. developed jaundice (1 per cent. was a severe case) [98 persons]. Whereas the cases of jaundice occurring among those in other occupations were very much less frequent. These other occupations were: the carrying of powder from the magazine to the huts; the packing of the bags of powder; the weighing and pouring of the powder into the moulds, where a metal scoop was used, and the hand came less directly into contact with the powder.

(2) Collating my records of workers whose hands come into contact with the powder, and whose hands, in the one case, are greasy or oily, and in the other case free from oil or grease, I note that 17 per cent. of those with greasy hands developed grave symptoms [187 workers]; only 11 per cent. of those with dry hands developed grave symptoms [865 workers]. An oily skin would seem to facilitate absorption. The group of workers with oily hands included the tiers of bags, who used vaselined silk, the workers using cloths moist with olive oil to clean the mould or bench, and the workers who handle lard in waxing the bombs.

(3) My record of cases among sixty persons engaged in the melt-house, show that six developed signs of cyanosis as a first grave symptom, whereas none showed signs of jaundice. This is a little remarkable. Whether signs of jaundice would have occurred, had the worker continued to be exposed to the vapour, must be conjectural. In no case was he or she so exposed after cyanosis had shown itself. In three of these cases the cyanosis was severe, in three it was slight. Respirators had been supplied. In no case were they habitually worn.

(4) Of 1,176 persons examined, 11½ per cent. (138) showed toxic symptoms of cyanosis or jaundice.

(5) I should like to lay stress on the important part excretion from the skin plays in retarding the date of development of grave symptoms and in promoting recovery. Dr. Legge has recorded that the onset of jaundice occurs more frequently about the eleventh week. In one of my factories it would appear to occur about the seventeenth week. This comparatively late development of jaundice is explained, I think, by the conditions in the factory, the size of the huts and their ample ventilation encouraging freedom of movement of the girls and free excretion from the skin. As to retarded recovery, an object lesson was recently afforded me. Some twenty girls, showing slight signs of conjunctival jaundice or cyanosis, were transferred, at my direction,

to "sewing bags" away from contact with the T.N.T. It chanced that about half were set to sew in the hall of an adapted brick house; the other half in a large wooden hut. Re-examining, ten days later, I was shocked to find the first company of girls in every case worse, even much worse. The second company was better, some girls apparently quite free from ill-health. In the brick built hall, the ventilation was poor, the physical movement of the girls limited by overcrowding. In the wooden hut the ventilation was free, and the physical movement of the girls relatively unrestrained in the ample space the hut afforded. It is a common complaint of the workers when they are transferred from "ramming" to an occupation requiring less expenditure of physical energy, that they "never feel so well" in the new occupation.

I am of opinion that a change of occupation may sometimes precipitate the signs of absorption in a worker who has worked in contact with T.N.T. in apparently good health for a great many weeks. The different habit of work, and the different standard of ventilation in the new workroom, may limit excretion from the skin.

(6) Two of my cases especially support the theory that T.N.T. lies stored in the body without necessarily producing signs of ill-health for some time after removal of the worker from contact with T.N.T.

Female, aged 33. Filling bags and ramming powder into them. After twelve weeks' work proceeded, in apparently excellent health, into the country for a holiday. Three days later showed severe cyanosis and marked conjunctival jaundice. Symptoms rapidly grew worse. General jaundice occurred, with dyspnœa. Œdema of hands and feet. Recovery only after three months.

Female, aged 25. Filling bags. After nine weeks in good health, except for eye-strain, took holiday to get eyes tested for glasses. Drops put into eyes. Eleventh week suddenly developed severe cyanosis and conjunctival jaundice, although not returned to work. Symptoms lasted four weeks, then cleared up under treatment. Employee did not return to T.N.T. work.

(7) I am inclined to regard with disfavour the wearing of dental suction plates by the workers, unless they are kept scrupulously clean, and removed from the mouth during the sleeping hours. Three out of four of the persons who died in my factories wore such plates.

(8) The clinical signs of ill-health due to T.N.T. are generally recognized, and have often been recorded. My experience supports them. But I have notes of an early symptom, which I have never yet seen in any printed account of the symptoms. In some five workers out of the 1,100 under observation, there has been manifest within the first week of work a feeling of unrelieved despondency or depression. The

condition persisted for some weeks. No acute headache was complained of. No cyanosis accompanied the depression. The workers' ages varied between 18 and 30. There was no emotional cause. In every case the condition caused the girl to give up work after a few weeks. Was this condition an early evidence of toxæmia? It contrasts with the condition of mental exaltation which has been observed in workers with well marked general jaundice due to T.N.T.

(9) The dermatitis, except in cases where the skin resistance has been lowered already by a staphylococcal or other infection, is, in my experience, always strictly localized. One case well illustrates this:—

Male, aged 54. His work required him to dip his forearms into a tub of water containing the powder, and to carry this mixture of water and powder in a small vessel elsewhere. This operation had to be repeated several times daily. Although his hands and forearms were wholly exposed to irritation by the powder, the rash was confined to two oval patches on the flexor aspect of each forearm "just where the vessel rubbed" when carried, as the workman explained.

The rash as I have seen it begins as a blotchy erythema, often so considerable as to cause swelling, if arising in a situation where the skin is soft and vascular. On the back of the hands, and in situations where the skin is less soft, papules, pale in colour and very numerous, are perhaps the first sign of the irritation caused by the powder. Between the fingers, and in moist situations, small vesicles may occur, which break, exuding, however, no obvious moisture. I have never seen the "sago grain" condition Prosser White has described, nor yet exfoliation *en masse*.

(10) Conditions in factories under my charge, over which I had at one time no control, enabled me to test how long it has taken for a case of slight conjunctival jaundice to develop into a case of severe conjunctival and general jaundice, if left in contact with T.N.T. The average of many such cases would seem to be two to eight weeks.

(11) In those workers who have had jaundice, and who have been removed from contact with T.N.T. and have recovered, it is a common complaint that they "never suffered so much before with constipation." It is only perhaps what the changes in the liver would lead us to expect.

Dr. W. R. Smith.

Work at a National shell-filling factory — i.e., filling shells with amatol, a mixture of T.N.T. and ammonium nitrate — began in the experimental house, a makeshift temporary building of very flimsy construction, in March and continued until the middle of August; on an average about 200 males were employed there; no case of toxic jaundice developed there.

The first melt-house, with very inadequate ventilation when first working, was started in March and used until August 1; the average number of men employed was about 250 until the middle of June, then the men, aged 38 to 41, under Lord Derby's scheme came in and the average number was about 850.

The present melt-house was opened on August 1, and the numbers employed have varied from 600 to 950 men, and from 350 to 700 women. On January 1 600 men and 400 women were employed.

The press-house work began on June 1 and there were about 200 men working there that month; by July 15 600 were employed; 900 by October 15, and 1,100 by December 15. Two hundred women began to work in the press in September, 500 on October 15, and 650 on December 15. On January 1 1,150 men and 600 women were working.

About 200 men are employed in the T.N.T. grinding mills.

Up to the present time, January 20, there have been sixty-two cases of toxic jaundice, with sixteen deaths; forty-seven cases in men and fifteen in women. Of the fatal cases ten were in men and six in women.

AGE-INCIDENCE.

Age	Cases	Males	Females	Deaths
Under 18*	6	6	0	4
18 to 30	16	3	13	6 (all women)
30 to 40	35	33	2	6 (all men)
Over 40	5	5	0	0

* After August 10 no persons under the age of 18 were allowed to work amongst T.N.T.

A very large proportion of the men were of ages 38 to 40, sent to work at munitions under the Derby scheme. The average age of the female workers was about 22 to 25.

INCIDENCE PER MONTH.

	Cases	Deaths
June	1	0
July	8	5
August	21	3
September	10	4
October	6	1
November	9	0
December	5	2
January (to the 20th)	2	1
	62	16

INCIDENCE IN DIFFERENT DEPARTMENTS.

	Cases	Males	Females	Deaths
Melt-house ...	40	29	11	10 (5 male, 5 female)
Press-house ...	19	15	4	5 (4 male, 1 female)
Mills	3	3	0	1

The falling off in the number of cases, and especially of fatal cases, in the past four months, notwithstanding the very great increase in the number of employees, is due to many factors. I think the most important is the very efficient system of ventilation which has been introduced, and in which further improvements are being made every month. Other factors are: (1) The change to the twelve hour shift, which took place on October 15, with its ample provision of time for proper meals in a proper place, and allowance of time for the workers to walk about in the fresh air before resuming, the hours being divided up as follows: three and a quarter hours' work, one and a quarter hour off; then three and a quarter hours' work, one and a quarter hour off; and finally three hours' work, making nine and a half hours of work. Also all the women had a small deduction made from their pay and were supplied with two good meat meals in the canteen. (2) The thorough preliminary medical examination of all employees started in October. (3) The provision of free dental advice and treatment on the works. (4) The pressure put on the officials by the management causing them to make doubtful cases report much earlier to the visiting doctors.

I have seen, personally, the majority of the sixty-two cases, but I have only been able to watch the clinical course all through in about half the cases, as many of them were Derby men brought from all parts of the country, and these were sent to their own homes when serious symptoms set in. I tried to keep in touch with their own doctors in the majority of these cases, and they in return have been good enough to send me most valuable reports of their progress.

The most striking clinical feature to me has been the reluctance of the majority of the cases to admit that they were ill in the early stages, even in some cases where jaundice was fully developed. Three cases only came to me because their friends told them they were yellow. Five cases were picked out whilst they were working by the officials, medical and otherwise, and sent for immediate medical examination, though three of these protested strongly against this. About one-third of the cases I had seen with symptoms of gastric catarrh, more or less severe, before any jaundice developed; some of these had definite cyanosis or pallor of skin with coated tongue, followed by jaundice when subsequently seen. I did not see a single case of T.N.T. dermatitis amongst the jaundice cases, though in May and June I saw cases of rash by the dozen in the T.N.T. workers. Vomiting and abdominal pain were seldom present to any extent except in the very worst cases, but nausea and distaste for food were usually present early. In three of the deeply jaundiced cases I have noted a distinct diminution of the liver dullness. Constipation was almost invariably present and several of the females had scanty or even suppressed menstruation. Distinct purpuric hæmorrhages were present in three cases, but I have seen this condition much more marked in some cases of T.N.T. poisoning where no jaundice was present — as in two cases with hæmorrhage by the side of all their finger nails, and one with great hæmorrhage into the mucous membrane of the mouth, palate and lips. One boy, aged 16, with very marked jaundice, appeared to be steadily getting worse and numerous purpuric spots appeared. He was under the care of Dr. Jeffares, of Kegworth, and he gave him calcic chloride, and first the purpura and then the jaundice slowly disappeared and the boy is now quite well and at work.

I would suggest, in view of the numerous petechial hæmorrhages seen in some of the fatal cases at the post-mortem on the serous and mucous membranes, that calcic chloride be freely given in certain cases.

Drowsiness was a well marked symptom in most of the advanced cases, and all the fatal cases that I saw ended with delirium—in two cases with almost maniacal violence, needing restraint—gradually passing into coma. The first fatal case, a well developed boy, aged 16, had marked tetanic convulsions with complete opisthotonus when I saw him, with his elbows kept firmly flexed at right angles across the chest; he had a high temperature. It appeared to be a case of cerebrospinal meningitis, but a lumbar puncture was negative, and at

the post-mortem only the characteristic signs of T.N.T. poisoning were found, with considerable congestion of the serous membranes of the brain.

For treatment I think absolute rest in bed as soon as the jaundice develops, even in the mildest cases, is essential. The patients in the earliest cases walked about protesting they did not feel ill enough to go to bed, and insisted on attending at the surgery at first. Every case ought, if possible, to be admitted into hospital and kept under constant observation. Several of the patients, however, absolutely declined to be admitted. Milk diet and free saline purgation is advisable, and calcic chloride if there is the slightest tendency to any petechiæ. Other treatment must be symptomatic. On Professor Moore's suggestion some of the cases had their face and hands washed with acetone.

Major P. S. O'Reilly, R.A.M.C., S.M.O.

I regret that, owing to pressure of work, I have been unable to prepare a paper on this subject. I have merely made some notes on clinical observations of the affections produced by working with tri-nitro-toluene. These affections may be divided into cutaneous and constitutional.

The *cutaneous* affections—generally spoken of as T.N.T. dermatitis—are most frequently met with in the first week of exposure. After this period a certain amount of tolerance appears to be set up. The parts most frequently affected are the hands, wrists, face, and neck, and occasionally the feet. The rash on the hands is usually of the cheiro-pompholyx type. It is also seen as discrete red patches on the backs of the hands and wrists. On the face and neck it usually appears as a superficial erythema. In whatever form it appears it is intensely itchy. Fine desquamation usually follows the rash, and in a few cases the skin is exfoliated in large flakes. Speaking generally, the skin affections produced by T.N.T. are not of a severe character, and yield readily to treatment. Sexes appear to be equally affected.

Constitutional or Toxic Eeffcts.—The constitutional or toxic effects are seen in three forms or types: The first, and by far the most common, is what might be described as the gastric type, usually accompanied

with cyanosis, more or less marked; secondly, we have the jaundice type, toxic jaundice; and, lastly, the anæmic type, idiopathic anæmia. I believe these to be three distinct types of poisoning, and not different stages in the one affection.

The *gastric type*, which, as I have previously mentioned, is the most common, is most frequently met with in persons under the age of 30, and with about equal frequency in men and women. It is met with in all periods of exposure, even contact for one day being sufficient in some cases to produce all the now well-known signs and symptoms. The appearance of persons affected by the gastric type of T.N.T. poisoning is very characteristic. They are listless. The face has a peculiar pallor, with what is sometimes spoken of as a muddy complexion. The lips are usually cyanosed, sometimes very deeply so. The conjunctivæ may have an icteric tinge. The symptoms complained of are a dull aching pain behind the ensiform cartilage, constipation (these are the two most constant and persistent symptoms), depression, nausea, a bitter taste in the mouth, anorexia, and occasionally giddiness or faintness. On examination the tongue is usually found clean, the respiratory system almost invariably unaffected, pulse normal, temperature normal or subnormal. Marked intestinal distension is common; retention of urine has been frequently met with, catheterization becoming necessary. The liver and blood are apparently normal. Intermittent glycosuria is sometimes present. These cases yield readily to suitable treatment, and no injurious after-effects have been observed.

The differential diagnosis in these cases is not always easy. The history given by a patient is very often misleading. Many of the workers have no idea as to the nature of the substance upon which they are working, and refer to all explosive powders as T.N.T. The staining of the hands is very little guide, as this condition is met with in C.E. and lyddite workers.

The following points are of importance for a diagnosis of T.N.T. poisoning:—

(1) The characteristic appearance as previously described.

(2) The character and situation of the abdominal pain.

(3) The presence of constipation and abdominal distension.

Inquiries as to diet often give useful information, and one also finds that the gastric troubles so frequently set up by pyorrhœa alveolaris are, in many instances, wrongly attributed by the sufferers to the nature of their employment.

Jaundice Type.—I will now refer to the jaundice type, or toxic jaundice, a much graver and fortunately more rare affection. I have seen no instance of what I have previously described as the gastric type merging into toxic jaundice. Persons under the age of 30 appear to be most frequently affected, and the sexes in about equal proportion. The jaundice appears suddenly, preceded by some mild gastric disturbance. The clinical features differ little from that of ordinary catarrhal jaundice; the pulse is slow, temperature normal, urine high-coloured, and containing bile pigments. The stools are light in colour. Persistent nasal catarrh is frequently present. The liver may be enlarged in the early stages; later, diminution of the area of liver dullness is more common. The intensity of the jaundice varies during the course of the illness, being more profound in the early stages. The skin affections frequently associated with catarrhal jaundice have not been noted, nor have any ocular disturbances, and the fundus oculi was normal in all cases examined. In three fatal cases that have come under my notice, symptoms of meningitis developed suddenly, about three weeks after the appearance of the jaundice, gradually merging into coma and death.

Of the *anæmic type* I have only seen two cases, both occurring in men of middle age, and employed on the same process—i.e., manipulating T.N.T. in the molten condition. Clinically these cases closely resembled pernicious anæmia, and it remained for the blood examination to establish a definite diagnosis, the diagnostic point being the entire absence of nucleated red cells. In one case the erythrocytes were as low as 700,000, and in the other, 1,637,000; in both the colour index was high, and hæmoglobin about 35 per cent. Both cases ended fatally, the duration of the illness being about ten weeks.

Treatment.—For the cutaneous affections any simple line of treatment, such as an ointment of bismuth and zinc or calamine lotion, rapidly effect a cure. In some cases it is necessary to order a temporary removal from work. For the gastric type of case the treatment is also simple and satisfactory. The following is the usual procedure adopted at the Royal Arsenal: Removal from contact, rest in bed for a day or two. Diet: Milk, milk puddings, fruit and green vegetables; demulcent drinks, such as barley water, imperial drink, tea and coffee. Medicinally, an initial dose of calomel, 2 or 3 gr. This is not repeated. For the persistent constipation vegetable laxatives and cascara sagrada are employed.

The following mixture is given as a routine measure:—

℞	Sodii sulphate	...	...	...	1 dr.
	Potass. cit. ...	...	...	...	40 gr.
	Sodii bicarb. ...	...	...	...	20 gr.
	Syriapi auranti	...	...	...	1 dr.
	Aq.	...	...	ad	1 oz.

For toxic jaundice a similar line of treatment has been adopted. Infusion of normal saline into a vein and subcutaneous injections of normal saline have been tried; results have not been satisfactory.

In the anæmic cases, the usual line of treatment for severe idiopathic anæmia was followed.

Recently treatment of T.N.T. cases with acetone has been carried out as follows: A small pledget of cotton wool is dipped in acetone, and this is rubbed over the body, special attention being paid to the exposed parts. The results have been encouraging, but our experience with this line of treatment is too limited to enable me to say anything more definite. I have not seen it tried in a case of toxic jaundice.

Dr. E. Scott Sugden.

At the factory I represent we have either been very lucky, or else the management are very successful in what is carried out, for though we have had a filling factory open for more than twelve months and now employ between 9,000 and 10,000 men and women, and the amatol factory has been open since July, and employs 2,500, it is only during the last month that we had our first case of jaundice of any kind. We have had, of course, many cases of slight dermatitis, and cases with gastric symptoms and vomiting. This first case of jaundice was in a woman aged 38, who had been working on powder for four months. The alternation of work is carried out very thoroughly at these factories. She had been on and off in the powder for four months. She tells me the first symptom she had was constant and severe frontal headache for three days. She stayed away from work three days, and returned to work for a further three days. She then began to complain of gastric symptoms, with vomiting, and had a violent pain in the stomach. Two days after the commencement of the vomiting, her children pointed out to her that she was yellow. She has been in her own home, under the care of a local practitioner, and my colleague Dr. (Mrs.) Deacon and I have seen her occasionally. She appears to be making a satisfactory recovery, and there seems to

be nothing to distinguish her case from an ordinary case of catarrhal jaundice. I have been wondering whether anyone can tell us how we can distinguish between ordinary jaundice occurring in a munition worker and a case of actual toxic jaundice.

Major H. MORLEY FLETCHER, R.A.M.C.(T.).

Though these cases are not sent to the general hospitals in large numbers, we have had at St. Bartholomew's Hospital a number of cases of T.N.T. poisoning, and a considerable proportion of them have been under my care. My object in speaking this evening is rather to ask questions than to offer information. I wish to ask what are the indications for treatment; what treatment should be adopted and when should it begin?

The cases I have seen have been divided into two classes, the first those with a dull, lead-coloured complexion, with some cyanosis of the lips, who suffer with headache and are apathetic; and the second, those with jaundice, who are bright, cheerful and hungry. Those of the first class generally have made a fairly rapid recovery.

Recently I have had under my care at St. Bartholomew's Hospital a girl aged 18, who first noticed, on December 12, 1916, that she was jaundiced after working for two months in a munitions factory. She was deeply jaundiced on admission but felt perfectly well, and indeed was annoyed at having been sent into hospital. On January 7 severe vomiting set in; she became drowsy on January 8, and died in a comatose condition on January 11. In such a case what treatment should have been adopted? We are told that the toxic substance is in the skin and is gradually being absorbed. I knew of Professor Benjamin Moore's investigations and tried treatment of the skin with ether and also xylol, as acetone was not procurable. Ether appeared to us to act better than xylol, but only traces of a substance giving the so-called T.N.T. reaction could be extracted, and that with difficulty. If the toxic substance resides in the skin and is being gradually absorbed with progressive damage to the liver we must be told how to eliminate it. I should like to ask if profuse sweating, as in a vapour or hot-air bath, has any effect.

In the case I have quoted, the only sign, except the jaundice, which made me anxious about the patient on admission to the hospital was a considerably diminished area of liver dullness. To determine whether

this diminution was due to a reduction of the size of the liver or to a dilated colon I asked Dr. Finzi to take a skiagram of the liver. This showed the liver to be greatly reduced in size, almost spherical in shape and apparently consisting of only the right lobe. I may mention that in this case itching of the skin was present, which is opposed to a statement made by one speaker in this discussion that itching does not occur in this form of toxic jaundice. Possibly its presence or absence depends on the duration of the jaundice.

The treatment we adopted during the quiescent stage was that of a limited diet, free action of the bowels, and the administration of a potassium citrate mixture with a view to moderate diuresis, but I fear we wasted the best part of a month, during which time we might have done more. When vomiting and drowsiness made their appearance we tried venesection and saline infusions, but without benefit. I now think we should have applied these measures much earlier. There was a great increase in the clotting power of the blood. Blood removed for examination in the ordinary way clotted in the pipette, so that it was impossible to obtain a blood count in this terminal stage. I should like to ask if saline infusions have been tried in these cases with jaundice before the graver symptoms have become manifest, and if so with what result. I may mention that the cerebrospinal fluid removed by lumbar puncture during the last two days of life was quite clear and free from bile, and yet at the post-mortem examination Dr. Spilsbury found it to be deeply bile-stained.

I fear I have no other suggestion to offer as to treatment; my object in speaking is to point out the difficulties I have had in a few cases and to allude to one or two clinical points which have presented themselves.

Dr. Israel Feldman.

With regard to the purely clinical aspect of toxic jaundice due to T.N.T., I have endeavoured to find some symptom which shows itself very early, and some physical sign which would put us on our guard, or indicate the prognosis.

As to early symptoms, from cross-examining patients I find that before the onset of jaundice, though feeling quite well in themselves, they get a dark-brown urine, probably indicating that bile is being excreted in the urine before the jaundice shows itself, at any rate to a degree that can be noticed by their friends. They also very early,

before the onset of jaundice, experience urgency of micturition; as soon as the desire is felt, the urine must be evacuated; there seems to be no control over the sphincter. A still earlier symptom is a feeling of extreme lassitude: some said that the first symptom that they could recollect was that in proceeding to their work they experienced a definite faintness, and felt too weak to get to the works.

As to indications helpful to prognosis. From the analogy of what is said to occur during the final stages in phosphorus poisoning, I have tested urines for special substances, and the sediments therein for crystals. In one fatal case in hospital, I had tested the urine daily without finding anything remarkable until one day I found leucin crystals in many groups in the centrifugalized sediment, and also a few scattered groups of tyrosin crystals. Both bile pigments and bile salts were present on this occasion, but lactic acid was absent. Two days later this patient became suddenly drowsy, and five days after that she died. The appearance of leucin and tyrosin crystals previous to the onset of coma is apparently not constant, however, as in another case (the one quoted in the previous discussion), although coma came on suddenly, the urine sediment failed to reveal any signs of these crystals, either previous to the onset of the coma or since. This patient, however, is still alive.

Estimations of urea in the urine seem to indicate that this phase of liver metabolism, in the final stages, is not affected to the degree we might have expected, judging by the profound manner in which the cells of the entire organ are disorganized as seen post mortem. In one fatal case, seven days before death, the urea content was 1·5 per cent., the amount of urine passed being 700 cc. in the twenty-four hours.

Fleet Surgeon R. C. Munday, R.N.

There are over 5,000 munition makers in four large Admiralty factories which for obvious reasons must be nameless, and there are numerous private firms making munitions for the Navy, but the medical department is responsible for the health of the workers in our own establishments alone, and in these I am able to report a clean bill of health. Not only have we had no fatal cases of T.N.T. poisoning, but there is no record of any person suffering from constitutional effects of the poison to such an extent as to disable him or her from work. Further there is reliable evidence that many workers who, when they

first entered our factories were weedy, ill-nourished and anæmic, have become robust and healthy. It is true that some of the tetryl workers have been affected with a dermatitis which has been in a few cases obstinately recurrent, but this has not impaired their general health, nor has it been at all severe or widespread. This appears to bear out Lord Chetwynd's experience.

Now the question arises, why are the Admiralty munition workers immune, while in other establishments illness from T.N.T. poisoning, sometimes with fatal results, is constantly occurring? I venture to think that our immunity is not a mere coincidence nor due to our smaller numbers, and further, that to a large extent the same result can be obtained in other factories. The Director-General of the Naval Medical Service, Sir Arthur May, takes a deep personal interest in the health of civilian workers employed in all Admiralty establishments on shore, dockyards, air stations, munition factories, &c., and he has laid it down that the Admiralty should be a model employer of labour, setting an example to all other employers and owners of factories in insuring that no stone is left unturned, and no expense spared, in safeguarding to every feasible extent the lives and health of the employees. Apart altogether from humanitarian reasons, he is very strongly of opinion that the employer who spends money both freely and judiciously in providing the means for the prevention of disease is making a good investment and receives substantial return for his outlay in diminished loss of labour and increased output of work. In pursuance of this policy, early in the War he detailed an officer of his staff to visit the Naval munition factories and inspect the conditions under which the employees were working—their food and kitchens, their workshops, ablutionary arrangements, cloak rooms, &c., were all minutely looked into and reported on. The Home Office regulations were carefully studied and compared with ours to insure that we had, so far as can be foreseen, an ample margin of precautionary safety.

I must gratefully acknowledge the eager co-operation of the Ordnance Stores Department of the Admiralty in carrying out to the smallest detail the measures required by the Medical Department.

If we compare the conditions under which Admiralty employees work with those surrounding other munition workpeople, we shall, I think, see that there are important differences. First, with regard to cubic space in workshops, although probably no munition factories afford an insufficient total cubic capacity in any one room, yet I have

reason to believe that in some workshops the employees become massed together in over-crowded groups, whereas this is not allowed in Admiralty workshops, and the employees are well spaced, with ample room for each. Although the good effect of this arrangement may act only indirectly, yet I submit it as an important factor in the general result. Next, our employees are not paid by piece work, so that although they work well and yield a good output, they cannot be induced by a patriotic desire to create a sensational output, or by ambition to get rich quick, to overtax their strength and at the same time expose themselves too long to the poisonous fumes of T.N.T. Further, I cannot help thinking that the discipline in Admiralty establishments is very much better than in some or, perhaps I should say, any other factories. I am certain that infringement of our hygienic rules is rendered practically impossible by the close supervision which obtains, and the anxiety of the employees to refrain from any acts of omission or commission which would result in dismissal. For instance I am told that in some factories it is a common thing to see women sucking sweets while at work on T.N.T.; such a thing cannot be imagined in an Admiralty establishment. Again, our overseers and foremen would never allow windows and doors to be closed which ought to be open, or permit of any laxity in wearing respirators, gloves, or veils. I think too that our ablutionary arrangements are probably better and on a better organized scale than in other factories. Then, again, there is no doubt that in our establishments the meticulous care which has been bestowed on the artificial exhaust ventilation of the melting and cooling pans leaves no loophole for the escape of poisonous fumes into the general atmosphere of the rooms. I hold very strongly that it is better to remove the fumes at the place of origin than to remove them from the bottom of the room after they have been allowed to gain access to the general atmosphere. Our system of alternation of work is, I am sure, more thorough than in other factories, because we are better able to carry it out, having several different kinds of work going on in the same establishment in each case; moreover our medical examination is conducted once a week, not once a fortnight, and so, where it is necessary, alternation of work is ordered earlier than if an employee is only seen once a fortnight. But it is to the scrupulous cleanliness of our workshops, the total absence of T.N.T. dust on the floors, and the prevention of soiling of the shells, that we must, I think, attribute the chief cause of our immunity. Moreover, on visiting our factories one cannot fail to be struck with the extraordinary cleanliness

of the teeth of the operatives, and of their hands when exposed on removal of the gloves.

I cannot go the whole way with Dr. Benjamin Moore in his confident assertion that it is through the skin and the skin only that the poison is absorbed, although I believe that it is the chief channel. For the present at any rate we shall relax none of the precautions which have as their object rapid and direct removal of the fumes and prevention of inhalation of these and of the dust.

If, then, a marked reduction of the number of deaths and of the incidence of cases in other factories is to be achieved, I submit that this must be accomplished by better discipline and greater cleanliness of workshops and workpeople.

With regard to the toxic jaundice caused by tetrachlorethane poisoning in dope I am glad to say that, although in many of our air stations a very large amount of doping was carried out with a material containing tetrachlorethane, we had no deaths, and illness which necessitated complete stoppage of work. I attribute this to the fact that we have very efficient exhaust ventilation by fans, which change the air at least thirty times an hour. Moreover our alternation of work is carried to its utmost limits.

There is both at our air stations and at our munition factories no excuse for ignorance amongst the employees on the subject of the danger of toxic jaundice from either tetrachlorethane or tri-nitro-toluene. They have notices explaining the dangers and rules for their guidance staring them in the face at every turn; the foremen and forewomen keenly supervise their daily life in the factory; and our energetic medical officers inspect them so frequently that some people think that there is more danger of alarming them than of their ever suffering from toxic jaundice.

Dr. J. A. P. Barnes.

Some of the early cases of illness due to T.N.T. in factories under my charge were admitted to an institution where, although everything possible was done for their recovery with the knowledge then available, two of the cases died after several weeks' illness. The medical officer of the institution thereupon proceeded to give much time to the working out of a theoretical line of treatment, which, not without difficulty, he was subsequently able to put into practice. This treatment he found accelerated recovery and probably even saved life. I wish he were here

to-night to give his experience. In his absence, he would, I believe, allow me to indicate the line of treatment. He formed the reasoned opinion that the T.N.T. toxæmia was a condition of acidosis, and that the toxic acid derivative of T.N.T. could be rendered innocuous by neutralization with alkalies. The practical problem he had to solve was how to enable and induce the patient to take in sufficiently large quantities of alkali. The problem was ultimately solved by using milk as the vehicle of the alkali, and alternating the salts of soda and potash every few days. By aid of the discipline inherent in the institution, and by personal moral suasion, he succeeded in getting his patients to take as much as 4 pints of milk daily; and commencing with 10 gr. of bicarbonate of soda or potash with every half pint, he was able to work up to 1 dr. with every half pint.

Dr. PILLMAN.

We have had eighteen cases of toxic jaundice, two in men and sixteen amongst women. Two cases (in women) occurred in the T.N.T. exploder bag department (one fatal); one case (female) in the block filling department, where the T.N.T. is protected, and the remainder in the amatol melt-sheds. I find it difficult during the early stages to distinguish between a case of toxic jaundice and those which subsequently prove to be simple catarrhal icterus. Several cases of catarrhal jaundice occurred in the cordite section of our factory, which, if they had occurred in the T.N.T. section, would have been notified as toxic. Again, the question of notification is also a difficulty. An average of six workers out of forty on admission have yellow conjunctivæ, probably due to the fact that most of the women who came to the factory suffer from constipation. I certainly do not think all cases of yellow conjunctivæ should be notified. Their progress should be noted after a few days' treatment.

Dr. M. A. S. DEACON.

I agree with the last speaker who says that she has found that a percentage of the women who were applicants for admission as workers in munitions were already affected with some jaundice of the conjunctivæ at the preliminary examination. I have examined over 2,000 women in the past three months and can fully bear her out in this statement, and that this condition does not grow worse after work has been started, but tends to improve, probably from the better health of the worker.

Dr. CASTELLAIN.

I also can bear out the statement as to the yellowness of the sclerotics of many workers when they apply for work in the factory. I have examined a large number of applicants since September last, and in a certain proportion the sclerotics are yellowish (subicteric) in both men and women, apart from the presence of "pingueculæ." The findings in these cases are extremely valuable for subsequent differential diagnosis. Dr. Moore brought me one of these cases which he regarded as suspicious, but there was no evidence of bile in the serum then, or of toxic jaundice subsequently, to my knowledge. His triad of signs of T.N.T. poisoning, "pallor, cyanosis, slight icterus," is of little value apart from a knowledge of previous clinical history and of physical examination on application for work and at the time when T.N.T. intoxication is suspected. Very many of our workers were previously miners, or lace or hosiery workers—all very pale, but with hæmoglobin very rarely less than 80 per cent., and usually more. Some of these—often alcoholics—have sclerotics showing subicterus, and even a short time in the works causes the blueness to which he attaches such importance—even in cold weather! The cyanosis in the same worker on Saturday morning and Monday morning after a day and a half out of the factory has often a very different appearance. Moreover, the probably underlying met-hæmoglobinæmia is, in all probability, only a very minor factor in the production of toxic jaundice due to T.N.T.

Summary of the Discussion.

By the Chairman, Surgeon-General H. D. ROLLESTON, R.N., C.B.

THIS discussion, professedly confined to the toxic jaundice of munition workers and troops, has to all intents and purposes resulted in a symposium on the toxic effects of tri-nitro-toluene. This is a distinct advantage from a practical point of view, for Dr. Legge, to whom the Society is greatly indebted, not only for his introductory remarks, but also for great help in attracting speakers with experience, has pointed out that tetrachlorethane is no longer employed in doping

aeroplanes and that the jaundice due to this cause is no longer likely to occur. Further, the other minor illnesses due to tri-nitro-toluene are probably thirty times more frequent than jaundice, and as many thousands of workers are employed in the handling of tri-nitro-toluene, the problems of its toxic effects are of the greatest importance in preventive medicine and the production of munitions for the successful prosecution of the war. The poisonous effects of tetrachlorethane, tetryl, and di-nitro-benzol are interesting in comparison with those of tri-nitro-toluene, but the great value of this discussion to medical men in charge of tri-nitro-toluene works is the information on the effects of this most important explosive. A brief summary of the more important points brought out in the debate may therefore be of use.

Mechanism of Tri-nitro-toluene Poisoning.

Tri-nitro-toluene liberates fumes as low as 32° C. (90° F.), and Lord Chetwynd argues that the poison enters the body by inhalation of nitrous fumes, on the circumstantial evidence that the incidence of its toxic effects varies with the ventilation of the factories—when the circulation of air is defective, and fumes are given off by molten tri-nitro-toluene, the toxic effects become more frequent, whereas good ventilation is accompanied by freedom from illness. On the importance of good ventilation as a prophylactic measure there is general agreement, but it is conceivable that its effect is to improve the general health and resistance, just as good feeding diminishes the incidence of gastritis among the women workers. Dr. Benjamin Moore's analytical and experimental investigations appear to prove that the skin is the main channel of absorption of tri-nitro-toluene, and he insists that inhalation of its fumes or of its dust does not play any part. There is some evidence that an oily condition of the hands, such as may result from handling vaselined silk bags, favours absorption. Personal susceptibility has some influence in determining the incidence of symptoms, and whether they appear after a short or after a considerable period of work. This is well shown in the case of dermatitis. But the amount of the exposure, or in other words the dose of the poison, is the more important factor in producing the toxic effects. The greatest incidence of jaundice occurs in the third month of employment, and it has been suggested by Dr. Collis that after a time the workers attain a certain amount of immunity against the poison.

Symptoms and Treatment.

Dermatitis is due to the local action of the explosive. According to Lord Chetwynd it is caused by the ammonium nitrate combined with tri-nitro-toluene, but no other speaker referred to this distinction. It occurs on the parts exposed to contact with the powder, especially the hands, where cheiro-pompholyx is common. Discrete red patches may occur on the dorsal surfaces and the wrists. The face and neck may show a diffuse erythema; and if there is dust on the floor the feet may be attacked. It is often seen during the first week of work and tolerance is readily established. It gives rise to severe itching. The treatment consists in the use of zinc and bismuth ointment or of calamine lotion.

Gastritis.—(1) Irritative. During the first week of work vomiting in the early morning and occasionally after food, with some loss of appetite, ascribed to swallowing tri-nitro-toluene, to which the stomach soon becomes tolerant, may occur. A purge, a holiday for a day or two, and rarely bismuth, cure the condition (O'Donovan).

(2) Toxic gastritis is much more important. Though it depends on absorption of tri-nitro-toluene from the skin it is rarely associated with dermatitis. The patients may present the following signs and symptoms: pallor with cyanosed lips, listlessness and depression, colicky pain in the epigastrium, nausea and aversion to food, constipation, abdominal distension, high-coloured urine containing tri-nitro-toluene, and often retention of urine. The treatment consists in removal from work, rest in bed for a day or two, milk diet with alkalies (10 gr. increased to 2 dr. of sodium or potassium bicarbonate to each pint of milk) to combat acidosis, demulcent drinks such as barley water, and the correction of constipation.

Toxic Jaundice.—Among the workers employed in handling tri-nitro-toluene during 1916 there are known to have been 181 (males 70, females 111) cases of toxic jaundice with 52 (males 21, females 31) deaths. It is infrequent as compared with toxic gastritis, which it does not appear to follow. The previous duration of employment has varied between three days and seventeen months, the most frequent period being three months. In some instances a latent period has occurred between employment and the onset of jaundice; this may depend on the continued absorption of tri-nitro-toluene through the skin of the hairy scalp or of the body from dirty body-linen laden with the explosive; or it may be explained by supposing that at the time of

exposure the liver sustained severe damage which subsequently, possibly from the action of an hepatic auto-cytolytic toxin, progressed though in the absence of tri-nitro-toluene.

Premonitory symptoms such as drowsiness, dizziness, depression, and dark urine may be present, but the onset of jaundice is often quite sudden. As bearing on the significance of a slight icteric tint of the conjunctivæ, it is important to remember that some persons, especially brunettes with constipation, may show this and have bile pigment in the blood serum—the simple cholæmia of French writers—and that this should be noted when the worker is examined on admission, so as to avoid alarm at subsequent inspections. The jaundice generally resembles simple catarrhal jaundice with bilious urine, slow pulse, constipation often, but not always, with pale stools. The intensity of the jaundice varies, and though fever is usually absent there may be an irregular temperature (100° to 102° F.). The prognosis is uncertain, and grave symptoms, such as hæmorrhages and convulsions, due to hepatic insufficiency, may appear rapidly. The treatment is on the same lines as in toxic gastritis, the antagonism of acidosis by alkalis being specially important.

Anæmia.—Workers in tri-nitro-toluene factories, although their blood is normal on examination, may appear anæmic, probably from vasomotor changes (O'Donovan). In workers in tri-nitro-toluene factories the red blood corpuscles, hæmoglobin, and colour index are usually normal, and the leucocyte count is often slightly raised. Cyanosis is not uncommon in women workers who are otherwise well and it has been assumed, though not satisfactorily proved (Panton), that this is due to met-hæmoglobinæmia. In cases with toxic effects, aplastic anæmia, recalling that produced by benzol, may result; there is grave anæmia without the nucleated reds and other regenerative changes characteristic of pernicious anæmia, a diminution in the total leucocyte count (leucopenia) with a fall in the percentage in the polymorphonuclears, and a relative lymphocytosis. This anæmia, which is fortunately extremely rare, may occur alone or be combined with toxic jaundice. It is a very fatal condition and as yet no treatment can be considered effective.

Pathology.

The morbid appearances seen in twenty-two carefully examined cases with toxic jaundice, thirteen of which were females, show very great reduction in the size and weight (17 to 36 oz.) of the liver

which is in a condition of yellow and red atrophy. There are yellow projections in which the destructive process is less advanced than in the red areas, the left lobe being more affected than the right. The lesion in fact is the same as that long familiar as acute yellow atrophy. The process is one of degeneration and necrosis of the liver cells associated with infiltration and subsequent fibrosis resembling ordinary portal cirrhosis. The liver cells, which do not contain hæmosiderin, show little attempt at compensatory regeneration. The small bile-ducts are inflamed, thus causing the jaundice, which is therefore not hæmolytic. The kidneys and myocardium undergo fatty change, and there may be subserous hæmorrhages.

Future research may show what derivative of tri-nitro-toluene exerts the toxic action on the body, and if more than one product is concerned in the changes induced in the stomach, liver, kidneys, and bone marrow.

Prophylaxis.

This is obviously the most important question, but as the methods are largely in official use it is unnecessary to enter into detail. In the first place the absorption of the poison should be prevented by minimizing the opportunities of contact between the skin and tri-nitro-toluene. Every care must be taken to avoid spilling of the powder on the tables, floors, and the outsides of the shells and bombs. The hands should be kept clean, and freed from adherent tri-nitro-toluene by a solvent such as acetone (B. Moore). Similarly the hair and under-clothing must be kept free from the powder. Periodic alternation of shifts so as to reduce the exposure to the poison and prompt removal when toxic symptoms threaten are essential. Good ventilation, substantial meals, and exercise, are important to maintain a good standard of health and to keep the bodily resistance high. The account given by Fleet Surgeon R. C. Munday shows the success of thorough prophylaxis.

Proceedings of the Royal Society of Medicine.

SUPPLEMENT

(Vol. X, No. 1, November, 1916).

NOTES ON BOOKS.

[*The purpose of these "Notes" is neither to praise nor to blame, but merely to draw attention to some of the new books and new editions which have been added to the Society's Library.*—Ed.]

Medical Ethnology. By Chas. E. Woodruff, A.M., M.D. Pp. xi + 321. Price 10s. 6d. London: William Heinemann, 1916.

The object of this work is to show how profoundly climate modifies the human race, and how the natives of every country have by natural selection become adapted to its climate. The large part which the solar rays—ultra-red, visual, and ultra-violet—play in determining climate is dwelt upon, also the means adopted by the human organism to combat their injurious effects. Prominent among these is the deposit of pigment in the deeper layers of the epidermis. The amount of pigmentation increases from the Poles to the Equator. Even in the United States of America a north to south darkening is to be observed; it has been effected by natural selection in the course of no more than fifteen generations. The high degree of pigmentation met with among the inhabitants of certain cold climates, such as the Esquimos and Northern Chinese, is to be explained by the fact that in such regions the sunshine, though only moderately warm, is rich in actinic rays. The Blonde Race (fair haired and blue eyed) has evolved in a cloudy, misty region, somewhere in the north-west of Europe. It represents the ancient Aryan Race—a people of great virility, who for thousands of years have sent conquering hordes southwards. In this way India, Greece, and Italy were overcome, though the blonde conquerors have long since died out through their inability to survive in their new homes. The law is enunciated that species can migrate with impunity east or west within their own proper zone, but not to any great distance north or south. Hence, a white race will never be able permanently to survive in tropical or subtropical regions, where the need for a dark skin is emphasized by the colour of the natives, as in Africa and Australia. The author insists that an exaggerated importance has been attributed to light from the health standpoint. Life can proceed healthily in darkness; indeed it first appeared upon our planet when the enveloping mists were too thick to allow light to pass through. Practically all the cells in the body are in darkness. Mules and other animals can live healthily for years in mines. Miners are healthy. On the other hand, many evils result from excessive sunlight. We are crazy about sunlight, says the author, the school-room and the sick-room should be carefully sheltered from anything approaching glare.

PRINCIPLES OF DIAGNOSIS AND TREATMENT IN HEART AFFECTIONS. By Sir JAMES MACKENZIE, M.D., F.R.S., F.R.C.P. Pp. viii + 264. Price 7s. 6d. London: Henry Frowde and Hodder and Stoughton, 1916.

The opening chapter of this book deals with medical research, and the best means of pursuing it. The author is of opinion that too little attention has been paid to the beginnings of disease. In the case of chronic diseases it is necessary to be able to follow individual cases from the start to the finish. Such a task can only be carried out by general practitioners during a life-long observation and a study of individual cases. It is to them that Sir James Mackenzie turns to make real advance in the progress of medicine, by solving those problems which have so far eluded solution. The rest of the book may be described as an exposition in simple language of the various indications of cardiac impairment and cardiac failure, how to recognize and how to treat them. It is a summary of what the author has learned, and the conclusions he has drawn from a life-long study of disturbances and diseases of the heart. Stress is laid on the importance of obtaining a full account of the patient's symptoms, which may give more information than the physical examination of the heart. The varieties, interpretation, and significance of cardiac irregularities are fully discussed. What has been definitely tested and learned is clearly stated, while at the same time the author does not hesitate to state difficulties and problems which are not yet cleared up, and regarding which either dogmatic statements or unproved speculations are to be avoided.

THE TREATMENT OF DISEASES OF THE SKIN. By W. KNOWSLEY SIBLEY, M.A., M.D., B.C.Camb., M.R.C.P.Lond., M.R.C.S.Eng. Second edition. With 16 illustrations; pp. xii + 307. Price 6s. net. London: Edward Arnold, 1916.

This second edition of Dr. Knowsley Sibley's work on "The Treatment of Diseases of the Skin" contains several new features. Sections on some of the more recently studied affections have been inserted, and additional photographs illustrating the results of treatment have been added. As in the first edition, the first part describes methods of treatment by X-rays, radium, electrolysis and ionization, and other physical measures. The bulk of the work is occupied by a succinct description of the treatment of the various diseases of the skin, arranged conveniently in alphabetical order. The last section contains a large collection of prescriptions, with an appended list of the dermatoses for which they are chiefly employed.

THE UNIFORM SYSTEM OF ACCOUNTS FOR HOSPITALS AND PUBLIC INSTITUTIONS, ORPHANAGES, MISSIONARY SOCIETIES, HOMES, CO-OPERATIONS, AND ALL CLASSES OF INSTITUTIONS. By Sir HENRY BURDETT, K.C.B., K.C.V.O. Fourth Edition. Pp. xi + 122. Price 5s. net. London: The Scientific Press, Ltd., 1916.

Opening with a full account of the origin and progress of the system of keeping uniform accounts inaugurated forty-eight years ago, the author contemplates its use not only in hospitals but in all institutions run for charitable purposes and financed by private subscriptions or grants of public money. It points out how widely the system has been adopted, and indicates the advantages accruing from its use, not only in large but also in small institutions. The reader is advised to read it in association with another book, "Hospital Expenditure: the Commissariat," as beside the prime object of affording a ready and uniform conspectus of the expenses incurred, the system aims at the indication of means whereby saving can be effected. The "Annual Report," which often darkens when it should illuminate an institution's workings, is studied and advice given as to what such a document should contain. A full exposé of the system, containing ruled exemplar accounts, is presented, and this leads to the all important balance sheet and its construction. Since institutions other than hospitals present features which are peculiar to hospital lines of work, a chapter is devoted to them and their book-keeping. This reveals how completely such charities can be brought within the scheme of uniform accounts and how advantageous this proves in their case. Points of some importance, such as the number of nurses required, the commissariat arrangements for them and for a resident staff, are discussed. One feature of the

volume is the insertion throughout its pages of model accounts, and there is an appendix giving (*a*) index of classification, (*b*) example forms for tender for supplies, (*c*) forms in use at the Edinburgh Royal Infirmary.

THE RESPIRATORY EXCHANGE OF ANIMALS AND MAN. By AUGUST KROGH, Ph.D. Illustrated; pp. viii + 173. Price 6s. London: Longmans, Green and Co., 1916.

This forms one of a series of monographs on biochemistry, some twenty-two of which, each independent of and yet dependent on the other, have already been published. The relation between respiratory exchange and functional activity have been excluded from the scope of the present monograph, which deals with one limited problem only: "The quantitative aspect of the catabolic activity of the living organism as living." The physiological significance of the exchange of oxygen and carbon dioxide is first dealt with, and it is pointed out that the study of the gas exchange has been utilized in three main directions: (1) To establish the carbon balance of the organism; (2) to determine the nature of the substances katabolized; (2) to measure the total katabolism. The numerous methods and technical appliances used in studying the respiratory exchange are reviewed and discussed, and various general principles are emphasized. The definition "normal animal" is sharply criticized, since in a normal animal the respiratory exchange may vary 100 per cent. and more. So, too, muscular movements increase metabolism considerably, hence the investigation of less potent influences must be made when muscular movements are excluded. Reference is made to the important improvement in technique afforded by the recording cage of Benedict and Homans (1911), by which any shifting of the centre of gravity of the animal under experiment is recorded, so that periods can be taken during which the animal keeps quiet. The best unit for expressing the respiratory exchange of animals is "to give the weights of gases absorbed or eliminated in a given time," and the volume of a gas being absolutely indefinite, a further statement of conditions of temperature and pressure is required. Various types of apparatus are described and illustrated, amongst which are some ingenious types devised by the author. Chapter IV deals with the "standard metabolism" of the organism (Krogh), its definition and determination. The influence of chemical and physical factors and varieties during life receive adequate attention, and, finally, interesting tables of comparison between different species of warm- and cold-blooded animals are appended. A copious bibliography completes the volume.

INTERNATIONAL CLINICS: A QUARTERLY OF ILLUSTRATED CLINICAL LECTURES AND ESPECIALLY PREPARED ORIGINAL ARTICLES. Edited by H. R. M. LANDIS, M.D. Philadelphia, with the collaboration of CHARLES H. MAYO, M.D. Rochester, and others. Vol. II, twenty-sixth series. Only sold in complete sets of four volumes. Illustrated; pp. x + 311. Price 35s. net per annum. Philadelphia and London: J. B. Lippincott Co., 1916.

Including articles on treatment, medicine, psychiatry, obstetrics, public health, and surgery, this volume is exclusively the work of American physicians and surgeons. Among the contributions two only have a direct reference to the War. One, by J. B. Young, deals with the subject of tetanus under the section of treatment. A comprehensive survey is given of the value of magnesium sulphate as a supplementary treatment to antitoxin, particularly in controlling the convulsions. The warning is impressed that an overdose of the salt, administered by intravenous injection, may cause temporary paralysis of the respiration. The author points out that injections by the intraspinal route are fairly prompt in their action and last longer in their effects than those given intravenously or intramuscularly. The second War article is that by Robert B. Osgood, upon the important subject of "Orthopædic problems presented by the European War." In this article attention is drawn to the "great efficiency of the English Orthopædic Base at Liverpool," in charge of Major Robert Jones. Various plates are included, descriptive of new forms of appliances in the orthopædic treatment of the wounded; and the author's experience at the American Ambulance Hospital at Neuilly has satisfied him that one of the greatest surgical problems arising from the War is that "of providing training and occupation for the cripples of peace."

SURGICAL CONTRIBUTIONS FROM 1881-1916. By RUTHERFORD MORISON, M.B., F.R.C.S.Edin., F.R.C.S.Eng. In Two Volumes: Vol. I, General Surgery, pp. xvi + 427; Vol. II, Abdominal Surgery, pp. xvi + 953. Illustrated. Price: Vol. I, 15s.; Vol. II, 30s.; 42s. two volumes. Bristol: John Wright and Sons, Ltd., 1916.

These volumes contain the contributions to surgical literature which Mr. Morison has published in the course of his long practice as surgeon to the Newcastle Infirmary. If taken in order of their date these papers will be found to form a review of the history of general surgery and of abdominal surgery from 1881. They show the kind of experience which has fallen to the lot of a surgeon to a large city hospital during that period. They include an account of the definite adoption of Lister's antiseptic system and the subsequent modification connected with sterilization; the change from the Old to the New Newcastle Infirmary; critical reviews of surgical works; general addresses; series of operation cases, with additional notes as to their subsequent course; cases and operations with which the author's name has been especially connected, such as his operation for the relief of ascites, as well as his record of single cases of special interest. Mr. Morison has been accustomed to write dogmatically, and he has appended notes, sometimes maintaining the opinions originally expressed, sometimes modifying or correcting them. He has reprinted a number of aphorisms such as have formed texts for his clinical instructions, where he doubtless introduced the necessary reservations. Numbers of diagrams have also been introduced, such as those illustrating the positions of appendix abscesses, the various rôles assumed by the omentum, the different forms of biliary troubles. The surgeon who reads through these "surgical contributions" will find his interest kept continually on the alert by agreeing or disagreeing with the views expressed by their author—the suture of the gall-bladder after the removal of gall stones, union without drainage after the complete operation for mammary cancer, the oblique incision for removal of the appendix, pyloroplasty, the removal of ovarian cysts without tapping, cæcostomy for intestinal obstruction, catgut sutures for fractured patella, torsion of bleeding vessels, the removal of patients from their homes for surgical operations, chloroform anæsthesia for empyema—these are a few, taken haphazard, of the many debatable questions dealt with.

ACUTE POLIOMYELITIS: ITS NATURE AND TREATMENT. Being the Lumleian Lectures delivered at the Royal College of Physicians, London, 1916. By FREDERICK E. BATTEN, M.D.Cantab., F.R.C.P. Illustrated; pp. 104. London: John Bale, Sons and Danielsson, Ltd., 1916.

This reprint contains a complete and up-to-date description of acute poliomyelitis. The recent outbreak of this disease in the United States, and the possibility of its spread to this country, render the appearance of this work most opportune. The book is divided into seven parts, in which the writer successively discusses the epidemiology, morbid anatomy, experimental work, poliomyelitis in animals, serum diagnosis, clinical manifestations and treatment. A bibliography of recent literature is appended, and there is an appendix on the making of celluloid splints. The work is illustrated by numerous maps, charts, and photographs of patients and histological preparations.

THE AUTOBIOGRAPHY OF SIR PETER EADE, M.D., F.R.C.P., WITH SELECTIONS FROM HIS DIARY. Edited by SYDNEY H. LONG, M.D. With 8 illustrations; pp. 211. Price 7s. 6d. London: Jarrold and Sons, 1916.

This autobiography by the late Sir Peter Eade is mostly related in the form of a diary. It traces the course of the author's life from the early days of his childhood to the end, in August of last year—a long period of ninety years. Having been born in 1825, Sir Peter Eade notes with interest that he had lived in the reigns of five Sovereigns, from George IV to the time of our present King. It is, perhaps, the fate of most biographies that the interest which belongs to them is of an ephemeral type. With the rapid advance of time a personal narrative of the past is apt soon to lose its attraction amid the more pressing claims of the devouring present. Still a diary in which are largely portrayed current events of a past period always possesses more or less historical value. "Pepys' Diary," for example, is a case in point.

As the author observes, "probably at the present time no published work is more frequently consulted or referred to for an account of the persons, manners and customs of his time than 'Pepys.'" Much will be found in the author's work relating to the history of Norwich. But among the more strictly personal records perhaps the most notable is his account of the narrow escape from death he experienced in the Thorpe railway accident in September, 1874. The book generally reflects the life of a man who rejoiced in hard work, both in connexion with and apart from his profession, while his pages breathe the happiness of a life well spent.

DISCOVERY, OR THE SPIRIT AND SERVICE OF SCIENCE. By R. A. GREGORY. With 8 illustrations; pp. viii + 340. Price 5s. net. London: Macmillan and Co., Ltd., 1916.

It is true (perhaps unfortunately true) that no amount of knowledge can adequately make up for mental deficiency, but it is equally true that the efficiency of a normal mind is immensely increased by an abundant supply of knowledge. In this book the author conducts his readers over the vast realms of natural science, pointing out to them the pinnacles of knowledge, both great and small, not forgetting the record of their original discovery, and giving here and there details of human interest culled from the lives of the great explorers and discoverers in these domains. What a heartening effect a survey of this kind may have—even on persons who cannot themselves hope to take much part in further exploration or in the securing and development of the fields already won! We are reminded of some of the French books that have been very successful in the popularization of knowledge, and that great men of that country have not disdained the rôle of "vulgarisateurs" of the discoveries of others. A similar part has been played by the German "Bilderbücher" of the nineteenth century, some of which were really more interesting to adults than they were to children. In regard to the great importance in England at the present time of statesmen and other leading men being in touch with the spirit of scientific discovery, we quote from p. 3: "Lecky, in the Introduction to his 'Democracy and Liberty,' says that the whole great field of modern scientific discovery seemed out of the range of even such a scholar and statesman as Mr. Gladstone, and that when Faraday was endeavouring to explain to Gladstone and several others an important new discovery in science, Gladstone's only commentary was, 'But, after all, what use is it?' 'Why, sir,' replied Faraday, 'there is every probability that you will soon be able to tax it.'" Chapter VIII, on the "Conquest of Disease," with its anecdotes regarding Lister, &c., must prove interesting to many others besides medical men.

THE STUDENT'S TEXT-BOOK OF SURGERY. By H. NORMAN BARNETT, F.R.C.S. (with contributions by thirteen other authors). With 222 illustrations; pp. xix + 794. Price 21s. net. London: William Heinemann, 1916.

Mr. Norman Barnett has united in one volume chapters by specialists on surgical affections of the skin and complications of infectious fevers, deformities, anæsthetics, clinical pathology and bacteriology, gynæcology, military surgery, radiology, the surgery of the eye, ear, nose and throat, and chronic arthritis. He has also included a great number of full-page photographic reproductions of post-mortem specimens preserved in the Belfast Museum. The author has restricted his surgical descriptions, especially as regards minor surgery, surgical anatomy, the description and diagnosis of typical clinical cases, and the details of common surgical operations.

REFRACTION OF THE HUMAN EYE AND METHODS OF ESTIMATING THE REFRACTION, INCLUDING A SECTION ON THE FITTING OF SPECTACLES AND EYE-GLASSES, &C. By JAMES THORINGTON, A.M., M.D. With 344 illustrations; pp. xiii. + 407. Price 10s. 6d. net. London: William Heinemann, 1916.

This volume is an amalgamation of three previous works of the author: "Refraction and How to Refract," "Prisms," and "Retinoscopy." He states that he has planned to be systematic and practical, so that the student, starting with the consideration of rays of light, is gradually brought to a full understanding of optics; and following this he is taught what is the standard eye, and then is given a description of ametropic eyes, with a differential diagnosis of each, until finally he is told how to place lenses in front of ametropic eyes to

make them equal to the standard condition. There are many points of difference in the American practice of refraction work as compared with that in this country. Again, the author refers to details devised by himself, the introduction of which have been found beneficial. As an example he claims as an improvement making no perforation of the glass at the sight-hole of the ophthalmoscopic mirror, and instead only removing the quicksilver over the area required. By this means he asserts "that the glass at the sight-hole gives additional reflecting surface, and at the same time does away with much annoying aberration which results when the glass is perforated." His estimate, we note, of the patients consulting an ophthalmic surgeon is that from 50 to 80 per cent. consist of refraction cases. The work is profusely illustrated.

THE ESSENTIALS OF CHEMICAL PHYSIOLOGY, FOR THE USE OF STUDENTS. By W. D. HALLIBURTON, M.D., LL.D., F.R.S. Ninth edition. Illustrated; pp. xi + 324. Price 6s. net. London: Longmans, Green and Co., 1916.

New editions of this book have followed in rapid and regular succession—a fact which manifests the position it has attained as a text-book. In this new edition there has been revision throughout, and the opportunity has been taken to introduce some new sections in order to bring the work up to date. Of these sections attention may be drawn to the description of the ninhydrin reaction, the urease method for estimating urea, the volumetric process for estimating sulphates, and the Lewis-Benedict method for determining the sugar in blood.

PSYCHICAL AND SUPERNORMAL PHENOMENA: THEIR OBSERVATION AND EXPERIMENTATION. By Dr. PAUL JOIRE. Translated by DUDLEY WRIGHT. With 22 illustrations; pp. x + 633. Price 10s. 6d. net. London: W. Rider and Son, Ltd., 1916.

This book is an extended narrative of what may be described as the emotional faculties associated with the unexplained phenomena of spirit-rapping, telepathy, crystal-gazing, thought-reading and the like. Regarded as a narrative it introduces us to many apparently convincing instances of "spiritism," the new term for spiritualism. Moreover, judging from the terminology generally, "progress is being made in the science." We read of "clair-audience," "typtology," "externalization of motriety," "phenomena of levitation," "materializations," otherwise phantoms, of which it is now possible to obtain photographic records. But the unorthodox reader, the sceptic who looks to scientific precision, not merely to deductions, based upon analogy, to help him in his unbelief, is always a difficult person to convince, and yet his unbelief is not based upon perverseness. His mind is quite open to conviction. The materialization of a ghost, however, raises in his mind many difficulties in this regard. That a ghost can be photographed is an advancement of which the ghost may or may not approve. An honest, old-fashioned ghost, fulfilling all the special features of its species, is invariably certain of gaining an immense notoriety in the world of to-day. The publicity thus acquired by it may conceivably satisfy its ambitions without being made the target for a man with a camera. In brief, it is useless to deny the impelling conviction that psychical research, however scientifically conducted, fails to conform to the attributes of a science. The why and the wherefore are always absent from its investigations in a purely scientific sense. Still the study is a fascinating one, and there may be some truth in the author's suggestion that just as the discovery of the X-rays disturbed our conceptions of the impenetrability of matter, causing a modification of our views in regard thereto, so spiritism, collectively, may depend upon realities, the existence of which one day may be in some way revealed. Meanwhile most of us look for entertainment while perusing the weird, eerie tales of ghosts and haunted houses, and at the same time we do not forget that the possession of "mediumistic" faculties is one of the various means for gaining a livelihood. Nor can we overlook the association with fraud, often difficult to detect, such as the late Mr. Ernest Hart exposed in his book on "Hypnotism, Mesmerism, and the New Witchcraft" some years ago, when "professional hypnotists" provided public entertainments for the mystification of deluded persons. This book represents the latest views on psychical phenomena, comprising a complete treatise on the subject from the spiritist standpoint.

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SUPPLEMENT

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NOTES ON BOOKS.

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Obstetrics: Normal and Operative. By George Peaslee Shears, B.S., M.D. With 419 illustrations; pp. xx + 745. Price 25s. net. Philadelphia and London: J. B. Lippincott Co., 1916.

The author of this work has placed his views before the student and practitioner in an eminently practical manner. He places practice and treatment first, and whilst not overlooking pathology, physiology and embryology, he does not allow this side of the subject to take up too much space to the detriment of the practical side. The book is divided into four parts of which the first is devoted to normal pregnancy, labour, and the puerperium; the diagnosis and clinical phenomena of pregnancy, its management and the ante-partum examination; the mechanism, clinical phenomena and the management of labour; the physiology, clinical history and management of the puerperium; multiple pregnancy. Part II deals with the pathology of pregnancy and labour, including local and general disorders of the mother, intercurrent diseases, premature interruption of pregnancy and extra-uterine gestation; anomalies of the fœtus *in utero*, anomalies of the expulsive forces, malpositions and malpresentations; the causes of fœtal mortality in labour; injuries to the mother during delivery; ante-partum and post-partum hæmorrhage; contracted pelvis. Part III treats of the obstetric operations, and Part IV describes the pathology of the puerperium. The book is profusely illustrated with original photographs and drawings, as well as by pictures derived from other sources, all fully acknowledged.

The Diseases of Women: a Handbook for Students and Practitioners. By Sir John Bland-Sutton, F.R.C.S.Eng., LL.D., and Arthur E. Giles, M.D., B.Sc.Lond., F.R.C.S.Ed. Seventh Edition. Illustrated; pp. xv + 571. Price 15s. London: William Heinemann, 1916.

This has now reached its seventh edition, and the authors state in their preface that an extensive re-arrangement of the book has been made. It is now divided into five parts. The first deals with development, anatomy and physiology of the organs of reproduction, the remaining parts comprise diseases, diagnosis, treatment and prognosis. In the portion devoted to diseases, the older anatomical system of classifying diseases according to their locality has been discarded in favour of a more up-to-date pathological classification. The general trend of the writing seems to adapt it more for the practitioner than for a student preparing for examinations. As a rule the views expressed are those which the

authors have arrived at as a result of their personal experiences, and alternative methods of diagnosis and treatment are sometimes omitted if the writers do not employ them. As an example of the personal nature of the views expressed, "condylomata" may be taken; these are stated to be sometimes syphilitic but more frequently gonorrhœal in origin: the two forms are not differentiated and in the treatment neither salvarsan or its British alternatives are mentioned. The articles on the development, anatomy, physiology and malformations of the generative organs and on extra-uterine gestation, are given with more detail than is usual with a volume of this size.

PULMONARY TUBERCULOSIS IN GENERAL PRACTICE. By HALLIDAY G. SUTHERLAND, M.D.Edin. Illustrated; pp. xiv + 290. Price 10s. 6d. net. London: Cassell and Co., Ltd., 1916.

The aim of the author is to present, with a special view to the requirements of the general practitioner, the modern conception of pulmonary tuberculosis as a systemic disease, with an account of clinical and biological methods of diagnosis, and the rational treatment of the malady. The pathology of the subject has been limited to the minimum necessary for the interpretation of clinical observations, and in this respect the work has no pretensions to the scope of a text-book. The first chapter deals with the ætiology of the disease, which is stated to be responsible for at least one-thirteenth of the world's death-rate. The two factors concerned, (1) the tubercle bacillus, and (2) the resistance of the tissues, are dealt with at some length, the conclusion being drawn that, in pulmonary tuberculosis, bacilli of the bovine type have so far been found in but few cases in man, whereas in young children in nearly half the cases of fatal intestinal tuberculosis the Royal Commission found it to be present. The pathology of infection and the importance of early diagnosis, together with the method of eliciting symptoms receive due notice. The various methods of physical examination in the lungs and other organs and systems are considered, as well as the varieties and examination of the sputum and other pathological products. Various classifications of the disease are reviewed, and their limitations and advantages defined. As infection of the pleura is said to be frequently the earliest manifestation of pulmonary tuberculosis, the ætiology, diagnosis, and treatment of pleurisy are considered in relation to phthisis. The various principles of treatment are given under the following headings: open-air, domiciliary, hydrotherapy and heliotherapy, graduated rest and activity, tuberculin and vaccine treatments, with brief mention of the method of induction of artificial pneumothorax in selected cases, and other surgical procedures. The treatment of various secondary symptoms and complications completes the work.

WHEN TO ADVISE OPERATION IN GENERAL PRACTICE. By A. RENDLE SHORT, M.D., B.S., B.Sc.Lond., F.R.C.S.Eng. Pp. vi + 279. Price 5s. net. Bristol: John Wright and Sons, Ltd., 1916.

Each chapter bears the title and includes the subject of just such an address as is found to be highly appreciated at local and district meetings of general medical practitioners. At the present time when meetings of this kind are in abeyance, the publication of this volume is very timely. Its contents embrace the following subjects: Abdominal conditions, genito-urinary diseases and injuries, cerebral tumours, ear diseases, diseases of the breast, deformities, injuries and diseases of bones and joints. A selection of the subjects has been made from those in which difficult and debatable points as to the indications for operation are apt to arise in general practice.

THE RIGHT HONOURABLE SIR HENRY ENFIELD ROSCOE, P.C., D.C.L., F.R.S.: A BIOGRAPHICAL SKETCH. By Sir EDWARD THORPE, C.B., F.R.S. Portr.: pp. viii + 208. Price 7s. 6d. net. London: Longmans, Green and Co., 1916.

This is more than a life of Roscoe. It gives an account of the gradual recognition of the value of the study of chemistry in England; an account of the foundation and fortunes of Owens College, and its absorption to form the nucleus of the Victoria

University; an account of the relations of men of science in England towards Germany and the German schools, to which many of them were at one time connected by bonds of personal friendship, by early recollections, and by healthy work in the same fields of scientific progress. How well Roscoe recognized the existence of possible causes of war between England and Germany is evident from the extracts quoted from his writings. Of what the book tells us about the character and ideals of the man himself, few passages can be more interesting to medical men than the following (p. 99): "Nothing angered him more than to find that an analytical result had been 'trimmed' or 'cooked.' He once summarily expelled a young man from his laboratory who, under pretence of making a re-determination of an atomic weight, was caught hatching out a series of wholly fictitious numbers. And he was amazed at the mentality of a minister of religion who failed to perceive the heinousness of such a crime. . . ."

THE SEXUAL DISABILITIES OF MAN AND THEIR TREATMENT AND PREVENTION. By ARTHUR COOPER. Third edition, revised and enlarged. Pp. viii + 227. Price 6s. net. London: H. K. Lewis and Co., Ltd., 1916.

Based on the writer's practice during the last thirty-eight years, this little book deals with a subject which has received but scanty recognition in the medical schools of this country. The work is divided into three parts, the first being concerned with sterility, the second with impotence, and the third, which is an entirely new feature of the present edition, with the prevention of sexual disability. In the first part a detailed account of normal semen is followed by a description of the quantitative and qualitative changes in this secretion, the former comprising polyspermia, oligospermia and aspermia, and the latter hydrospermia, hæmospermia, and pyospermia. A chapter on changes in the zoosperms in disease is followed by one on treatment. The writer classifies impotence into secondary and primary forms according as there is or is not some definite condition to account for it, and describes the appropriate local and general treatment. The third part contains a short account of education in sex matters, sexual perversion, and prophylaxis in venereal diseases.

THE PROBLEMS OF PHYSIOLOGICAL AND PATHOLOGICAL CHEMISTRY OF METABOLISM: FOR STUDENTS, PHYSICIANS, BIOLOGISTS AND CHEMISTS. By Dr. OTTO VON FÜRTH. Authorized Translation by ALLEN J. SMITH. Pp. xv + 667. Price 25s. net. Philadelphia and London: J. B. Lippincott Co., 1916.

Based upon twenty-five lectures originally addressed to students of biological chemistry, this book presents the normal and pathological chemistry of metabolism as a broad and connected whole. The author begins with the proteins, tracing them from their ingestion as food through the various stages of their katabolism to their final end-products in the urine. In subsequent chapters the carbohydrates and fats are dealt with on similar lines, whilst the remainder of the book is devoted to the chemistry of the vital combustion processes. Results are described rather than methods, the whole book is critical and suggestive more than didactic. The chemical pathology of the common metabolic diseases—gout, diabetes, obesity, &c., is fully discussed. The clinical aspects of the author's subject are kept in the foreground throughout.

INSECT ENEMIES: ENUMERATING THE LIFE-HISTORIES AND DESTRUCTIVE HABITS OF A NUMBER OF IMPORTANT BRITISH INJURIOUS INSECTS. TOGETHER WITH DESCRIPTIONS ENABLING THEM TO BE RECOGNIZED, AND METHODS BY MEANS OF WHICH THEY MAY BE HELD IN CHECK. By C. A. EALAND, M.A. With 53 illustrations. Pp. xiii + 223. Price 6s. net. London: Grant Richards, Ltd., 1916.

The author tells us that his purpose is to provide an introduction to the field of economic entomology. The subject is attracting much attention just now in the interests of humanity, and the problem it introduces is a curious one. Translated into other words, it means "war to the knife," that is the extermination of insect life which causes discomfort and is proved to be harmful to man. Thus man usurps to himself the right to deny that such insects are

entitled to live; what then can their purpose be among vital creatures if these insects were only intended to be slain? In the days of our childhood we were taught that it was cruel to kill a "poor" fly, but recent science has taught us that every "poor" fly must be killed if we desire to live ourselves. The fly and the other harmful insects deserve their fate, but there is, nevertheless, the probability that man has now to do the killing himself, in consequence of disturbing the natural order of things, whereby such pests were kept under control by other creatures feeding upon them. A gamekeeper has to kill rats because he shoots at sight the "vermin" whose natural food they form. The author's book tells us much about our insect pests, his pages being devoted solely to those met with in these islands. In ten chapters the life-histories and habits of these creatures are discussed in an attractive form, and constitute a revelation of the advances of our knowledge upon the subject. An appendix describing the methods of using various insecticides, a bibliography, and an index complete the volume, the illustrations of which usefully serve the purposes of instruction.

THE ART OF ANÆSTHESIA. By PALUEL J. FLAGG, M.D. With 136 illustrations; pp. xvi + 341. Price 15s. net. Philadelphia and London: J. B. Lippincott Co., 1916.

The whole subject of anæsthesia is here presented in a very readable form. There are many illustrations and the list of table positions, as the author claims, is quite complete. He gives full details of pre-anæsthetic preparations, emphasizing the need of precise personal inspection of the patient just before operation. Dr. Flagg devotes a long chapter to the signs of anæsthesia. In describing treatment for shock he explains the method of using the "Lewis Pendulum Swing" as well as the Japanese procedure known as "kuatzu." In the former "the patient should be suspended by the fully flexed knees and swung forcibly from side to side for a period of from one to two minutes. The suffusion of the neck and face . . . is the index by which one may judge the effect of the centrifugation." In "kuatzu" "the patient is placed in the prone position with arms extended sideways; the operator with his wrist, lands severely on the seventh cervical vertebra with the regularity of a carpenter wielding a hammer. This stimulation is thought to act by overcoming the vagus inhibition responsible for the cessation of the heart's action." Both these manœuvres are suggested for arrested or suspended respiration. Under the heading of ether anæsthesia, Dr. Flagg exhibits four or five large woodcuts which help very clearly to explain his Semi-open Drop Method. The frontispiece to the work consists of a medallion bust of Long, the first to use ether in surgery, erected to his memory by the University of Pennsylvania, of which he was a graduate.

MAN AS HE IS: ESSAYS IN A NEW PSYCHOLOGY. By Sir BAMPFYLDE FULLER, K.C.S.I., C.I.E. Pp. 247. Price 7s. 6d. net. London: John Murray, 1916.

Although the author is an Indian Governor who has taken up psychology as a hobby and is therefore to be regarded as an amateur, it would be wrong to infer that this psychological study is at all amateurish. Observation of the events of the War has forced many people, including the author, to recognize the important part played by impulse in directing and controlling human behaviour. Moreover, Sir Bampfylde realizes that impulses take their origin in the unconscious mind. These are the teachings of the modern psychoanalytic school, with whose literature he appears to be unfamiliar; for not only is there no reference to a single psychoanalytic paper or doctrine, but he appears to be under the impression that his contribution is new in principle. In his preface, for example, he writes that the War "has illumined realities and forced upon us glimpses of human nature, which will not serve as illustrations to any of the pages of current psychology." The book is a study of human impulses or, being interpreted, instincts and emotions. Possibly it includes a little more, for it is not usual to regard memory or language as an impulse. The impulses are difficult to classify, but Sir Bampfylde attempts the task in two tables under the headings of Sympathy and Antipathy, and of Self-effacement and Self-assertion. Finally, on page 203, there is an attempt at comprehensive classification, despite the author's own objection to any undertaking "to unify." It would seem that we should not be far wrong if we inferred that the tendency "to unify" is one of the human impulses. These are but a few of the thoughts suggested by "Man as he is."

TREATISE ON FRACTURES. By JOHN B. ROBERTS, A.M., M.D., F.R.C.S., and JAMES A. KELLY, A.M., M.D. Illustrated; pp. xxv + 677. Price 25s. net. London and Philadelphia: J. B. Lippincott Co., 1916.

The first chapter, occupying 84 pages with 53 illustrations, deals with "General Considerations." These include estimates of the relative frequency of fracture in individual bones. Plagemann's tables based on cases (for the most part diagnosed by radiogram) at the Rostock Clinic between the years 1891 and 1910 are relied on chiefly. The causes of fractures, their varieties (the terms "closed" and "open" being used as the equivalents of "simple" and "compound" respectively); the causes of displacement of fragments; the symptoms of fracture; the use of Röntgen-rays, the pathology of repair; the complications of fractures, and the general symptoms with which they may be associated; the peculiarities of epiphyseal separation; prognosis; statistics of results, are all dealt with in this chapter. The operative treatment of closed fractures is accorded 30 pages and 72 illustrations, and concludes with a passage from a recent report of the American Surgical Association, the final sentence being: "The operative method, when adopted, should be employed early, and should, for closed fractures, be undertaken only by experienced surgeons, thoroughly equipped by training and with proper instruments and apparatus." To fractures of the cranium 56 pages and 54 illustrations, to fractures of the facial bones 36 pages and 43 illustrations, and to fractures of the vertebræ 39 pages with 48 illustrations are devoted. Fractures of the hyoid bone, larynx and trachea, the sternum, ribs, costal cartilages are dealt with. The remainder of the book is given to consideration of fractures of the bones of the extremities and of the pelvis. To indicate the atmosphere of the book an extract may be given concerning the treatment of certain fractures about the elbow by the position of hyperflexion and supination: "The best results are obtained by this position in the following fractures of the lower end of the humerus: supracondylar fractures (with the possible exception of the Kocher flexion type); diacondylar fracture; separation of the lower epiphyses; fractures of the external epicondyle, external condyle, internal epicondyle, and internal condyle," and again: "The degree of hyperflexion will depend upon the amount of swelling present. In cases with much swelling it is always wise to abstain from using flexion for a few days, and should stop at the point which causes discomfort, or which is likely to cause compression of the brachial artery."

CLINICAL METHODS: A GUIDE TO THE PRACTICAL STUDY OF MEDICINE. By ROBERT HUTCHISON, M.D., F.R.C.P., and HARRY RAINY, M.D., F.R.C.P.Ed., F.R.S.E. Sixth Edition. 161 illustrations; pp. xiii + 664. Price 10s. 6d. net. London: Cassell and Co., Ltd., 1916.

The new edition of this well-known handbook contains all the characteristic features of former editions, with some important additions, particularly in the sections of Clinical Bacteriology and the Circulatory System. In the former, rewritten by Professor James Ritchie, additional matter has been added with regard to various organisms of topical interest, such as *Bacillus paratyphosus*, *Bacillus dysenteriæ*, *Bacillus tetani*, &c. The chapter on the Circulation contains some account of the various types of irregularity on which so much light has been shed by a study of the venous pulse, and includes a description of Mackenzie's ink polygraph, but no mention is made of the string-galvanometer.

A TEXT-BOOK OF HISTOLOGY. By HARVEY ERNEST JORDAN, A.M., Ph.D., and JEREMIAH S. FERGUSON, M.Sc., M.D. 598 illustrations; pp. xxviii + 799. Price 15s. New York and London: D. Appleton and Co., 1916.

As explained in their preface the authors have found from experience as teachers, that students take a much greater interest in the study of histology if, together with the dry facts of histological arrangement, they are given some brief idea as to the known or believed function which makes such an arrangement of special value. The feature of the book, therefore, is the addition of concise accounts of the special functions of the cells and tissues concerned, to which are added, in such cases as they seem specially helpful, brief statements

of embryological and comparative anatomical facts. Otherwise the book follows much the usual lines. It is profusely illustrated with a happy mixture of diagrams, drawings and microphotographs, whilst a number of reproductions of reconstruction models help to explain the gross anatomy of the finer details of the vascular supply and duct arrangement of the various organs. In the last chapter the more important and simpler methods of histological technique are described.

THE CATARRHAL AND SUPPURATIVE DISEASES OF THE ACCESSORY SINUSES OF THE NOSE. By ROSS HALL SKILLERN, M.D. Second Edition. With 287 Illustrations; pp. xxii + 417. Price 21s. net. Philadelphia and London: J. B. Lippincott Co. 1916.

The second edition of this important work has recently appeared, the first having been quickly exhausted in the comparatively short period of a few years. Even within this time several alterations became necessary, and additions had to be made. The author sums up the most important of these in his preface—viz., "The treatment of sinus disease in children; the use of the nasopharyngoscope in diagnosis of obscure conditions in the posterior ethmoid and sphenoid regions; the diagnostic needle puncture of the maxillary sinus more fully explained, with possible dangers and how to avoid them; Canfield's operation on the maxillary sinus compared with the pre-turbinal method . . . . ; a compilation of the American mortalities following the Killian operation on the frontal sinus; complete revision of the chapter on the sphenoid sinus with description and illustrations of Halle's new operation; a chapter on combined empyema or multiple sinusitis." There is also added a more thorough discussion on the post-operative treatment of the sinuses, and the complications that may arise. The work is divided into six parts: (1) General considerations, (2) the maxillary sinus, (3) frontal sinus, (4) ethmoid labyrinth, (5) sphenoid sinus, (6) multiple sinusitis (pan-sinusitis). The first hundred pages deal with the anatomy, physiology and bacteriology of the accessory sinuses. The ætiological causes of the various diseased conditions are dealt with, and the sources of contamination and infection considered. The pathological changes, both in the mucous membrane and bone are fully discussed, as are also the effects of pressure from over-secretion, and cholesteatomatous, calcareous, and carcinomatous formations. The symptoms arising from the various affections of the sinuses, and the correlated and associated conditions of the larynx and pharynx, are given in detail. The important relation of nasal polypus to nasal suppuration, and the danger in which it involves the sinuses, are emphasized. The author enforces the important consequences generally of sinus disease—febrile, nervous, circulatory, and sexual—which in general practice are often overlooked. All the steps and methods of diagnosis are entered into, and the section concludes with a consideration of the complications, orbital, cerebral, and other, which may attend sinus affections. On the same lines, the author treats of affections of the maxillary sinus, the adjuncts to diagnosis, and the assistance derived from the different collateral signs and symptoms in order to arrive at a correct conclusion. Forty pages are devoted to treatment, including all the most modern operative measures. A hundred pages are devoted to the frontal sinus, a large portion of which is absorbed in discussing the different methods, including a comparison of such operative procedures as those of Ogston-Luc, Kuhnt, and Killian. The last chapters of the work include the ethmoid labyrinth and the sphenoid sinus, with a brief section dealing with multiple sinusitis and pan-sinusitis. The anatomy and anomalies in structure of the ethmoid labyrinth and sphenoid sinus; the ætiology and symptoms of their diseased states, are fully described, with their treatment and operative procedures. The work is profusely illustrated.

MILITARY SURGERY. By DUNLAP PEARCE PENHALLOW, S.B., M.D.(Harv.). With Introduction by Sir ALFRED KEOGH, K.C.B. With 151 illustrations; pp. xvi + 432. Price 15s. net. London: Henry Frowde and Hodder and Stoughton, 1916.

This book forms a summary of what has been written on Military Surgery during this present War, and gives a general account of how the wounded are being cared for. It further includes an account of important original contributions such as Sir Anthony Bowlby's

Bradshaw Lecture on Wounds; Dr. Fleming's paper on the Bacteriology of Septic Wounds; the Treatment of Wounds with Salt Solution by Sir Almroth Wright's method; Dr. Carrel's employment, for the same purpose, of a 0·5 per cent. hypochlorite solution (the decimal point has been omitted in the last line but one on page 70); Mr. Gray's plan of immediately paring and suturing wounds; the paper by Messrs. Holmes and Sargent on Injuries to the Longitudinal Sinus; the important account of aneurysms by Sir George Makins: the series of Cases of Early Operations for Gunshot Wounds of the Abdomen by Mr. Cuthbert Wallace. There is a full index.

GALEN: ON THE NATURAL FACULTIES. With an English Translation by ARTHUR JOHN BROCK, M.D. Pp. iv + 339. Price 5s. net. London: William Heinemann, 1916.

This latest addition to the Loeb Classical Library is the first example of a medical treatise appearing in the collection, the previous volumes being devoted to belles lettres or theology. The present work, which it is hoped will help to hasten the coming reunion between "the humanities" and modern biological science, contains the Greek text and facing it a translation of Galen's treatise on "The Natural Faculties." In his introduction Dr. Brock gives some account of Galen's predecessors, and of his subsequent influence on medical thought. He then discusses his method, personal character, and the style of his writings. Galen's contribution to medicine of the present day is summarized as follows: (1) The high ideal which he set before the profession. (2) His insistence on immediate contact with nature as the primary condition for arriving at an understanding of disease; on the need for due consideration of previous authorities; on the need for reflection—for employment of the mind's eye as an aid to the physical eye. (3) His essentially broad outlook, which helped him in the comprehension of a phenomenon through his knowledge of an analogous phenomenon in another field of nature. (4) His keen appreciation of the unity of the organism, and of the inter-dependence of its parts; his realization that the vital phenomena in a living organism can only be understood when considered in relation to the environment. (5) His realization of the inappropriateness and inadequacy of physical formulæ in explaining physiological activities. (6) His quarrel with the anatomists due to his realization that a view of the whole could never be obtained by a mere summation of partial views, and hence his sense of the dangers which would beset the medical art if it were allowed to fall into the hands of specialists without an organizing head to guide them. As regards the present treatise Dr. Brock says: "If Galen be looked on as a crystallization of Greek medicine, then this book may be looked on as a crystallization of Galen. Within this comparatively short compass we meet with instances illustrating perhaps most of the sides of this many-sided writer. The 'Natural Faculties,' therefore, forms an excellent prelude to the study of his larger and more specialized works."

EXPERIENCES OF A WOMAN DOCTOR IN SERBIA. By Dr. CAROLINE MATTHEWS. With Portrait; pp. 246. Price 5s. net. London: Mills and Boon, 1916.

"Come over and help us." Such was the agonized appeal for medical aid by Serbia in her distress, while undergoing the pangs of invasion. The author answered the appeal by volunteering, at her own expense and with her own equipment, for service with a Serbian Army field unit. Thus does she explain the origin of this book, in which is related the story of her perilous adventures, her hardships, the almost miraculous escapes from falling a victim to German hatred of England. A natural intuitiveness, however, helped her out of many a tight corner, and was largely instrumental in enabling her to reach again the shores of her native country. Her last bid for safety may be taken to illustrate the stressful ordeals to which she was continually being exposed. While the train was leaving a German town on the author's journey, at last, for neutral territory—Switzerland, a man clung to the carriage in which she was travelling. He was a German spy, and had determined, at all hazards, to detain her. There was only one thing to be done; exerting all her strength she forced him to loosen his hold upon the now fast-moving train. He fell in a heap on the platform, and she believed, at first, that he had been killed. Thus was secured her release

from the iniquities of German *Kultur*. A vein of lightheartedness, nevertheless, pervades the book, which relieves the sombreness of the details, and adds to the admiration for the plenitude, in this instance, of a woman's courage.

HOME CARE OF CONSUMPTIVES. By ROY L. FRENCH, M.A. With 27 Illustrations; pp. xii + 224. Price 5s. net. New York and London: G. P. Putnam's Sons, 1916.

This book is written by a social worker and former secretary of the Kentucky Tuberculosis Commission, who has been engaged for four years in educational work in the campaign against tuberculosis. The information given is set out in the simplest possible form for the benefit of patients, visiting workers and nurses, teachers, ministers, and clubs interested in the health problems of their localities. No theory nor practice is presented that is not known and used by the tuberculosis specialists of the entire world, and useful information is brought together that would require an amount of research and reading impossible for the average family. Simple facts are given on the nature of the disease itself, with special reference to its home care. Personal cleanliness, baths, disposal of discharges from the body, rest, fresh air and exercise receive suitable mention. The care of the "bedfast" patient is briefly touched upon and suggestions given as to the use of antiseptics in the home. Chloride of lime is recommended for disinfection of excreta, but since this "has a bad effect on the plumbing" a strong solution of formalin is preferred. One of the most useful chapters is a reprint of "Hints and Helps for Tuberculosis Patients," by Dr. Charles L. Minor, of Asheville, N.C. Another chapter on "Foods and their Preparations," by Miss Cauble, contains a list of food-stuffs which are good for the patient to use, together with the time required for cooking. Various recipes are added. The book contains 27 illustrations of sleeping porches, bungalows, and various appliances for the consumptive, all of which are practical.

EXTRA-OCULAR PRESSURE AND MYOPIA. By ISLAY B. MUIRHEAD, M.D. Pp. vi + 96. Price 3s. 6d. net. London: John Bale, Sons and Danielsson, Ltd., 1916.

This small treatise is a philosophical dissertation upon the theme "militating against the current views as to the effect of convergence on the length of the optic axis." The author's propositions are discussed from the evidence based upon anatomy, the changes in the apparent size of objects, the change in the definition of objects and from the evidence derived from ætiology. It is impossible, however, to do full justice to his views within the compass of a review, for almost every page contains an argument. For ophthalmic surgeons therefore, and others interested in the subject, the necessity arises for their reading this small book, should they be desirous of testing their own beliefs against those favoured and promulgated by the author. The author draws upon his personal experience, as a myope, in support of his views.

INTERNATIONAL CLINICS: A QUARTERLY OF ILLUSTRATED CLINICAL LECTURES AND ESPECIALLY PREPARED ORIGINAL ARTICLES. Edited by H. R. M. LANDIS, M.D.Philad., with the collaboration of CHAS. H. MAYO, M.D., Rochester, U.S.A., and others. Vol. III. Twenty-sixth Series, 1916. Only sold in complete sets of four vols. With 283 illustrations; Pp. ix + 309. Price 35s. net per year. Philadelphia and London: J. B. Lippincott Co., 1916.

With the exception of Dr. Parkes Weber (who writes on some aspects of herpes zoster) all the contributors to this volume of the International Clinics are American. The therapeutic articles deal with the treatment of gonorrhœa in the male, the Bergonié treatment of obesity and the medical uses of high-frequency currents. Under the heading of diagnosis there is a paper on the "Clinical Features of Pneumothorax," by Dr. A. W. Hewlett, and several contributions on the use of X-rays in the diagnosis of intra-thoracic conditions. Amongst the papers of specially surgical interest one may mention that of Mr. Gwilym E. Davis on "Birth Traumatisms of the Upper Extremity," and a very practical article on "How to Examine the Rectum," by Dr. Charles J. Drueck. The volume concludes with an interesting biographical sketch of Trousseau by Dr. Fielding H. Garrison.

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SUPPLEMENT

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NOTES ON BOOKS.

[*The purpose of these "Notes" is neither to praise nor to blame, but merely to draw attention to some of the new books and new editions which have been added to the Society's Library.*—Ed.]

The Basle Anatomical Nomenclature (B.N.A.): being an Alphabetical List of Terms showing the old Terminology, the B.N.A. Terminology and the suggested English Equivalent. By E. B. Jamieson, M.D., M.B., Ch.B.Edin. Pp. viii + 91. Price 6s. net. London and Edinburgh: W. Green and Son, Ltd., 1916.

The author, in the preface to this book, explains the circumstances which led to the innovation of the Basle nomenclature. His informative remarks are judicial, authoritative, and mostly convincing, upon this much debated subject. That we must concede. But it must still be remembered that the B.N.A. has much headway to make before its universal acceptance becomes an accomplished fact. It has so far been adopted, as the author tells us, in many schools on the Continent—that was to have been expected—in America and in British Colonies, and it is making its way among an increasing number of English text-books of anatomy. The scheme of the book is comprised in the arrangement of the terms in three parallel columns. In the first is placed the English names, in the second the Basle, and a translation or an equivalent in the third. In one particular the B.N.A. is, perhaps, of noticeable significance, namely, in the elimination of the names of celebrated old anatomists and others, with whose work many structures of the body have been identified for many generations. Gone are the names of Fallopius, Vieussens, Sylvius, Stenson, Rolando, Hunter (Hunter's canal), Peyer, and many others, even Venus has ceased to be recognized in anatomical nomenclature, displaced, like the other names, by the impelling force of scientific accuracy, in accord with the demands of the time.

Diseases of the Throat, Nose and Ear, for Practitioners and Students. By W. G. Porter, M.B., B.Sc., F.R.C.S.Ed. Second edition, fully revised for the Author during his absence from England in the service of his country by P. McBride, M.D.Ed., F.R.C.P.Ed., F.R.S.E. With 77 illustrations, pp. xvi + 280. Price 7s. 6d. net. Bristol: John Wright and Sons, Ltd., 1916.

Dr. Porter is to be congratulated upon having the benefit of a master hand as deputy for the revision of his book, while he himself is on active service. It is a manual which holds its particular position amongst those treating of the triple specialty through just giving what the general practitioner requires in the attainment, roughly speaking, of two objects: First, the medical care of the slighter class of cases that come under his view, and secondly, a capability of a full appreciation of what the expert can do when the time for his intervention arrives, and the diagnostic knowledge which is essential for such appreciation.

Dr. McBride has briefly summarized all the main facts added to our knowledge since the earlier publication in 1912. Amongst these additions are Killian's suspension laryngoscopy; whilst other subjects have been amplified and brought more up to date, e.g., the vestibular reactions, and the pointing test as a diagnostic in cerebellar abscess. The affections of the labyrinth have been more extensively treated, and the relationship of epidemic cerebrospinal meningitis to labyrinthine deafness duly noted. The important appendix of remedies at the end is extended, and is quite up to the practitioner's requirements.

MÉTHODE DE TRAITEMENT DES FRACTURES. Par le Professeur PIERRE DELBET, avec la Collaboration de MM. MARCHACK, MOSSÉ et LAMARE. ("Annales de la clinique chirurgicale du Professeur Pierre Delbet," No. 5.) With 191 illustrations; pp. 501. Price 20 fr. Paris: Félix Alcan, 1916.

In this work Professor Delbet urges in favour of the so-called ambulant treatment of fractures of the shaft of the long bones. The 67 plates containing 159 figures, along with 32 figures in the text, afford a cursory view of his methods. In the case of fractures of the shafts of the tibia and fibula, also for Pott's and Dupuytren's fractures, reduction is made by attaching a weight of 18 or 20 kilogrammes to a sling applied round the ankle, so that the foot is flexed to a little more than a right angle at the ankle, and the anterior outline of the leg is rendered a little more concave. Then a many-tailed plaster bandage is applied, stiffened by two side-splints. When hard the plaster is cut away with a wire saw, front and back, or in the case of compound fractures, according to the wound. There is left a plaster ring round the tuberosities of the tibia and another ring at the ankle, the two rings being kept from approximating by the side splints. The patient may be allowed to bear his weight on his heel, but not on his toes, after twenty-four hours. The plaster requires to be reapplied, whether on account of swelling or shrinkage of swelling, and is worn for thirty-five to forty days. In the case of fractures of the shaft of the femur, humerus and forearm, the plaster rings are not simply held apart, but are continually forced apart by side-springs, which are gradually increased in force by the aid of screws. In the case of fractures of the femur, the upper plaster pelvic ring rests against the ilium or ischium, as in Thomas's knee-joint splint; the lower ring rests against the upper parts of the condyles of the femur. The patient then gets about with the aid of crutches. In the case of the humerus, the upper plaster ring presses like a crutch in the axilla, the lower against the flexor aspect of the upper third of the forearm, which is simultaneously held fixed at a right angle. In fractures of the forearm the upper ring presses against the flexor aspect of the lower third of the humerus, the lower ring of plaster is applied to the wrist, the elbow is kept flexed at a right angle, and an anterior spring separates the two rings.

LE THORAX ET L'EMPHYSÈME: LA CHONDRECTOMIE. Par EUGÈNE DOUAY. ("Annales de la clinique chirurgicale du Professeur Pierre Delbet." No. 4.) With 111 illustrations; pp. 472. Price 20 fr. Paris: Félix Alcan, 1914.

This monograph constitutes the fourth member in the series of Professor Pierre Delbet's "Annals of Clinical Surgery." It deals with the operation of chondrectomy in relation to the thorax and emphysema. According to the hypothesis of W. A. Freund, "certain primary lesions of the costal cartilages are able to modify the thoracic equilibrium and determine secondary lesions in the lung, particularly emphysema and pulmonary tuberculosis. Chondrectomy, restoring to the thorax its normal mobility, is therefore a rational operation, capable of diminishing respiratory distress in the emphysematous, and of facilitating cicatrization of an incipient pulmonary tuberculosis." This theory has drawn the attention of surgeons to the mobility of the thorax, and raises two main questions, which the author endeavours to answer: (1) Is it possible by surgical intervention directed to the thoracic wall to ameliorate the respiratory mechanics? (2) Has this intervention any other action? The historical aspect of the subject is first considered; emphysema is next dealt with, and a standard established in order to measure exactly the degree of the lesions, the elasticity of the cartilages, and especially that of the lung. As regards the heart, "dilatation of the ri ht

auricle, which constitutes the initial element in changes in the right heart, is very frequent in emphysema ; it is an important cause of dyspnœa, hence therapeutic efforts must be directed to it." The characteristics of the thoracic cage and the condition of pulmonary elasticity, together with respiratory movements of the thorax, are detailed and illustrated. This concludes the first portion of the work ; the second half is devoted to chondrectomy, which the author states to have generally "un effet heureux sur les troubles respiratoires de l'emphysémateux." He does not agree with Freund's conception, but regards the action of chondrectomy as a beneficial one in suppressing the direct and harmful action of the anterior border of the emphysematous lung upon the right heart by relief of pressure. The crises of asthma are also said to be benefited by chondrectomy. The technique of Delbet's operation is given, which consists in a sub-periosteal resection of 4 cm. to 6 cm. of various costal extremities and resection of the cartilage with the whole of the perichondrium. The last chapter contains summaries of the notes of cases operated upon by this method, with immediate and remote results, as far as the latter can be ascertained.

MANUAL OF PSYCHIATRY. By J. ROGUES DE FURSAC, M.D., and A. J. ROSANOFF, M.D. Fourth Edition. Pp. xi + 522. Price 10s. 6d. net. New York and London : Chapman and Hall, Ltd., 1916.

In preparing a fourth edition of this well known text-book close co-operation between the French and American collaborators was found to be impossible owing to the War. It was therefore agreed between them to place the preparation of this edition entirely in the hands of Dr. Rosanoff. With the object of bringing the book up to date nearly half the chapters appear to have been entirely re-written or, at least, very extensively revised. There is a great deal of new matter, especially in the sections on case-taking, and there are quite full accounts of the Wassermann reaction and the Binet-Simon tests.

ANATOMY, DESCRIPTIVE AND APPLIED. By HENRY GRAY, F.R.S. Edited by ROBERT HOWDEN, M.A., D.Sc., M.B., C.M. Notes on Applied Anatomy revised by A. J. JEX-BLAKE, M.A., M.D.Oxon, F.R.C.P.Lond., and W. FEDDE FEDDEN, M.B., M.S.Lond., F.R.C.S. Nineteenth Edition. With 1,143 illustrations; pp. xvi + 1304. Price 32s. net. London: Longmans, Green and Co., 1916.

This edition of Gray's anatomy is the eighteenth superstructure built by successive hands on the great text-book. Whilst increased to nearly double the extent of the old work by the necessary introduction of new sections, illustrations and gradually acquired additions to knowledge in anatomical science, it is significant that the original arrangement of that work has never demanded alteration. The bulk of Carter's drawings survive, including, for instance, the unique sketches of fractured bones; and it is remarkable how little the classical descriptions of Gray's text have needed revisal when the gross structures of the body are under consideration. Comparing the nineteenth with the previous edition, there are in the former two more pages in the descriptive matter, and ten more in the index, but the total falls short by seven pages, owing to the exclusion of the glossary of the Basle anatomical nomenclature, apparently now no longer considered essential. Eighty new figures are introduced, of which sixty replace older ones, and more figures are coloured than hitherto. Some illustrations are now withdrawn, as for example Nos. 146 and 148, representing phases in the development of the aural labyrinth in the sheep and cat respectively. A new author's name appears in the preface, viz., that of Dr. E. P. Stibbe, who assists Dr. J. D. Lickley in the revision of the texts.

PHYSICS AND CHEMISTRY FOR NURSES. By AMY ELIZABETH POPE. Illustrated; pp. x + 444. Price 7s. 6d. net. New York and London: G. P. Putnam's Sons, 1916.

This is a bid for further advancement in a nurse's education. She is here introduced to laboratory work, to chemistry and physics, to electricity and magnetism, to the chemical constituents of the human body and of food, to the chemistry of digestion, of absorption and metabolism, and the chemistry of the urine, and urine analysis. These are only some "of

the important chemical and physical processes constantly referred to in physiology, materia medica, and the other studies included in the school of nursing curriculum," as the author states in her preface. It may, therefore, be gathered that this field of garnered information is of a very wide description, providing the nurse with many sources of knowledge, within a reasonable compass. The book is divided into twenty-four chapters, and includes, at the end, a glossary, full index, and an index of experiments. There are numerous illustrations.

THE BIOLOGY OF TUMOURS. By C. MANSELL MOULLIN, M.A., M.D.Oxon., F.R.C.S. Pp. 55. Price 2s. 6d. net. London: H. K. Lewis and Co., Ltd., 1916.

This little volume of 55 pages is an elaboration of the author's Bradshaw Lecture of 1912. The author considers the most satisfactory basis of classification of tumours is the mode of origin, and he divides them into two groups, the first due to " the reproductive power innate in all living things being suddenly roused into activity," and the second due to "changes that occur in the course of development being imperfectly carried out." The evolution of tumours is discussed in two sections on this basis.

LES FORMES ANORMALES DU TÉTANOS; ÉTUDE CLINIQUE, PATHOGÉNIQUE, PROPHYLACTIQUE ET THÉRAPEUTIQUE. Par M. COURTOIS-SUFFIT et R. GIROUX. Préface du Professeur FERNAND WIDAL. Pp. iii + 174. Price 4 fr. Paris: Masson et Cie, 1916.

This work treats of forms of tetanus in which the spasm is confined to a limited group of muscles, e.g., those of the head, of one or more limbs, or the abdomino-thoracic muscles. In the cephalic type the spasm may be followed by paralysis of the cranial nerves, e.g., the ocular, facial or hypoglossal. The constitutional symptoms are less severe than in the case of the generalized form of the disease, and the prognosis is more favourable. The pathology and treatment are set forth in detail.

LOSSES OF LIFE IN MODERN WARS: "Austria-Hungary, France," by GASTON BODART, LL.D.; "Military Selection and Race Deterioration," by VERNON LYMAN KELLOGG. Edited by HARALD WESTERGAARD, LL.D. Pp. x + 205 + 6. Price 6s. net. Oxford: Clarendon Press, 1916.

This is published by the Carnegie Endowment for International Peace, Division of Economics and History, the Director of which, John Bates Clark, says in his "Introductory Note" that the Division in question is organized to "promote a thorough and scientific investigation of the causes and results of war." An elaborate series of investigations has been undertaken, and reports are to be printed, in accordance with the plan of investigation formed at the conference of eminent statesmen, publicists, and economists, held in Berne, Switzerland, in August, 1911. Neither the officers of the Carnegie Endowment, nor its Committee of Research, vouch for more than that the works issued by them contain the data – statistical facts, opinions of various classes (such as business classes, socialistic and other bodies), &c.—which they are stated to contain. "The standing and attainments of the writers selected afford a guarantee of thoroughness of research and accuracy in the statement of fact." The present volume contains a large series of statistics in regard to the numbers of killed and wounded, &c., in very many (almost exclusively European) wars of relatively modern times. This is followed by a "preliminary report and discussion" of the subject of "Military Selection and Race Deterioration," by Vernon Lyman Kellogg. Various aspects of this subject are considered. Mr. Kellogg writes in his preface (p. 161): "Under the conditions thus described, army life may do something, in interests of peace, towards redeeming the poor material;" and again: "Under general and compulsory service army life in times of peace may improve the physical condition of the soldiers (Germany) of most classes. This discipline may reduce the ravages of war, when war occurs." The essay ends as follows: "Deaths from all venereal disease in England and Wales average about fifty per million inhabitants. Deaths from such diseases as phthisis and cancer are nearly one hundred times as many. Venereal disease is racially contaminating and deteriorating. It does not select the less vigorous types by death. It is a very harmful influence on the species, and it is an influence strongly fostered by militarism."

ESSAYS IN WAR TIME. By HAVELOCK ELLIS. Pp. 252. Price 5s. net. London: Constable and Co., Ltd., 1916.

Mr. Havelock Ellis has gathered in this volume eighteen essays dealing with various aspects of sociology and eugenics. The writer argues that war is not a permanent factor of national evolution, and that far from being a "national regenerator" as claimed by Hegel, Moltke and others, it enfeebles and deteriorates the race. The dysgenic influence of war is shown by the fact that armies are highly favourable to the spread of racial poisons, especially syphilis. In the essay on the Control of Venereal Disease the writer maintains that popular enlightenment is a necessary preliminary to notification. The advantages of a State Medical Service are set forth in an essay on "The Nationalization of Health." In the chapter on Eugenics and Genius, we read that in not 1 per cent. can definite insanity be traced among the parents of British men and women of genius, and that the total amount of insanity in British men and women of genius is not more than 4·2 per cent. Similar conclusions are drawn from a study of genius in other countries. Several chapters are devoted to consideration of the birth-rate, entitled War and the Birth-rate, The Meaning of the Birth-rate, Civilization of the Birth-rate and Birth-control. Mr. Havelock Ellis holds that the falling birth-rate which is affecting all civilized countries is a matter for joy rather than for grief. "A low birth-rate with a low infantile death-rate not only produces the same increase in the population as a high birth-rate with a high death-rate which always accompanies it, but it produces it in a way which is far more worthy of our admiration than the way of Russia and China where opposite conditions prevail."

ENCYCLOPÆDIA MEDICA. Under the General Editorship of J. W. BALLANTYNE, M.D., C.M., F.R.C.P.E. Second Edition. Vol. IV: Ear to Filariasis. With illustrations; pp. viii + 685. Price 20s. net. Edinburgh and London: W. Green and Son, Ltd., 1916.

In this volume of the new edition, the opportunity has been taken to recast and revise many of the articles. In some cases the contributions have been entirely rewritten by the authors. Again two new articles have been introduced, one on eclampsia and the pre-eclampsic state by Dr. J. W. Ballantyne, of Edinburgh, the other on Eugenics by Dr. Saleeby. In each of these articles the subject is comprehensively dealt with, by which the value of the volume is increased.

INTERNATIONAL CLINICS: A QUARTERLY OF ILLUSTRATED CLINICAL LECTURES AND ESPECIALLY PREPARED ORIGINAL ARTICLES. Edited by H. R. M. LANDIS, M.D.Philad., U.S.A. With the Collaboration of CHARLES H. MAYO, M.D., Rochester, and others. Vol. I, twenty-sixth series, 1916. Illustrated; pp. x + 326. Price: Only sold in complete sets of four vols, 35s. net per annum. Philadelphia and London: J. B. Lippincott Co., 1916.

Of the seventeen papers included in this volume, six are surgical, including articles on the treatment of spina bifida (Dr. W. W. Babcock), surgical shock (Dr. G. S. Foster), and the non-operative treatment of fractures of long bones (Dr. J. B. Roberts). Medicine is represented by three contributions—on pellagra (Dr. Tudor), gastric cancer (Dr. Julius Friedenwald), and syphilitic nephritis (Dr. F. Parkes Weber and Dr. H. Schmidt). Of the rest mention may be made of a paper by Dr. E. E. and Dr. W. H. Mayer on a new treatment of chorea, and of another by Dr. J. P. H. Murphy on the wounded mind.

CARE AND FEEDING OF INFANTS AND CHILDREN. A Text-book for Trained Nurses, by WALTER REEVE RAMSEY, M.D. Including Suggestions on Nursing, by MARGARET B. LETTICE and NANN GOSSMAN. With 123 illustrations; pp. x + 290. Price 9s. net. Philadelphia and London: J. B. Lippincott Co., 1916.

One of the many books published in recent years to spread the medical gospel of healthy childhood among non-professional readers. A full two-thirds of the pages are occupied with discursive chapters on sleep, exercises, puberty, infant feeding, delicate children, and so on, but in the remaining third the theme settles down to a more or less systematic account of diseases classified on the usual anatomical lines.

THE HOPE OF THE FUTURE; THE MANAGEMENT OF CHILDREN IN HEALTH AND DISEASE. By Dr. MARY SCHARLIEB. Pp. x + 261. Price 6s. net. London: Chapman and Hall, Ltd., 1916.

This book has much the same chapter headings as those of most medical text-books on children's diseases, but it is written in a popular style. It provides a trustworthy account of practically all the common ailments of childhood, and, though prepared "in the hope of helping mothers and nurses to take intelligent care of their little ones," includes sections, some of them running to several pages, on such out of the way conditions as typhus fever, gastric ulcer, hæmorrhagic measles and cancrum oris.

LA FIÈVRE TYPHOÏDE, ET LES FIÈVRES PARATYPHOÏDES (SYMPTOMATOLOGIE, ÉTIOLOGIE, PROPHYLAXIE). Par H. VINCENT et L. MURATET. Pp. ii + 278. Price 4 francs. Paris: Masson et Cie, 1916.

The present work, which belongs to the "Collection Horizon," a series of publications dealing with the medicine and surgery of war, is divided into two parts, the first dealing with the clinical features, and the second with the epidemiology and prophylaxis of, typhoid fever and paratyphoid fever A and B. The writers combat a belief in the comparatively harmless nature of paratyphoid and state that in the present war hæmorrhage and perforation have been as frequent in paratyphoid as in typhoid fever. In the chapter on diagnosis it is shown that the serum test is of no value in the case of those who have undergone anti-typhoid or anti-paratyphoid vaccination, and that precise information can be given by blood cultures only. The relative advantages of a restricted and liberal diet are discussed in the chapter on treatment, which also contains a description of serum therapy and vaccine therapy, and general management of the patient. The excessive frequency of typhoid fever in war time is demonstrated in a brief sketch of its history from the War of Secession of 1861-66 down to the present day. The Manchurian Campaign, which was characterized by very long intervals of rest interrupted at rare intervals by violent battles as well as by the excellent hygienic arrangements prevailing among the belligerents, is the only exception to this rule. Considerable space is devoted to the important question of the carrier in the dissemination of infection. All methods hitherto attempted to rid the organism of the specific germ have proved ineffectual, and the best method of prophylaxis is to vaccinate all who come in contact with the carrier. A special chapter is devoted to the prophylaxis of typhoid fever in the Army. The work concludes with a chapter on preventive inoculation, in which its value is conclusively proved by the statistics of all countries in which it has been adopted.

LIGATIONS AND AMPUTATIONS. By A. BROCA. Translated by ERNEST WARD, M A., M.D., F.R.C.S. With 510 illustrations; pp. vi + 285. Price 8s. 6d. net. Bristol: John Wright and Sons, Ltd., 1917.

Dr. Ernest Ward has translated Professor A. Broca's "Précis de Médecine Opératoire" under the above title, because ligations and amputations are operations of special importance at the present time. Professor Broca described his book as a guide for students preparing for their practical examination in operative surgery. Apparently that examination is restricted to the performance on the cadaver of ligations and amputations, including a knowledge of the surgical anatomy involved, but omitting excisions of joints, exposure of nerve trunks, trephining and other operations. The section on ligation includes a number of clear diagrams of the anatomy of the several parts, but not the actual application and knotting of the ligatures. Whilst the descriptions differ from those current in English books in many small particulars, yet they may be found to supplement usefully the English details by laying emphasis on various points. The section on amputations presents diagrams of almost all the possible amputations which can be practised on the limbs of the cadaver. The operator is generally placed facing the trunk of the subject and the cutting appears as if done chiefly with the point of the knife. Should the knife slip, it would be likely—so the drawings seem to indicate—to come into contact with the left hand or forearm of the operator or with the hands of his assistant. This section is hardly in touch with the requirements of the moment. These rather demand a careful planning and carrying out of a few selected amputations, such as can be correlated with artificial limbs best suited to afford the maximum of utility.

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SUPPLEMENT

(Vol. X, No. 6, April, 1917).

NOTES ON BOOKS.

[*The purpose of these "Notes" is neither to praise nor to blame, but merely to draw attention to some of the new books and new editions which have been added to the Society's Library.*—Ed.]

The Control of Hunger in Health and Disease. By Anton Julius Carlson. Illustrated; pp. vii + 319. Price 9s. net. Chicago: The University Press (Agents in U.K., Cambridge University Press), 1916.

This is a summary of the work on the stomach, with special reference to hunger and appetite, carried out in the Hull Physiological Laboratory of the University of Chicago during the last four years. The author's observations were made on a man with a permanent gastric fistula, on normal individuals and on animals. The nature of hunger, which is ascribed to muscular contractions in the stomach, and its nerve control, are considered; the relation of hunger to appetite is discussed. Other subjects dealt with are the sensibility of the gastric mucosa, the secretion of gastric juice in man and hunger and appetite in disease. There is also a chapter on the pharmacology of bitters. A full bibliography is appended. Although the book is chiefly of interest to physiologists the clinical aspects of the subject have not been lost sight of.

Le Traitement des Plaies infectées. Par A. Carrel et G. Dehelly. With 82 illustrations; pp. 177. Price 4 francs. Paris: Masson et Cie, 1917.

This is a full account of Carrel's method, which was recently dealt with in a paper by Dr. Sherman read before the Section of Surgery of this Society (*Proceedings*, 1916, x, Sect. Surg., p. 1), and is based on researches carried out at Compiègne in the laboratories supported by the Rockefeller foundation and in the Military Hospital No. 21. In opposition to many well known authorities the writers hold that it is possible to obtain the sterilization of the majority of infected wounds. As the result of prolonged experiments Dakin prepared an ideal antiseptic which was bactericidal without being toxic—viz., a solution of sodium hypochlorite which was free from caustic alkali. A detailed description, illustrated by photographs, is given of the application of this solution, which is introduced into the wounds by continuous or intermittent instillation. The writers maintain that it is impossible to estimate accurately the results of treatment without the constant aid of the microscope. This does not, however, require the presence of an expert bacteriologist. All that is needed is to examine smears taken from the wound secretions, and estimate roughly the number of bacteria present in each field. A disappearance of the organisms from the

smears indicates a degree of asepsis compatible with the closure of the wound. From three to ten days are required for sterilization of the soft parts, and ten to fifteen days or more in the case of fractures. The writers claim that this method diminishes to a very large extent the general and local complications of wounds, the frequency of amputation, the duration of treatment and the degree of final incapacity. A large number of wounded is no obstacle to its use, as it is systematically carried out by Depage in his hospital at La Panne, which contains 600 to 700 wounded men.

NERVE INJURIES AND THEIR TREATMENT. By PURVES STEWART, M.A., M.D.Edin., F.R.C.P. (Temporary Colonel A.M.S.), and ARTHUR EVANS, M.S., M.D.Lond., F.R.C.S. (Captain R.A.M.C.T.). (Oxford Medical Publications.) With 97 illustrations; pp. xii + 208. Price 8s. 6d. London: Henry Frowde and Hodder and Stoughton, 1916.

The first chapter of this work is devoted to a short account of the anatomy and physiology of the peripheral nerves and of the changes which follow a break in their continuity without dwelling upon the controversial views held by various observers as to the exact nature of the processes leading to regeneration. The second chapter is concerned with methods of clinical examination, and gives clear instruction as to how the functions of the nerves can be tested and the correct diagnosis in any particular case of injury arrived at. Another chapter deals with conditions which may simulate nerve injuries, such as damage to bone, joints and muscles, functional paralysis and anæsthesia, as well as lesions of the central nervous system. In dealing with the question of prognosis the authors are necessarily at some disadvantage, as the time is not yet ripe for the full consideration of this aspect of nervous surgery in the light of the results obtained in the course of this war, but certain principles are laid down which no doubt will prove to be more or less well founded. Surgical methods and technique are fully described in the chapter on treatment, and the authors insist on the importance of looking after the muscles, joints and nerves both before and after operation, if the best results are to be obtained from surgical intervention. The remainder of the book is occupied with a description of the symptomatology of lesions of individual nerves and plexuses, and its value is much enhanced by a large number of illustrations and a full index.

COLLECTED PAPERS ON CIRCULATION AND RESPIRATION. Second series. Clinical and Experimental. By Sir T. LAUDER BRUNTON, Bart., M.D., D.Sc., LL.D.Edin. and Aberd., M.D. (Hon.) Dubl., F.R.C.P., F.R.S. With 256 illustrations; pp. xxi + 719. Price 5s. net. London: Macmillan and Co., Ltd., 1916.

This volume contains a second series of papers or articles on medical subjects published in different medical and other journals between the years 1883 and 1915. They are sixty-eight in number: in about one-fourth of them Sir Lauder Brunton was associated with another writer, Dr. Tunnicliffe, Dr. Cash, Dr. Prickett or Dr. Williams. As might be expected by one acquainted with Sir Lauder Brunton's work, they are concerned more with the physiological and therapeutical sides of medicine than with its clinical and pathological aspects. The papers of most interest and importance are those which record Brunton's work on the Hyderabad Commission in connexion with general anæsthesia; several papers on cardiac pain, angina pectoris, angina abdominis, and the action of nitrite of amyl and other vasodilators; papers on heart disease and the action of digitalis; and others on atheroma of arteries, the estimation of blood-pressure, pleurisy, pericarditis, and cardiac strain. From the *Philosophical Transactions* of 1891 is taken an extract, running to fifty pages, of the "Contribution to the Study of the Connexion between Chemical Constitution and Physiological Action: Action of Aromatic Compounds on the Circulation," by Sir Lauder Brunton, in conjunction with Dr. Theodore Cash. But it is doubtless the articles on heart disease which will attract most readers; and among these is one on "Cardiac Pain and Angina," in which he recounts again how he was led to attempt, and that with immediate success, the treatment of angina pectoris by amyl nitrite.

POVERTY AND ITS VICIOUS CIRCLES. By JAMIESON B. HURRY, M.A., M.D. Pp. 180. Price 5s. net. London: J. and A. Churchill, 1917.

The author of this book has studied the association of poverty with bad housing, ignorance, disease, inebriety, and other evils, and has illustrated the way in which all these factors act and react upon each other. As an example of many vicious circles he describes, we may quote poverty, defective housing, phthisis, incapacity for work, poverty. Again, poverty leads to employment of women, which is followed by neglect of the home and increase of infant mortality, while the increased competition in the labour market further depresses wages. Artificial circles arise when injudicious relief aggravates the poverty it seeks to remove. The remedy for these unsatisfactory conditions is to break the circle at some point, and this can be done by legislation, voluntary organizations and personal effort. Among legislative measures the author attributes highly beneficial results to the various Poor Law Acts, the Free-trade Movement, Compulsory Education, and the Insurance Act. Voluntary organizations which have assisted to further social progress are the Trade Unions, Friendly Societies, the Co-operative Movement, the Voluntary Hospitals and kindred institutions. Individual effort is promoted by industrial training and personal interest in the welfare of workers.

MECHANISMS OF CHARACTER FORMATION: AN INTRODUCTION TO PSYCHOANALYSIS. By WILLIAM A. WHITE, M.D. Pp. 342. Price 7s. 6d. net. New York: The Macmillan Company, 1916.

In this volume Dr. White describes and discusses the broad principles which underlie human behaviour and must be understood in order to gain a real appreciation of mental facts and their true meanings. After an historical introduction the author explains how the mental development of the child, like the physical, is an historical reproduction of the mental development of the human species, and how such infantile thought, though repressed into the unconscious, may occasionally influence conduct. When conflict arises between the conscious and the unconscious, resolution may be achieved symbolically either in dreams or mental symptoms, symbolism being necessary to disguise effectually the antisocial and unconventional tendencies of the unconscious in permitting them to enter consciousness. Symbolism is fully discussed in a separate chapter, as also are dream mechanisms and the unconscious psychical relationships between a patient (or any other person, for that matter), and members of his own family, especially the parents. In a couple of chapters on "The Will to Power," the author discusses such matters as the all-powerfulness of thought and what he calls "partial libido strivings." Then follows a chapter on extroversion, or the tendency to enter the battle of life and to meet reality face to face, and introversion, or the tendency to retire from the battle and to live in a world of one's own unconscious creation. "Organ Inferiority" is rather a misleading title for a chapter dealing with the effect on the mind of diseased, under-functioning or over-functioning organs of the body (heart, lungs, kidneys, testes, endocrinal glands, &c.); but the chapter lays stress on the fact that conflict may occur at a lower level than the psyche and may, in just the same way, give rise to over-compensations which have sometimes been regarded as the primary disease. As examples on the one hand, cardiac hypertrophy in renal disease, hyperacusis (hearing) in blindness, hyperthyroidism in hypopituitarism, and, on the other, constipation resulting from the repressions imposed by conventionality, the suspicions of deaf people and delusions of exaltation occurring in patients who believe themselves to be persecuted. The book closes with a couple of chapters on "Resolution of the Conflict" and "Summary and Synthesis."

THE FUNDAMENTALS OF PSYCHOLOGY. By W. B. PILLSBURY. Pp. 252. Price 8s. 6d. net. New York: The Macmillan Company, 1916.

This book, which is primarily intended for students who have done no previous work in psychology, presupposes no preliminary knowledge. Accordingly, nearly a quarter of it is devoted to descriptive anatomy and histology of the central nervous system and the organs of special sense. This part, however, is not a mere geographical description; for there is a

considerable amount of physiology intermingled with the narrative. In fact, the anatomy—although given in some detail—is merely intended as a basis for the physiology. The account of the physiology of sensation and centrally aroused sensation, still interspersed with a good deal of anatomy, takes us nearly to the middle of the book; and, at the end of the chapters on perception of space, time, reading, &c., we find that we are three-fifths through. Then follow chapters on memory, recognition, imagination, reasoning, instinct, affection, emotion, temperament, will and the concept of self. The various descriptions are orthodox and fairly full. There are no long discussions on controversial matter. Opposing theories are discussed only as they may illumine statements of fact or where they have great historical importance, and then only if the problem is real but not settled. In such instances the merits and faults of the opposing theories are set forth with strict impartiality and the student is left to form his own views on the subject. Looked at as a whole, the book is practical and concerns itself more with what consciousness does than what it is.

APPLIED IMMUNOLOGY: THE PRACTICAL APPLICATION OF SERA AND BACTERINS PROPHYLACTICALLY, DIAGNOSTICALLY AND THERAPEUTICALLY. With an Appendix on Serum Treatment of Hæmorrhage, Organotherapy and Chemotherapy. By B. A. THOMAS, A.M., M.D., and R. H. IVY, M.D., D.D.S. Second edition; revised. With 73 illustrations; pp. xvii + 364. Price 16s. net. Philadelphia and London: J. B. Lippincott Co., 1916.

The authors are surgeons attached to the University of Pennsylvania, and consequently approach their subject from the practical standpoint of the clinician. They state clearly that the aim of the book is not to deal with experimental research, but to assist the practitioner in a "more thorough comprehension of biological prophylaxis, diagnosis and therapeusis." A few short opening chapters deal briefly with the history of immunity and the mechanism of its production, the side chain theory, anaphylaxis, &c., whilst the rest of the work is devoted to the clinical aspect of the subject. The chapter on antitoxic sera includes an account of von Behring's new method of producing prophylaxis against diphtheria by combined active and passive immunization. It also gives full details of the subcutaneous, intravenous, intraspinal and intraneural injection of antitetanic serum. On this subject the authors are of opinion that Ashhurst and John's technique—which is quoted in full—should reduce the mortality of tetanus to less than 20 per cent. if employed within twelve hours from the onset of symptoms. The technique of the Wassermann reaction is described at considerable length, and several pages are devoted to the clinical side of the question. In the chapters dealing with specific bacterial reactions and tuberculin therapy, the writers confine themselves largely to the commoner preparations of tuberculin, but give fairly full instructions for the use of tuberculin in diagnosis and treatment. The last sixty pages of the book are devoted to a very full account of vaccine therapy, in which the authors give the results of their own experience of a large number of bacterial inoculations. Three appendices deal respectively with the serum treatment of hæmorrhage, organotherapy, and chemotherapy; and the book also has a glossary of the commoner terms used in immunity. References are given throughout in the text. The illustrations and diagrams are numerous.

SYPHILIS AND THE NERVOUS SYSTEM. For Practitioners, Neurologists and Syphilologists. By Dr. MAX NONNE. Authorized Translation from the Second Revised and Enlarged German Edition, by CHARLES R. BALL, B.A., M.D. With 98 illustrations; pp. xxiv + 450. Price 18s. net. Philadelphia and London: J. B. Lippincott Co., 1916.

The present edition is a revised and enlarged one of the original abridged English translation, but the enlargement is mainly concerned with the tests employed in the examination of the cerebrospinal fluid. The clinical material has not been added to, though the author distinctly states that syphilitic affections of the nervous system have increased since the advent of the arsenical preparations, a fact which we have noticed with alarm, and to which we have drawn attention for some time past. No cases are cited to prove this contention, and the book is wanting in reports of cases which have been treated with the

newer remedies. After dealing with the pathology of nervous syphilis, the author gives an excellent account of the ætiology of nervous syphilis and specific endarteritis; the symptoms of intracranial meningitis are then described and divided into two categories, (*a*) those which accompany cortical meningitis, (*b*) those which accompany basilar meningitis. From pure meningeal syphilis our attention is drawn to the symptoms, &c., which follow a combined meningeal and nervous lesion proper. Naturally this is followed by a description of the primarily nervous lesions. We expected to find some newer light thrown upon the ætiology and pathology of degenerative encephalitis, information which we feel sure the author would be able to furnish, since there can be no doubt that primarily degenerative lesions stand in closer relation to earlier syphilitic involvement of nerve tissue than has been hitherto generally recognized. Syphilis of the cord is dealt with in the same manner as is the brain, and the author draws the attention of the reader to two facts, which cannot be too strongly emphasized: (1) That an intracranial lesion is usually associated with an intraspinal lesion, and vice versa—in other words that spinal syphilis cannot be separated from cranial syphilis; (2) that a degenerative lesion in one part of the nervous system may be associated with a non-degenerative lesion in another part of the nervous system. As in syphilitic skin eruptions, so in syphilitic disease of the nervous system, polymorphism is the note struck. The two remaining chapters to be mentioned are those which deal with syphilis of the peripheral nerves and with hereditary syphilis of the nervous system. The clinical part of the book is most to be recommended, as it is so richly illustrated with cases. We strongly advise everyone who is interested in syphilis at all, to read through this book two or three times, and then to apply the knowledge gained to his clinical material. It will then be recognized how largely syphilis of the nervous system is on the increase, and how it will bridge that gulf which separates syphilologists from neurologists, since the cases which are most on the increase are those which would come before the former, and which are now missed, owing to the scanty knowledge so-called syphilologists have of nervous diseases.

FRIENDS OF FRANCE: THE FIELD SERVICE OF THE AMERICAN AMBULANCE DESCRIBED BY ITS MEMBERS. With 88 illustrations; pp. xx + 298. Price 7s. 6d. net. London: Smith, Elder and Co., 1916.

This book is another war narrative of the class with which during recent days we have become somewhat familiar. It describes the work of the American Ambulance in the French Service. It derives its title "Friends of France," in a reciprocal sense, recalling the incident in the American War of Independence, 1777-81, when "tens of thousands of young Frenchmen crossed the ocean as soldiers and sailors to help America." Most of the fourteen chapters of which the book consists are the personal records of various contributors. Thus we have stories of scenes in such various fields of fighting as Alsace, Dunkirk and Ypres, Lorraine, Verdun, Flanders—differing from the hurried compilations of the war correspondent, writing against time—forming prose pictures, full of detail, of interest and attraction. In the last chapter, "Tributes and Citations," in a paragraph on war poetry, the palm over Rupert Brookes is given to an American soldier of the Foreign Legion, killed in July last, for a poem entitled "Champagne, 1914-15." The volume concludes with a list of the members of the Field Service American Ambulance, corrected to September 1, 1916.

AN INDEX OF SYMPTOMS, WITH DIAGNOSTIC METHODS. By RALPH WINNINGTON LEFTWICH, M.D. Sixth edition. Pp. xii. + 555. Price 10s. net. London: Smith, Elder and Co., 1917.

In the sixth edition of the Index, the number of new symptoms added is not great. Brief descriptions of some seventy more or less rare diseases, as well as a section upon eponymous signs has been appended. The author takes the view that, broadly speaking, medicine is applied physiology, so that the previous notes on these lines have been amplified and added to. Under many sections are included the art of diagnosis, classification of patients and symptoms, fallacies, methods of interrogation, inspection, palpation, percussion, auscultation, and miscellaneous. Fourteen illustrations elucidate the text.

INITIS, OR NUTRITION AND EXERCISES, CONGESTION OF THE CONNECTIVE TISSUES. ON SOME FREQUENTLY FOUND SYMPTOMS WHICH INTERFERE WITH THE USEFULNESS OF HUMAN LIFE: THEIR SEAT IN THE COVERINGS OF MUSCLES, NERVES AND BONES, AND IN THE LIGAMENTS OF JOINTS; THEIR ORIGIN IN MAL-NUTRITION; AND THEIR TREATMENT BY DIET, MASSAGE AND SELF-MOVEMENTS OF THE AFFECTED PARTS UNDER PRESSURE. By A. RABAGLIATI, M.A., M.D., F.R.C.S.Edin. With 28 illustrations, pp. xi. + 183. Price 10s. 6d. net. London: C. W. Daniel, Ltd., 1916.

This dissertation is designed to elaborate the author's theory that many diseases are due to congestion of the connective tissues. Hence this new addition to medical terminology—initis. We read that "the word is connected with the Greek ἶς, Latin *vis* or strength—and the intention in choosing the title is to show that the affection is mainly one of the strong or connective tissues of the body. These are so called because they connect every part of the body with every other." And so we are introduced to such definitions as dyspepsia, initis (inflammatory affections); dyspepsia, initis (chronic affections); dyspepsia, initis, tuberculosis; dyspepsia, initis, apoplexy; dyspepsia, initis, cancer, and several others, under the primary title of dyspepsia. But the book must be read in order to gain the drift and exposition of the author's contentions. In the latter part of the volume, forming Part II, the author deals with the subject of systematic and repeated exercises for the purpose of maintaining and improving bodily nutrition. These pages are fully illustrated with photographic reproductions showing his method of practising this form of treatment. A copious index is appended.

Proceedings of the Royal Society of Medicine.

SUPPLEMENT

(Vol. X, No. 8, June, 1917).

NOTES ON BOOKS.

[*The purpose of these "Notes" is neither to praise nor to blame, but merely to draw attention to some of the new books and new editions which have been added to the Society's Library.*—Ed.]

Diseases of Children. By A. Dingwall-Fordyce, M.D., M.B., Ch.B., F.R.C.P.E. Illustrated; pp. xxiii + 483. Price 10s. 6d. net. London: A. and C. Black, Ltd., 1916.

This is described as a "practical modern manual—systematic, small, and complete." The subject of diet occupies a large part, and the details of the knowledge, supervision, and observation required of the physician in connexion with infant feeding are given with great minuteness. Methods employed in other countries, as well as those in use at home are described, and the more recent attempts to form a scientific classification of digestive diseases and disturbances are referred to. Diseases of the various organs of the body, as well as constitutional diseases, are described in a systematic if somewhat brief form. The special clinical features of disease as they occur in early life are duly emphasized. Much letterpress is saved by numerous illustrations from photographs.

Studies in Insect Life, and other Essays. By Arthur Everett Shipley, Sc.D., F.R.S. With 11 illustrations; pp. xii + 338. Price 10s. 6d. net. London: T. Fisher Unwin, Ltd., 1917.

This volume consists of a number of articles which have been previously published in various magazines. The opening chapter, which deals with those insects which the writer has elsewhere called the "minor horrors of war," is followed by chapters dealing with the honey bee, the humble bee, and certain differences between wasps and bees. The following three chapters are devoted to various aspects of marine zoology and are entitled respectively, "The Romance of the Depths of the Sea," "Sea Fisheries," and "Sir John Murray, a great Oceanographer." In an essay on the "Grouse Disease," the writer shows that the conditions known as coccidiosis and strongylosis are responsible for a very large proportion of deaths among grouse. A chapter on "Zoology in the time of Shakespeare" gives a sketch of the state of the science at that time and illustrations of the poet's acquaintance with the subject. The chapter on the "Revival of Science in the Seventeenth Century" contains an account of the contributions to science by Evelyn, Pepys, Newton, Harvey, Sydenham, Glisson, and other worthies. In the concluding chapter, entitled "Hate," which is illustrated by a striking bronze mask by Professor R. Tait Mackenzie, the secretion of adrenalin is shown to play an important part in the physiology of this emotion.

CLINICAL BACTERIOLOGY AND HÆMATOLOGY FOR PRACTITIONERS. By W. D'ESTE EMERY, M.D., B.Sc.Lond. Fifth edition. With 66 illustrations; pp. xiii + 310. Price 9s. net. London: H. K. Lewis and Co., Ltd., 1917.

This work is so well known that the fifth edition needs little comment except in so far as new material is concerned. Although it was primarily intended for practitioners, sections have now been added describing methods which are only habitually used by bacteriologists, thus making the work more than ever a laboratory handbook. Dreyer's method of carrying out the agglutination test is fully described and illustrated, and an account is given of the isolation of the typhoid-dysentery group of bacilli from the fæces by means of brilliant green peptone water and Conradi-Drigalski plates. The section on syphilis has been extended to 22 pages, and includes descriptions of the modern methods used in the diagnosis and control of treatment of this disease. One of the methods of doing the so-called "original" Wassermann reaction has been included since; the author states: "A method with added complement is generally (though I think, erroneously) preferred." The advances in clinical bacteriology, which have resulted from the prevailing war conditions, are all fully noted and described.

ESSENTIALS OF PHYSIOLOGY. By F. A. BAINBRIDGE, M.A., M.D.Cantab, D.Sc.Lond., F.R.C.P., and J. ACWORTH MENZIES, M.A.Dunelm, M.D.Edin. Second edition. With 173 illustrations; pp. viii + 478. Price 12s. 6d. net. London: Longmans, Green and Co., 1916.

It seems only recently that we called attention to the first edition of this book. What we then predicted, that it would probably meet with the approval of students, has presumably come to pass. The issue of a second edition, within a short period after the first, is proof of that prophecy being correct. This edition has been thoroughly revised, and the revision has extended to the rewriting of parts of some of the chapters—for example, those on muscle, the nervous system, and digestion. In addition many new figures have been incorporated in the text.

THE SECRETION OF THE URINE. By ARTHUR R. CUSHNY, M.A., M.D., LL.D., F.R.S. With diagrams; pp. xi + 241. Price 9s. net. London: Longmans, Green and Co., 1917.

In this modest volume of some 200 odd pages Professor Cushny has condensed what seems to him to be all the more important parts of the literature bearing on the physiology of the kidney, and states that it has involved the thorough sifting of over 6,000 pages of printed matter. Whatever view may be taken of his conclusions, there can be no doubt that the thanks of everyone interested in the subject are due to him for his attempt to bring order out of a chaos of conflicting ideas and experimental results. The outstanding views of the functions of the kidneys associated with the names of Bowman and Ludwig respectively are fully dealt with, and the experimental evidence for and against each considered, but the author favours a new interpretation which embraces some of the features of each while differing in other respects from any that has been accepted hitherto; this he terms the "modern view." It is based on physical chemistry as well as on the direct observation of physiologists, and it is claimed that it does not conflict with any ascertained fact in physiology, while furnishing an intelligible connexion between almost all those which have been established. After preliminary chapters on the anatomy and histology, the work, the gaseous metabolism and the blood supply of the kidneys, and the composition of the urine, the author outlines the "modern view," and then proceeds in subsequent sections of the book to discuss how each set of observations can be brought into accord with it, dealing in turn with the direct evidence in the functions of the tubules and glomerulus, the mechanical and chemical factors in secretion, the reaction of the urine, the action of diuretics and other drugs, glycosuria, the effects of perfusion of the kidney, and albuminuria. Renal pathology is not dealt with at length, but some points arising out of the consideration of the normal functions of the kidney are briefly considered. An extensive bibliography and an adequate index conclude the volume.

"COLLECTION HORIZON." Précis de Médecine et de Chirurgie de guerre. Price 4 fr. each. Paris: Masson et Cie.

(*Medical Series.*)

"La Fièvre typhoïde et les Fièvres paratyphoïdes (Symptomatologie, Etiologie, Prophylaxie)." Par H. VINCENT et L. MURATET. 1916. Pp. ii + 278.

"Les formes anormales du Tétanos. Étude clinique, pathogénique, prophylactique et thérapeutique." Par M. COURTOIS-SUFFIT et R. GIROUX; Préface du Professeur FERNAND WIDAL. 1916. Pp iii + 174.

"Les Dysenteries, le Choléra asiatique, le Typhus exanthématique." Par H. VINCENT et L. MURATET. 1917. Pp. 184.

"Hystérie-Pithiatisme et Troubles nerveux d'ordre réflexe en Neurologie de guerre." Par J. BABINSKI et J. FROMENT. (37 figures et 8 planches.) 1917. Pp. 267.

"Les Psychonévroses de guerre." Par G. ROUSSY et JEAN LHERMITTE. (13 planches.) 1917. Pp. 187.

"La Syphilis et l'Armée." Par G. THIBIERGE. 1917. Pp. 196.

(*Surgical Series.*)

"Traitement des Fractures." Par R. LERICHE. 2 volumes (253 figures). 1916. Pp. 189 and 272.

"Les Séquelles ostéo-articulaires des Plaies de guerre." Par AUG. BROCA. (112 figures.) 1916. Pp. 177.

"La Prothèse des Amputés en Chirurgie de guerre." Par AUG. BROCA et DUCROQUET. (208 figures.) 1917. Pp. 144.

"Blessures du Crâne et du Cerveau: Formes cliniques et Traitement médico-chirurgical." Par CH. CHATELIN et T. DE MARTEL. Préface du Professeur PIERRE MARIE. (98 figures et 2 planches.) 1917. Pp. viii + 279.

"Les Fractures de la Mâchoire inférieure." Par LÈON IMBERT et PIERRE REAL. Préface de M. le Médecin Inspecteur-Général CH. FÉVRIER. (97 figures et 5 planches.) 1917. Pp. viii + 154.

"Localisation et Extraction des Projectiles." Par L. OMBRÉDANNE et R. LEDOUX-LEBARD. (225 figures et 8 planches.) 1917. Pp. iv + 349.

"Les Blessures des Vaisseaux." Par L. SENCERT. (68 figures et 2 planches.) 1917. Pp. 226.

"Les Fractures de l'Orbite par Projectiles de guerre." Par FÉLIX LAGRANGE. (77 figures et 6 planches.) 1917. Pp. 222.

The "Collection Horizon" is a valuable series of handy little volumes containing in concise but remarkably readable form the various acquisitions to the medicine and surgery of war which have hitherto been disseminated in periodical literature. The six books whose titles appear above represent the principal medical works hitherto published in this series, and are all written by well-known specialists. Attention has already been drawn in this Supplement (1917, pp. 18 and 20) to the monographs on the "Abnormal Forms of Tetanus," by Courtois-Suffit and Giroux, and on "Typhoid Fever and Paratyphoid Fevers," by Vincent and Muratet.

The last two writers have also contributed a work on "Dysentery, Cholera and Typhus." Each of the three sections of this book is divided into two parts. The first, which is clinical, deals with the symptomatology, diagnosis and treatment, while the second is devoted to the epidemiology and prophylaxis of each of these three diseases. Of special interest are the statistics dealing with the carrier problem in relation to dysentery and cholera. The writers lay special stress on the epidemiological importance of mild or abortive cases of these two diseases.

The work on "Hysteria and Nervous Disorders of a Reflex Character," by Babinski and Froment, is divided into two parts. In the first the old conception of hysteria especially as it was built up by Charcot is set forth, and is followed by a description of the modern

conception of hysteria due to Babinski, who has suggested the substitution of the term "pithiatism"—i.e., a state curable by persuasion, for the old term "hysteria." Neurological observations made during two years of war have served to confirm this modern conception of hysteria. A full account is given of the physical signs which form the criteria in the differentiation of organic from functional nervous disease. The second part deals with nervous disorders of a reflex character consisting of contractures or paralysis following traumatism, which are frequently met with in the neurology of war. A section on treatment contains much valuable information for medical officers in charge of neurological cases.

An instructive companion volume to the above is to be found in the monograph by G. Roussy and J. Lhermitte, which embodies a description of the psycho-neuroses met with in war, starting with elementary motor disorders, and concluding with the most complex, represented by pure psychoses.

Perhaps the most important work in the series, and one which will appeal to the greatest number of readers, is that by Dr. G. Thibierge on "Syphilis in the Army." The volume is intended as a vade-mecum of syphiligraphy for medical officers in the Army. In the first chapter, which is entitled "Frequency of Syphilis in the Army," the writer states that the present war surpasses all previous wars in the frequency of venereal disease and of syphilis in particular. The second chapter, which deals with the origin of syphilitic contagion in the Army, contains interesting statistics relating to the infections due to official or clandestine prostitution both in the zone of the Armies and in the interior. In the third chapter, which is entitled "Syphilis as a National Danger," the writer deals first with the increase of syphilis since the outbreak of the war in the civil population, in which respectable married women, and lads aged from 16 to 18, form a high proportion of those attacked. The social consequences of syphilis among soldiers are then described. The following chapters contain an account of the symptomatology, diagnosis and treatment (curative and prophylactic) of syphilis. The book concludes by insisting on the importance of legislative measures being taken to control the propagation of syphilis by the regular supervision of prostitution, as has been done in regard to small-pox and typhoid fever by making vaccination and inoculation compulsory.

M. R. Leriche devotes one volume to fractures by gunshot involving joints, and the other volume to the various comminuted fractures of the shafts of the long bones. In Chapter II of the latter volume the author advocates the "Désinfection opératoire des fractures ouvertes," the "Stérilisation opératoire primitive des fractures dans les premières heures: l'esquill-ectomie d'exploration et de prophylaxie." As soon as possible and quite apart from any signs of infection, the surgeon, not limiting himself to establishing drainage of removing foreign bodies which are obvious, should proceed under general anæsthesia, and with the assistance of radiology, to expose the comminuted fracture by a free incision, cut away bruised soft parts, and remove all detached fragments, especially those projecting out amongst the muscles, also the partly connected fragments when interposed between the fractured ends. The wound is then lightly plugged. The author appears to rely wholly on the above for disinfection, and does not mention the use of antiseptics. If infection is already established he relies on aseptic gauze soaked in salt solution, fresh air, and sunlight.

M. A. Broca, in his description of the sequelæ following upon gunshot injuries of bones and joints, includes the subjects of mal-union with shortening and angular deformity, false joints, sinuses owing to chronic osteomyelitis following comminuted fractures, and the central necrosis in stumps. In the case of joints he notes the varieties of ankylosis, stiffness, and deviations. In later stages osteotomy may be useful in rectifying the axis of the limb so that the muscles can regain action in their right line. A final chapter is devoted to medico-legal considerations.

In another volume M. Broca, along with M. Ducroquet, describes the varieties of artificial limbs employed to replace a lost lower limb. As for the upper extremity illustrations are given of various ingenious suggestions in cases where the hand has been lost. In addition to the familiar hook and dinner fork it is proposed that various tools may be screwed in to the end of the artificial limb, especially to enable objects to be held fixed.

In the first part of the volume relating to gunshot injuries of the skull and brain, M. Chatelin describes the examination of the patients and the complications which may

follow. In the second part M. Martel gives drawings and descriptions of wide craniectomy and the extended search for foreign bodies in the brain, gaps left in the skull being later filled in by pieces of the patient's rib. The reader may miss a discussion as to the indications for extending operative measures beyond those sanctioned by long experience.

MM. L. Imbert and P. Real consider the treatment of gunshot injuries of the mandible as established by palpation and X-ray examination. They describe the various forms of dental splints and the surgical treatment of mal-union by the manipulation of mobile fragments. They do not give encouragement to the use of bone-grafts in cases of mal-union. In the last chapter they discuss the military incapacity arising from loss of teeth, fracture of the mandible and stiffness of the jaw.

MM. L. Ombrédanne and R. Ledoux-Lebard, in a volume of 349 pages, supply an extraordinary detailed description of radiology, the search for and the localization of projectiles, as well as the questions connected with the extraction of projectiles. The radiologist and the surgeon working together extract a bullet as follows: The radiologist views the foreign body keeping his head and the screen fixed, whilst the surgeon, using a long curved needle on a long handle, inserts the point into the wound or applies it to the skin. Then, under the guidance of the radiologist, the surgeon moves the point of the needle until it is in line with the shadow of the projectile. Continuing under the same guidance, the surgeon pushes on the needle-point down the line of the shadow, until it comes in contact with the foreign body.

The volume on the wounds of the blood-vessels by M. L. Sencert contains a valuable bibliography of the French and English publications on this subject since the commencement of the War.

Under "Fractures of the Orbit" M. F. Lagrange treats of the various injuries to the globe of the eye consistent with the preservation of some degree of vision, sympathetic ophthalmia, traumatic cataract, and detachment of the retina, also the repair of the eyelids and a very brief notice of the involvement of the frontal and maxillary sinuses.

AN INDEX OF DIFFERENTIAL DIAGNOSIS OF MAIN SYMPTOMS. By Various Writers. Edited by HERBERT FRENCH, M.A., M.D.Oxon., F.R.C.P.Lond. Second edition. With 37 coloured plates and 306 illustrations in the text; pp. xx + 912. Price 42s. net. Bristol: John Wright and Sons, Ltd., 1917.

The guiding principle of this book is to suppose that a particular symptom attracts special notice in a given case and that the diagnosis has to be established by differentiating between the various diseases to which the symptom may be due. Leading symptoms and signs are discussed in alphabetical order, whilst a very full general index facilitates cross-reference. The first edition of the book met with a large measure of appreciation and in this, the second, edition all the old articles have been revised and a number of new ones added. The illustrations, especially the coloured plates, have been nearly doubled in number, and the appearance of the book has been improved by the adoption of a larger size of type.

LA PRATIQUE CHIRURGICALE DANS LA ZÔNE DE L'AVANT. Leçons professées sous la direction du Médecin-inspecteur-général MIGNON, avec la collaboration de MM. HENRY BILLET et HENRI MARTIN. With numerous illustrations; pp. 206. Price 10 frs. Paris: J. B. Baillière et Fils, 1917.

This contains a course of instruction, given under the orders of the Directeur-général du Service de Santé, to general practitioners who have been called to serve under the medical officers of the Army with ambulances and at casualty stations behind the fighting line. In the introduction the Inspecteur-général refers to the necessity for immediate surgical treatment, the enlargement and paring of the margins of the wound, the exploration of the wound for foreign bodies and detached fragments of bone, the cleaning and drainage of the wound through a counter-opening, the immobilization of the injured part. The first *leçon* is a general sketch of ambulance work illustrated by photographs. The second *leçon* alludes in a general way to the different wounds of soft parts by rifle bullets from a distance (excluding ricochets), and gunshot injuries at close quarters, and by artillery. The third *leçon* contains numerous photographs of dried bones taken from amputated limbs,

to show the extensive comminution and splitting of the bones. In the fourth *leçon* primary amputation is regarded the exception, but a short paragraph refers to gangrene following the cutting off of the main arteries, and to gas gangrene. The fifth *leçon* contains illustrations from dried specimens of extensive damage done to joints which had required amputation. The sixth *leçon* refers to head injuries and in a general way advocates immediate interference and trephining. The illustrations are taken from dried skulls, in which extensive injuries had proved fatal.

CHRONIC GENERAL PERIODONTITIS: "PERIODONTAL DISEASE" (PYORRHŒA ALVEOLARIS). By J. F. COLYER, F.R.C.S., L.R.C.P., L.D.S. With illustrations; pp. vi + 109. Price 9s. 6d. net. London: Claudius Ash, Sons and Co., Ltd., 1916.

This is a complete exposition of the subject, and deals fully with the anatomy of the disease as met with in man, the horse, dogs and cats, and wild animals in captivity. The author argues from the normal to the pathological. He states "that investigations into the bacteriology of the disease do not afford any evidence of its being due to a specific organism." The effect of modern diet and the functional activity of the teeth are shown to be the chief factors in the production of the disease, modified by the resistance of the tissues of the body. A chapter on "Periodontal Disease as the Active Agent in the Production of Pathological Lesions," refers to "certain diseases which seem to be directly traceable to mouth infection," and cases are quoted in support of this view. Attention is called to the anomaly of oral infection being often ignored by medical men who recognize the danger of small areas of sepsis in other parts of the body. The author lays stress on the rôle mouth-breathing plays and the influence of the degree of resistance offered by the tissues in the progress or severity of the disease. Complete recovery is recorded of cases in which early removal of the teeth was carried out and arguments favourable to such treatment are given. Vaccine therapy may afford relief but not a "cure." The Bier method is referred to. Electro-therapeutic treatment is fully described, and is advocated in suitable cases.

WAR-SHOCK: THE PSYCHO-NEUROSES IN WAR; PSYCHOLOGY AND TREATMENT. By M. D. EDER, B.Sc.Lond., M.R.C.S., L.R.C.P.Lond. Pp. vii + 154. Price 5s. net. London: William Heinemann, 1917.

The writer, who was recently in charge of the psycho-neurological department at Malta, has chosen as material for his work the first hundred consecutive cases which came under his care. He defines "war-shock" as hysteria occurring in a person free from hereditary or personal psycho-neurotic antecedents, but with a mind more than usually responsive to psychical stimulus. He follows Freud in dividing hysteria into the two groups of conversion-hysteria and anxiety-hysteria. He regards hypnotic suggestion as the treatment *par excellence* for the condition, and is of opinion that cases cured by this method can return to the Front in three to six months. An appendix contains a summary of the cases.

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SUPPLEMENT

(Vol. X, No. 9, July, 1917).

NOTES ON BOOKS.

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A Practical Treatise on Disorders of the Sexual Function in the Male and Female. By Max Hühner, M.D. Pp. xv + 318. Price 12s. 6d. net. Philadelphia: F. A. Davis Co.; London: Stanley Phillips, 23, Creighton Road, Queen's Park, N.W., 1916.

Although the treatment of sexual neuroses belongs rather to the genito-urinary specialist than to the neurologist, most of the cases seeking relief come in the first place to a neurological clinic. Dr. Hühner, although engaged in genito-urinary work for over twenty years did not gain his knowledge of sexual neuroses until after he had worked for several years in a neurological clinic, where he employed the urethroscope whenever necessary and made frequent examinations of the prostate and seminal vesicles in the sexual neurasthenic. One of the objects of the present work, as stated in the preface, is to bridge over the gap between the neurological and genito-urinary specialist. The subjects dealt with are masturbation, impotence, pollutions, priapism, clitorism, clitoris crises, satyriasis, nymphomania, frigidity, vaginismus, dyspareunia, absence of orgasm in the female during coitus, enuresis, withdrawal, continence, and some unusual forms of sexual neuroses. The writer has sought to make the work as practical as possible and to interest the general practitioner as well as the psychiatrist and neurologist.

Common Diseases of the Male Urethra: being a Course of Lectures delivered at the London Hospital. By Frank Kidd, M.B., B.C.Cantab., F.R.C.S.Eng. With an Additional Lecture on the Clinical Pathology of Urethritis, by Dr. Philip Panton. Illustrated; pp. xii + 132. Price 5s. net. London: Longmans, Green and Co., 1917.

This is offered as a practical guide to the medical man in the management of urethritis. In the first chapter the writer discusses the ætiology of urethritis, showing that though in most cases it is caused by the gonococcus it may be due to other organisms and be contracted otherwise than by sexual intercourse. The surgical anatomy of the urethra is described and the important difference between anterior and posterior urethritis is accentuated. Subsequent lectures deal with diagnosis and methods of examination and treatment; a special lecture being devoted to the urethroscope. Three appendices are subjoined, the first of which contains a brief history of cases illustrating special points mentioned in the lectures, the second is a reprint of the writer's evidence tendered to the Royal Commission on Venereal Diseases, and the third is a description of how to fit up a room for the examination of urethral cases.

PHOTOGRAPHY IN COLOURS. By GEORGE LINDSAY JOHNSON, M.A., M.D., B.S., F.R.C.S. Third (revised) edition. With 14 full-page plates (five in colour) and numerous illustrations in the text; pp. xiv + 302. Price 4s. 6d. net. London: George Routledge and Sons, Ltd., 1916.

Dr. Lindsay Johnson has long been known as an expert photographer. That hobby has been pursued with such diligence, amid his professional demands as an ophthalmic surgeon, that this work on "Photography in Colours" has now reached a third edition, thus establishing its popularity as a text-book on the subject. From his point of view, as he tells us, "the striking analogy which exists between the physiological perception of colours and the phenomena associated with colour photography has convinced me that both the ophthalmic surgeon and the physiologist who have taken up the study of colour blindness and colour vision, will find that the serious study of this fascinating science will illuminate many obscure phenomena connected with the physiology of vision and colour blindness, and will well repay them for the time spent in acquiring a practical knowledge of at least one of the leading processes described in this treatise." In this new edition careful revision has been carried out, and new matter added, which has led to an increase in the number of the pages. A chapter has been included on "Art in Colour Photography," as well as on "Photomicrography in Colour." A full description is appended of the Raydex process, and of Gaumont's new method of cinematography in colours, also of Carrara's method of reproducing autochromes on paper, by all of which additions the book has been brought up to date.

VENESECTION: A BRIEF SUMMARY OF THE PRACTICAL VALUE OF VENESECTION IN DISEASE. For Students and Practicians of Medicine. By WALTON FOREST DUTTON, M.D. Illustrated with several text engravings and three full-page plates, one in colours; pp. viii + 220. Price 10s. 6d. net. Philadelphia: F. A. Davis Co.; London: Stanley Phillips, 23, Creighton Road, Queen's Park, N.W., 1916.

The plea of this book is that the neglect of scientific venesection, as a therapeutic agent, has been recognized by some of the foremost medical men of our time, and that physicians and students have long felt the need of a work of the kind. In furtherance of his aim, of providing a treatise to fill this gap, the author illustrates his own experience. "In the hour," he writes, "when all other therapeutic agencies have failed, I have resorted to the lancet to see the livid hue, which mapped the way to an early death, give way to the rosy glow and bright light of health." Again, to prove his case, the views and experience of many authorities are quoted, some of these verbatim, showing the value of blood-letting as a therapeutic agent in these days. One of these authorities is given as "Haviland and Hall," a curious jumble of a well-known name. The chapter on the history of blood-letting is of conspicuous interest, contributed by Mr. F. H. Gerrison. Other sections of the book comprise the indications for venesection, the technique of venesection, while the bulk of the volume consists of the description of the various diseases in which blood-letting has been found therapeutically useful. An index is added, as well as a bibliography.

INTERNATIONAL CLINICS: A QUARTERLY OF ILLUSTRATED CLINICAL LECTURES AND ESPECIALLY PREPARED ORIGINAL ARTICLES . . . . BY LEADING MEMBERS OF THE MEDICAL PROFESSION THROUGHOUT THE WORLD. Edited by H. R. M. LANDIS, M.D., Philadelphia. With the collaboration of CHARLES H. MAYO, M.D., Rochester, U.S.A., and others. Vol. IV., 26th series, 1916. Illustrated; pp. xi + 307. Price: Only sold in complete sets of four vols., 35s. net per annum. Philadelphia and London: J. B. Lippincott Co., 1916.

We notice in this volume only one contribution by an English writer, that by Dr. J. W. Ballantyne on "Infant Welfare." Other articles to which attention may be drawn are "A Clinical Consideration of Migraine," by Dr. J. A. Lichty, "Duodenal Ulcer in Infancy," by Dr. Helmholz, "The Psychology of the Criminal Under Sentence of Death," by Dr. P. E. Bowers, "Granular Ulceration of the Genitalia," by Dr. H. Tucker, "The Crypts of Morgagni and their Surgical Significance," by Dr. C. F. Martin, and "The Treatment of Wounds and

Aneurysms of the Axillary Artery," by Dr. M. G. Vairaud (France). In an article upon convergent squint we are treated to a classification of the poor by the author, Dr. Linn Emerson, of New York. "While we have," he writes, "the poor always with us, there are three kinds of poor: the Lord's poor, the devil's poor, and the poor devils, and it is only the children of the first-kind that we can hope to cure of squint by methods other than operative."

X-RAYS. By G. W. C. KAYE, M.A., D.Sc., Captain R.E. (T.). Second edition. Illustrated; pp. xxi + 285. Price 9s. net. London: Longmans, Green and Co., 1917.

This book is intended for the student of physics, the man of general scientific interests, and particularly for members of the medical profession. It does not profess to be a treatise or handbook of X-rays, but as stated in the preface to the first edition (1914), "aims merely at giving an account of such of the present-day methods and apparatus as appear valuable or novel, and which, in many cases, can only be found scattered throughout many journals, ... It is concerned to some extent with the development of theory as well as experiment, and it attempts to convey a notion of the historical trend of events from Professor Röntgen's world famous discovery in 1895 down to the middle of the year 1913." In this, the second edition, the author has thoroughly revised the book, and has incorporated original work of note published up to the middle of the summer, 1916. Beginning with a discussion of the phenomena of a discharge tube, cathode rays and positive rays, the author then deals with the discovery of X-rays, and gives a brief account of their production, and of the evolution of the X-ray tube or bulb from the earliest types down to the Coolidge and Snook hydrogen tubes. All radiologists will agree with his remark that the bulb has scarcely kept pace with the very extensive improvements that have been made in the rest of the X-ray equipment. Chapters are devoted to high-potential generators, the "hardness" and blackening of an X-ray bulb, the measurement of X-rays, scattered, characteristic and secondary corpuscular rays, and to some further properties of the X-ray. In Chapters 11 and 12 brief descriptions are given of radiography, radiotherapy, and X-ray equipment and technique. The two last chapters discuss the diffraction of X-rays by crystals, and the nature of X-rays, their identity with ultra-violet light rays, and the theories of Stokes, J. J. Thomson, and Planck. The book contains a number of useful tables. It is well illustrated, and is provided with a copious index.

THE CAUSATION OF SEX IN MAN: A NEW THEORY OF SEX BASED ON CLINICAL MATERIALS; TOGETHER WITH CHAPTERS ON FORECASTING OR PREDICTING THE SEX OF THE UNBORN CHILD, AND ON THE DETERMINATION OR PRODUCTION OF EITHER SEX AT WILL. By E. RUMLEY DAWSON, L.R.C.P.Lond., M.R.C.S.Eng. With 22 illustrations; pp. x + 226. Price 7s. 6d. net. London: H. K. Lewis and Co., Ltd., 1917.

In this, the second edition of the work, the author has considerably revised the previous one, while important new material, and proofs of the correctness of his sex theory, have been added. Three points are especially worthy of notice. The author has been engaged for the last twenty years in the study of the subject; and the first edition was the first publication in the shape of a treatise which has appeared on the sex problem in the English language; his conclusion—that determination of sex is dependent on the ovary of the woman—originated with him. Starting from the basis of unilateral ovulation, that the ovaries do not work synchronously, but alternately, the theory is advanced that the determination of sex depends upon the ovary, right or left, which discharges the ovum that is impregnated by the spermatozoon; the right ovary determining the male, and the left the female sex. To support his view, he advances evidence from cases of uterine pregnancy, extra-uterine pregnancy, post-operative pregnancy, after removal and resection of an ovary, and pregnancy occurring in abnormal uteri. The influence of the male parent in sex production is considered in a separate chapter, and a large number of instances are given of second marriages in which only male or female offspring were born to the same husband with different wives. Various operative cases are quoted in which from a variety of causes opportunities occurred of

examining the ovaries during pregnancy where the sex, male or female, corresponded to the right or left ovary. Again, in pregnant women who had undergone ovariotomy, and in whom the sex corresponded to the retained ovary. In dealing with objections which are advanced to disprove the theory, such as the removal of one ovary and the subsequent birth of a child whose sex corresponds to that of the absent ovary which is met by the argument that frequently portions of an ovary have been left after operation, or there is an accessory ovary; for even after both ovaries are thought to have been removed, a woman has conceived. It is of course well known that resection of the ovary does not prevent conception. In cases of pregnancy in a double uterus, if an exception occurs with regard to the relation of sex to ovary, the author contends that it is due to migration of the ovum, and the absence of the corpus luteum in the ovary of the side in which development occurs, goes to prove this. The value of the corpus luteum as an evidence of pregnancy, the migration or transmigration of the ovary, is fully discussed. Space is devoted to the consideration of the preponderance of male births, and the proportion of the sexes in families; the occurrence of twins, and the relative size of the two ovaries, as this affects plural births, as also the influence of decubitus as it affects sex determination. The point whether an ovary with diseased ova affects the mental and physical health of the offspring, is considered. Instances are given in which the male or the female children were respectively affected. Insanity, deafness and dumbness, blindness, convulsions, left-handedness, premature death, monstrosities, deformities, are shown to have followed. That the one ovary may contain both healthy and diseased ova has to be remembered. The subject of hermaphroditism is briefly noticed. The alternate action of the ovaries is fully entered into in a separate chapter, and the author claims to have had 97 per cent. of successes in predicting the sex of the coming child. The conditions and data on which a correct conclusion can be arrived at are specified, and the sources of error defined, while details of cases are given. The final chapters deal with the pre- and post-menstrual theory of sex determination, as also that of its determination at will.

APPLIED ANATOMY: THE CONSTRUCTION OF THE HUMAN BODY CONSIDERED IN RELATION TO ITS FUNCTIONS, DISEASES AND INJURIES. By GWILYM G. DAVIS, M.D., M.R.C.S.Eng., LL.D. Fourth edition. With 63 illustrations; pp. x + 630. Price 24s. net. Philadelphia and London: J. B. Lippincott Co., 1916.

The fourth edition appears three years after the first. "The text and illustrations have been carefully revised with many corrections and additions, the cuts and illustrations have been made more accurate, ten have been entirely replaced and two new ones added." The foregoing quotation from the author's short preface to the present edition may be supplemented by another from that to the first edition: "The book is not intended to be a systematic treatise on anatomy, such anatomical facts as cannot be shown to be useful in practice are not mentioned." It would not appear to any practitioner who has studied this book that any great exaggeration would be involved in stating the converse of this latter proposition, and more could not well be said to indicate the claim of this book on the attention of the medical profession.

PULMONARY TUBERCULOSIS: ITS DIAGNOSIS, PREVENTION AND TREATMENT. By W. M. CROFTON, M.D. With 21 illustrations; pp. vi + 122. Price 6s. net. London: J. and A. Churchill, 1917.

The first chapter of this little book gives a short and clear account of the bacteriology of pulmonary tuberculosis. From this point onwards the author briefly outlines the salient facts of the anatomy, histology, and physiology of the normal lungs, which facts are essential for correct diagnosis of pathological conditions. The two chief sources of infection are stated to be through the milk of infected cattle and through the sputum of infected human beings, the bacilli reaching the lungs by inspiration, through the lymphatics, or by way of the blood-stream. Stress is rightly laid on early diagnosis "before physical signs are recognizable. There is no such thing as a patient being 'threatened' with consumption. He has either got tuberculosis of the lungs or he has not." X-rays are of immense value in diagnosis

where there are no definite physical signs and symptoms, as well as in affording useful information as to extent of disease. Prophylaxis, treatment in general and of special conditions, with an appendix dealing with the manufacture of vaccines, constitute the remaining subjects dealt with in this manual.

TREATMENT OF JOINT AND MUSCLE INJURIES. By W. ROWLEY BRISTOW, M.B., B.S.Lond., F.R.C.S., Captain R.A.M.C.(T.) With 38 illustrations; pp. xii + 148. Price 6s. net. London: Henry Frowde and Hodder and Stoughton, 1917.

"The main object of this small book is to bring to the notice of the profession a method of dealing with sprains and simple injuries of joints and muscle wasting, and to indicate the type of case for which it is suitable as a method of treatment. . . . . It is not just 'contractions,' but rhythmical and graduated contractions of definite muscles and muscle-groups which are the very essence of the method, and which alone can be relied on to give the desired results." So states the author in his preface, adding that his book contains also a long chapter on pre-operative and post-operative peripheral nerve-injuries. The battery devised and used by Dr. Bristow consists of a specially wound coil, actuated by dry cells or by accumulators. The primary and secondary windings are both of thick wire. The secondary, which is the current used, can be tapped from one, two, or three layers, according to the strength required. Any degree of contraction can be obtained. Chapters II to VIII inclusive respectively deal with technique of the treatment, acute sprains, chronic sprains, peripheral nerve injuries, fractures, some fractures and dislocations, massage and exercises. The illustrations are all clear and informing. The following may be taken as an example of the author's plan of treatment applied to a case of fracture: The case was treated by graduated contraction, commenced forty-eight hours after the accident, which caused a T-shaped fracture of the lower end of the radius. "The wrist was moved gently by the contractions produced by stimulation of his own muscles. The functional result was excellent. . . . . Painless movements are all that are necessary. . . . . Any forcible manipulation is contra-indicated."

NOTES ON MILITARY ORTHOPÆDICS. By Colonel ROBERT JONES, C.B., Inspector of Military Orthopædics, A.M.S. With an Introductory Note by Surgeon-General Sir ALFRED KEOGH, G.C.B., Director-General A.M.S. Illustrated; pp. xiv + 132. Price 2s. 6d. net. London: Cassell and Co., Ltd., 1917.

In the preface the author, now Colonel Sir Robert Jones, C.B., C.M.G., emphasizes the value of suitable occupation as a remedial agent: "The shock of injury, frequently in itself severe, followed in succession by a long period of suppuration, and then by a wearisome convalescence, during which he receives treatment by massage or electricity or by monotonous movement with mechanical apparatus of the Zander type, too often leaves him discontented with hospital life, its monotonous round of routine, and its long periods of idleness. In the Orthopædic Centre he finds his fellow-patients busily engaged in employments in which they are doing something, and it is not many days before he asks for a job." Chapter I deals with the position of election for ankylosis of joints: the author recommends for the shoulder, abduction to about 50 degrees; for the elbow, 70 degrees of flexion, with the radius fixed midway between pronation and supination; for the wrist, dorsiflexion; for the hip, slight abduction and slight rotation out; for the ankle, the rectangular position with slight inversion of the foot; and for a flail joint ankylosis in a proper position. Chapter II deals with suture of nerves and alternative methods of treatment by transplantation of tendon. The many kinds and degrees of nerve-injury in military cases are indicated, also the general principles that adhesions and malpositions of muscles and joints are to be overcome and paralysed muscles to be relaxed during the period of treatment. This applies equally to cases of poliomyelitis. The danger of mistaking an inactive and anæmic for a paralysed muscle is pointed out. "The clinical test of the recoverability of a muscle therefore depends on an experiment. Let it be kept for a long period—for at least six months—in a position of relaxation." The modes of tendon-

transplantation to be used where recovery of an injured nerve cannot be obtained are described and fully illustrated. Injury to the sciatic nerve is thus referred to: "The idea of rushing to amputation of a limb merely because the sciatic nerve is destroyed and therefore theoretically the nutrition of the foot must go wrong is too horrible to be contemplated." Chapter III deals with the soldier's foot and the treatment of common deformities of the foot. This chapter is as important as any in the book, and includes the established principles of dealing with deformities of the foot, together with some original features. The author observes: "The Army boot is not perfect, but it is better than it was some years ago." Chapter IV is on "Malunited and Ununited Fractures"; Chapter V, "Transplantation of Bone and some Uses of the Bone-graft"; Chapter VI, "Disabilities of the Knee-joint"; and Chapter VII, "Fractures, War-conditions." These last four chapters deal with matters of daily importance both in civil and military surgery, and are lucid and clearly illustrated. Like the rest of the book they seem to tell plainly that the best preparation for war is well-informed efficiency in peace.

SURGICAL THERAPEUTICS AND OPERATIVE TECHNIQUE. By E. DOYEN. English edition prepared by the author in collaboration with H. SPENCER-BROWNE, M.B.Cantab., &c. (To be complete in three volumes.) Volume I, with 1,034 original illustrations; pp. ix + 746. Price 25s. net. London: Ballière, Tindall and Cox, 1917.

This English edition of Doyen's work on operative surgery is not, the translator tells us, a reproduction of the existing French edition, for, previously to the author's death, the latter was revised for the purposes of this translation: part of the introductory pages were recast, the chapters on the surgery of the blood-vessels and nerves and the transfusion of blood were rewritten, and the latest developments in war surgery and surgical treatment generally were added. The present volume—the first of three—comprises three introductory chapters, followed by the division of the book into two parts: (1) General Surgical Technique; and (2) Regional Surgery, embracing operations upon the head. A feature in the book is the mechanical ingenuity displayed by Doyen in the design of new instruments. Many pages of illustration of these are given, as well as of new appliances which he introduced. His work on cancer is also fully dealt with, and his method of destroying cancer cells by electro-coagulation occupies a large section, in which he claims that this method should be substituted in every variety of cancer in which the employment of X-rays and radium is indicated. There is probably much in this work which will appeal to English surgeons, allowance being made for the author's enthusiasm in his own methods. There is no index to this volume.

A REGIMENTAL SURGEON IN WAR AND PRISON. By Captain ROBERT V. DOLBEY, M.B., M.S.Lond., F.R.C.S.Eng., R.A.M.C. Pp. ix + 248. Price 5s. net. London: John Murray, 1917.

This narrative is a description and a running commentary upon the author's experience as a medical officer at the Front, in the early days of the War, and subsequently as a prisoner in Germany. The transparent honesty of the writer, the absence of all attempts to do more than give an uncoloured statement of all that he did and saw, his reasoned commentaries upon the facts he discloses, combine to render his book a noteworthy contribution to the literature of the War. In the picture the reader is taken across the Channel with the First Expeditionary Force to the Front, is presented with the fateful, though glorious details of the retreat from Mons, is cheered with "the miracle of the Marne," and learns the difficulties and hardships of the first battle of Ypres. It was in this action that the author was taken prisoner, and thereafter his book deals with his history in the prison camps of Crefeld, Muiden, Sennelager-bei-Paderborn. Those were the days when the epileptic megalomania of the Ruler of Germany insisted upon cruelty as the inspired policy of the treatment of war prisoners, especially British, and the horrors of that policy the author portrays. Many passages in the volume invite quotation. But the book must be read to learn the lessons it teaches, the convictions it creates from warfare with a nation which despises humanity's laws and casts aside with disdain the demands of civilization.

THE PNEUMOTHORAX TREATMENT OF PULMONARY TUBERCULOSIS. By CLIVE RIVIERE, M.D.Lond., F.R.C.P. Illustrated; pp. xv + 186. Price 6s. net. London: Henry Frowde and Hodder and Stoughton, 1917.

In this convenient text-book the author has summarized the results of his own and others' experience in the treatment of pulmonary tuberculosis by collapse and compression of the diseased lung. The problems of pneumothorax treatment are many and complex, and at present to some of them no final answer can be given, but recent views on the subject are outlined and some indication of their trend is given. The benefit to be derived from this method of treatment is stated to depend upon (*a*) the local mechanical effects produced, and (*b*) the removal of toxæmia. The requisite apparatus and technique of the initial operation and refills are detailed, the most suitable cases for treatment being those of severe one-sided disease with the other lung clear or nearly clear to clinical examination. The chief accidents of pneumothorax treatment are given as pleural shock, gas embolism, and perforation of the lung. "The striking success in comparatively advanced cases impresses itself very forcibly on all those who practise this treatment."

THE CANCER PROBLEM: A STATISTICAL STUDY. By C. E. GREEN, F.R.S.E. New Edition. With map and 30 illustrations; pp. ix + 140. Price 2s. net. Edinburgh: W. Green and Son, Ltd., 1917.

On the title page this book is described as a new edition, but, in the absence of a preface, there is nothing to guide us in respect of the features in which it differs from the preceding issue. Whether, that is to say, the work has been subjected to revision, whether additions have been incorporated, or by what means it has been brought up-to-date. Although the author is not a medical man he shows a free acquaintance with the medical aspects of his subject, while the labour which must have been expended upon the statistical facts he has been able to gather, are proof of the enthusiasm with which he has undertaken his task. The statistical rays of light bearing upon the cancer problem he claims are derived from three sources: (1) That cancer is much more prevalent in some districts than in others; (2) that it is very common in some trades and very uncommon in others; (3) that these figures are practically constant from year to year. These various points are fully developed in the book, in the course of which much interesting information is brought forward in support of the author's views. The chapter upon "the occupational incidence of cancer" deals largely with the question of the influence of sulphur compounds in relation to the disease. Ammonium sulphate is freely present in soot—hence chimney-sweep's cancer; sulphuric acid is used largely in paraffin refinement—hence paraffin cancer; sulphur salts are employed to a considerable extent in brewing—hence the high mortality rate from cancer among brewers; and the same applies to india-rubber workers, lead workers, &c. The evidence which the author adduces upon the presumed cancer factor of sulphur is worthy of careful attention. The whole volume is full of suggestiveness, and is obviously the outcome of much patient research.

PSYCHOLOGICAL MEDICINE: A MANUAL ON MENTAL DISEASES FOR PRACTITIONERS AND STUDENTS. By MAURICE CRAIG, M.A., M.D.Cantab., F.R.C.P.Lond. Third edition. With 27 plates, some in colour; pp. xii + 484. Price 15s. net. London: J. and A. Churchill, 1917.

The present edition of this manual on mental diseases for practitioners and students has been brought up to date and somewhat enlarged. A new chapter is devoted to the neuroses and psycho-neuroses occurring in men exposed to shell shock and the strain of war. Psycho-analytic treatment is more fully described than in the last edition. Throughout the volume the writer is constantly reminding the reader to regard mental disorders in the same light as he does physical disease, and the book is written from this standpoint.

CONGENITAL WORD-BLINDNESS. By JAMES HINSHELWOOD, M.A., M.D., F.R.F.P.S.Glas. With 3 plates; pp. x + 112. Price 4s. net. London: H. K. Lewis and Co., Ltd., 1917.

In the author's view the knowledge of the chief facts respecting acquired word-blindness is necessary to the interpretation and explanation of the various phenomena of congenital word-blindness. The first chapter, therefore, of this book deals with the former subject. The interest in this curious defect mainly belongs to the localization of the lesion which causes it. "The angular gyrus of the left side of the brain is now generally accepted as the area in which are deposited the visual memories of words and letters," and "word-blindness" results either from the destruction of the cortical centre itself or from its complete isolation by the destruction of its communicating fibres. Right homonymous hemiopia is a frequently associated symptom of the defect, and this symptom, the author affirms, should always be carefully looked for, as its presence renders the localization of the lesion more exact. Of the congenital form, the increasing literature of the subject would indicate that this defect is more common than was formerly supposed. From an educational standpoint its importance need scarcely be insisted upon. Nevertheless the author is able to affirm, from his long experience, that a hopeful prognosis is possible in such cases, for "children so affected, with proper treatment and great perseverance, can be taught to read." This book will be found very helpful in defining and elucidating the subject with which it deals.

THE CAUSES OF TUBERCULOSIS: TOGETHER WITH SOME ACCOUNT OF THE PREVALENCE AND DISTRIBUTION OF THE DISEASE. By LOUIS COBBETT, M.D., F.R.C.S. With 23 plates and 8 diagrams; pp. xvi + 707. Price 21s. net. Cambridge: The University Press, 1917.

Written mainly from the standpoint of the experimental pathologist, one of the principal objects of this work is to bring together the researches of the Royal Commission on Tuberculosis and of the Local Government Board in this country, the Department of Health of the City of New York, and the Imperial Board of Health in Berlin. The opening chapters deal with vital statistics and the ætiology of the disease. These include sections on the annual mortality and decline of the disease, the doctrine of contagion, hereditary transmission, and phthisis in relation to dusty trades. Two chapters are also devoted to an examination of the portals of entry of the tubercle bacillus, from which, after examining a large mass of experimental evidence, the author concludes that "the old theory of the inspiratory origin of pulmonary tuberculosis has emerged greatly strengthened." The relations between animal and human tuberculosis occupies the largest portion of the book, and is treated in a detailed manner, from the earliest observations of Villemin in 1868 to the most recent publications of Eastwood and F. Griffith in 1916. The differentiation of the three main types of *Bacillus tuberculosis* is set forth at length, and several chapters are devoted to the stability of type of tubercle bacilli in the animal body. In examining this question of stability the author produces evidence to show that intermediate types are probably due to impure cultures. A separate chapter deals with the vexed question of the types of bacilli found in cases of lupus. The concluding sections of the book are concerned with the part played by bovine infection in human tuberculosis, and contain the recent work of Mitchell (1914) on the exceptionally high figures for bovine tuberculosis obtained in Edinburgh, and the latest results of A. S. Griffith (1916) with sputum. The book is well supplied with illustrations, and contains an extensive list of references at the end of each chapter and an index.

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(*November* 3, 1916.)

Case of Heart Failure during an Operation for the Removal of Tonsils and Adenoids; Heart Massage through an Abdominal Incision; Recovery.

By W. M. MOLLISON, M.C.

PUBLISHED cases of heart massage are even now not numerous, and successful results are much less numerous, and so I hope the following case may prove of some interest, not only because recovery followed after a considerable period of heart stoppage, but also because during recovery the patient exhibited symptoms which have always been followed by death in previous partially successful cases.

The patient was a boy, A. W., aged 6. He was slight, but healthy in appearance. He was sent to the throat and ear out-patient department at Guy's Hospital in August of this year by Dr. Chaning-Pearce, with a view to operation on the throat. Last winter the boy had had bronchitis and asthma, and it was considered advisable to remove the tonsils and adenoids on that account.

Operation was performed in the out-patient department on September 5, 1916. The usual preparation for an anæsthetic was carried out: a purge was given the previous day, and the patient was given a cup of milk at 8 a.m. on the morning of the operation. On account of the lack of qualified assistants two senior students had charge of the operation under my supervision; on several previous occasions they had successfully carried out similar operations. A

mixture of chloroform (two parts) and ether (three parts) was administered on an open mask; without any struggling the boy became unconscious, but the corneal reflex was never lost. The amount of anæsthetic given is not known, but the administrator noted that it was less than he had used before in similar cases. The operation was begun about 1 p.m. The left tonsil was removed successfully; while the right was being removed the boy struggled slightly. He was now turned on his left side and the adenoids curetted (the operator was left-handed). It was noted that the boy did not struggle while the adenoids were curetted and he remained inert when cold water was poured over the face; this fact made me realize that the patient was suffering from shock (I had been watching the operation, but taking no active part). On examination the boy was found to be flaccid, respiration had ceased, the pupil was dilated, and the corneal reflex absent.

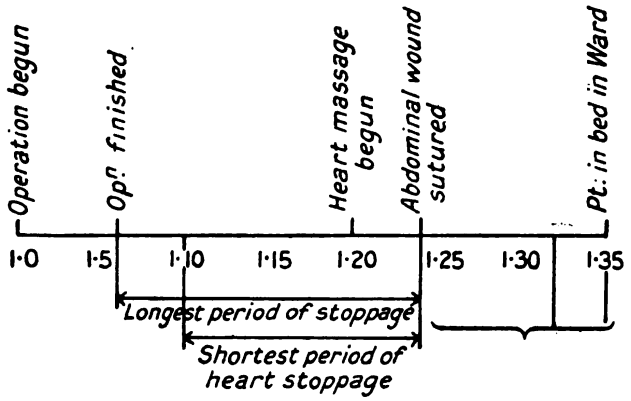
The head was lowered, the throat cleared of the small amount of blood present, the tongue pulled forward, and artificial respiration by Silvester's method begun; air entered the chest quite freely, but the patient's bluish colour persisted, and it became obvious that no improvement was taking place. At the same time stimulants were being administered, hot cloths were applied to the chest and abdomen, brandy and ether were injected subcutaneously, 0·5 c.c. pituitrin was injected subcutaneously, and another 0·5 c.c. was injected through the chest wall into the heart. No response followed. Examination with a stethoscope by two of us revealed absence of heart sounds.

I now decided to open the abdomen and massage the heart. The abdomen was washed over with ether and antisepsis carried out as far as possible; an incision about 4 in. long was made from the ensiform cartilage to just above the umbilicus in the middle line; there was no bleeding from the sides of the incision. In the hurry the liver was superficially incised and a little dark blood oozed from it. The right hand was inserted between the liver and the diaphragm, and the heart was easily felt through the diaphragm; there was no trace of movement. With the left hand on the chest wall and the fingers of the right hand behind the heart, pressure was exerted at about the rate of ninety times a minute; for some moments there was no response, then some respiratory movements began and continued intermittently; the boy's colour improved and his pupil contracted to about 3 mm.; still there was no attempt at heart contractions. This attempt at respiration I suggest was due to the slight artificial circulation produced; blood was driven to the medulla and the respiratory centre stimulated into

action. One of the students relieved me at the massage, which proved somewhat tiring; I then resumed, but still failed to get any response. I now injected nearly 1 c.c. of pituitrin into the heart, guiding the needle through the chest wall towards the fingers of the right hand, thus making certain it entered the heart. Massage was now renewed, and after about twenty more squeezes the heart suddenly began beating strongly.

It is extremely difficult to make definite statements as to times in cases of great urgency, like this one, and in view of the subsequent history it is of great interest to try to arrive at an accurate estimate. The whole incident lasted from 1 p.m., when the operation was begun, to 1.35 when the boy reached the ward. The operation took a very short time, perhaps three minutes, and the sponging of the face and sponging out the throat and mouth perhaps another three minutes. This is, I am sure, a generous estimate, but as against that one must consider that the operation may not have started till 1.2. There was almost no interval between this and the commencement of artificial respiration; it is probable that the heart stoppage came on immediately after the removal of the second tonsil, and thus we arrive at the conclusion that the heart stopped at 1.10 (allowing an extra four minutes for the process of stoppage, this may well have been 1.5 p.m.). Stimulants were applied and artificial respiration continued for about five minutes probably; this brings us to 1.15 p.m. Now the abdomen was opened: one must allow from one to two minutes for preparation for this, as well as for taking off one's coat, washing one's hands, and washing over the abdominal wall with ether. The incision took only a few seconds: indeed so rapidly was it made that the liver was superficially incised. Massage was begun at once and persevered with till the heart-beat began; this probably took three to four minutes. As soon as it was certain that the heart was beating well, the liver sutures were inserted, and this, together with the application of dressings, occupied about four minutes, perhaps six: this brings the time to 1.30 or 1.32 p.m.; the further two or three minutes were occupied in carrying the boy to bed. From these time-records it is fairly certain that the time during which the heart was stopped cannot have been less than thirteen minutes and not more than twenty-four minutes. During part of this time, however, some slight circulation must have been going on because, as I have said, respiratory movements started while the heart was being massaged. I may add that the impression of those present was that the heart had been stopped for

fifteen to twenty minutes, and not only were the two students present, but an extremely competent head nurse who was invaluable, and one other nurse. The following diagram shows also the times taken for the various procedures.



The boy's condition was still very poor, and no radial pulse could be detected, but his corneal reflex returned. Two catgut sutures were inserted in the liver to draw the edges of the cut together; two sutures only were put into the abdominal wound and a rough dressing applied; and the boy carried to the ward.

Saline infusions were given, and the foot of the bed raised considerably. About an hour later he became restless, and his limbs were rigid or made choreic movements, and the intestines escaped from the wound: my colleague, Mr. E. C. Hughes, kindly operated under light ether anæsthesia and sutured the wound, no drainage being employed.

On recovery from the anæsthetic the choreic movements returned; he ground his teeth, and at one time there was rigidity of the right arm with conjugate deviation of the eyes to the left and upwards.

For the subsequent history of the case I have to thank my house-surgeon, Mr. Wilson, and the sister of the ward, both of whom made careful notes while I was absent on a holiday.

To sum up the history of the next fourteen days: for seven days the boy was more or less unconscious, though he could recognize his mother now and then; consciousness then gradually returned (with relapses). For ten days there was rigidity of the limbs, or choreic movements—at one time both feet and hands were held in the position of tetany. From September 8 to September 12 he frequently cried out

shrilly (meningitic cry); for thirty-six hours the screaming was almost continuous. For about twelve days he had incontinence of fæces, and for fifteen or sixteen days incontinence of urine (though there was one day on which he had retention of urine for twenty hours). On September 15 he became very violent, tore the bed-clothes, bit himself and spat; again on September 18 and 19 he tore the clothes, and tried to eat his blanket. Shortly expressed he had symptoms of severe cerebral irritation, no doubt due to the damage done to the brain during the cessation of the circulation.

At the end of fourteen days he had much improved, and on September 21 I saw him again: he lay quietly in bed; tried to put his fingers in his mouth; answered questions as to name and age correctly; could not remember what he had for dinner; could count up to twelve, but beyond that he got mixed. On September 22 he could sit up: he still had incontinence of urine. The nervous system seemed normal. He made eventually a perfect recovery, and left the hospital on October 19. His mental condition appears quite normal now and he is mentally fully up to the standard of a child of six.

I submit a table of the published successful cases (*see* p. 6).

There is one other case published in the *Journal of the American Institute of Homœopathy*, but unfortunately I cannot find this journal, and so do not know whether the case was successful.

It will be noticed that in most of the cases only a short time elapsed before massage was begun, and indeed in some of the cases one wonders whether the heart would not have recovered without the massage.

It was Green, in 1906, who pointed out that really the partially successful cases were the most interesting, as showing the great vitality of the heart. In all these partially successful cases, where the patients have lived for periods varying from two to twenty hours, the symptoms noted have been unconsciousness or semi-consciousness, rigidity or cramps in the arms, incontinence of urine. It was Russell who pointed out that these symptoms also occurred in cases of temporary cerebral anæmia from various causes, other than heart failure under anæsthetics. These statements rather lead me to think that my case is as it were a link between success and failure. Indeed, probably the strongest evidence that the circulation was arrested for some long time, even if the heart had not stopped beating, lies in the after-history.

I take it there are two lessons to be learned, the first that heart massage ought not to be postponed too long, probably not longer than five minutes after heart stoppage has occurred; the second, that even

if a longer time has elapsed, massage ought always to be carried out through an abdominal wound. The real difficulty lies in making up one's mind that the heart will not recover without some desperate measure: it would be most unwise to lay down a rule that sub-diaphragmatic massage should be at once undertaken in every case of heart failure under an anæsthetic.

Case	Name of operator	Anæsthetic	Time of ordinary methods	Time taken to restore heart	Method	Operation being performed
1	Igelsrud ...	?	3 to 4 min.	1 min.	Resection of ribs and opening pericardium	Abdominal
2	Lane ...	Ether	2 to 3 min. ?	1 or 2 squeezes	Sub-diaphragmatic	Abdominal
3	Gray ...	?	?	2 or 3 squeezes	Sub-diaphragmatic	Abdominal
4	Cohen ...	$CHCl_3$	2 min.	1 min.	Sub-diaphragmatic	Abdominal
5	Crile ...	Ether	*Nil.*	5 to 6 min.	Rubber suit method	Exophthalmic goitre
6	Sencert ...	$CHCl_3$	7 to 8 min.	5 min.	Sub-diaphragmatic	Abdominal
7	Conkling ...	Ether	2 min.	1 min.	Through wound of chest-wall	Repair of wound of chest wall
8	Smith ...	$CHCl_3$	3 min.	1 min.	Sub-diaphragmatic	Examination of rectum
9	Ramsay ...	$CHCl_3$ and ether	4 min.	1 min.	Sub-diaphragmatic	For prolapse of uterus
10	Rutherford	$CHCl_3$	1 to 2 min.	12 squeezes	Sub-diaphragmatic	Whitehead's operation
11	Milne ...	$CHCl_3$	2 min. ?	1 squeeze	Sub-diaphragmatic	Operation not begun
12	Sichell ...	C.E. and ether	1 min. ?	"A short time"	Sub-diaphragmatic	Operation not begun
13	Frazier ...	Ether, then $CHCl_3$	1 to 2 min. or less	2 min.	Sub-diaphragmatic	Hydrocele, just begun
14	Mollison ...	C.E.	13 min.	4 min. ?	Sub-diaphragmatic	Removal of tonsils and adenoids

The first nine cases were quoted by Green in his paper in the *Lancet*, 1906, ii, p. 1,708. Only in Case 9 is any note made of after-effects. In Case 9 it is noted the patient slept for four hours and was at times delirious. She was better the next day.

Two other problems arise in connexion with the case: Why did the boy have heart failure? Was it that the anæsthesia was too light, or was it a case of vagal inhibition? Were contractions continuing in the auricles, but not getting through to the ventricles? And did the pituitrin play any special rôle in assisting recovery, or did it lead to any of the symptoms during the period of recovery? Of none of these am I competent to suggest solutions.

DISCUSSION.

Dr. BLOMFIELD: Mr. Mollison's carefully recorded case is of great importance, because it is an undoubted instance of life being saved by the method adopted. In similar instances hitherto recorded, one has often received the impression that recovery would have followed even if the abdomen had not been opened; such a suspicion cannot here be entertained, and we are brought to the highly important question—At what point ought we to insist upon direct massage treatment being performed in these cases of collapse? Probably in the case of an adult earlier interference is necessary than in the case of a child. I suppose if after five minutes' thorough performance of artificial respiration, tongue traction, &c., there is no response, then direct massage should be carried out.

Dr. M. S. PEMBREY: The fact that artificial respiration can be of no use in the absence of circulation is often overlooked. It has been shown that the human heart can be revived by perfusion, and be made to start beating again some hours after death. The cerebral irritation certainly indicates that there has been cessation of the circulation for a considerable period. Children withstand a lack of oxygen better than adults.

Observations upon the Air under Masks during Ether Anæsthesia.

By M. S. PEMBREY, M.D., and F. E. SHIPWAY, M.D.

ALTHOUGH much has been written about the vitiation of the air breathed by patients during anæsthesia, few exact observations upon the composition of the air appear to have been made. Dreser[1] recognized the need of analyses, and in 1893 and 1895 published the results of researches upon the composition of the air breathed during ether anæsthesia with closed and semi-open methods. He experimented with Julliard's mask and Wanscher's mask; the former is a large wire framework, with an impermeable cover of waxed taffeta, and the ether is dropped on an absorbent pad in the dome of the mask; the latter is a modification of Ormsby's inhaler. The analyses of the air taken during the administration of ether with the Julliard's mask showed that the carbon dioxide varied between 1·2 and 1·7 vols. per cent., and the oxygen between 16·6 and 18·7; the ether was 1·2 to 4·7 vols. per cent.

[1] *Beitr. f. klin. Chir.*, 1893, x, p. 412.

This amount of ether was sufficient for the induction and maintenance of satisfactory anæsthesia. The quantity of carbon dioxide was adequate for stimulation of the respiratory centre, but far too small to produce any paralysing effect; the fall in the percentage of oxygen was slight, and within the limits of safety. With Wanscher's mask, control experiments showed that after breathing for one minute the oxygen was as low as 9·8 vols. per cent. and the carbon dioxide as high as 7·6. During ether anæsthesia with a new model of this inhaler, in which the mask did not fit the face of the patients, the percentages of oxygen were 12·4 to 17·8, carbon dioxide 3 to 1·2, and ether 16·8 to 6·8 by volume.[1]

A modification of Wanscher's mask is that of Rovsing, in which the bag has a capacity of 3 or 4 litres. Bryant and Yandell Henderson[2] were greatly impressed by the administration of ether with this mask, as seen in Rovsing's clinic in Copenhagen, and recommend its use as a satisfactory and efficient method of controlling the rebreathing and rate of ether administration. Their rule for the anæsthetist, "keep the patient pink" is good, but the results of their analyses show that the air in the Rovsing bag is often so poor in oxygen that there is the danger of want of oxygen. The following are their results expressed in percentages by volume :—

TABLE I.

Samples	Ether	Carbon dioxide	Oxygen	Remarks, colour, &c.
1	10·15	3·18	9·03	Man; bad subject, purple
2	7·11	2·39	13·35	Boy; pale pink
3	10·35	3·01	6·96	Boy; somewhat cyanotic
4	9·45	2·79	15·85	Boy; pink
6	9·92	2·67	16·78	Boy; pink, mask partly open
8	8·90	3·27	8·35	Boy; light anæsthesia and slight cyanosis
9	10·35	2·69	10·15	Boy; good condition; respiration 32, pulse 110
Average ...	9·32	2·85	11·50	

[1] *Johns Hopkins Hosp. Bull.*, 1895, vi, p. 7.

[2] *Journ. Amer. Med. Assoc.*, 1915, lxv, p. 1.

It will be noted that, although the percentages of carbon dioxide are safe and adequate for stimulation of the respiratory centre, the amounts of oxygen in the bag are dangerously low. It is necessary, therefore, to allow the patient to obtain air from the outside, otherwise cyanosis would be more frequent than it is in the above table, two or three cases in seven. The actual administration, therefore, becomes not a closed method, but a semi-open one.

Apart from these analyses we are not aware of any other. The subject of the gaseous composition of the air under anæsthetic masks has received little or no attention in the recognized text-books.

Our observations were made upon a Schimmelbusch mask for "open ether"; by which term is meant the method in which ether is dropped continuously on to the fabric spread over the mask, which is so closely applied to the face by a shaped flannel pad, that the air currents pass through the fabric. Clover's inhaler and Hewitt's wide-bore inhaler were employed for the closed methods. The net capacity of the first was 250 c.c., of the second 3,650 c.c., and of the third about 6,000 c.c.

In the first place control observations without an anæsthetic were made upon a healthy man who is accustomed to such experiments. The results are shown in the following tables (*see* p. 10).

A comparison of these results shows that in the open method, with the mask closely applied to the face by means of a pad, there is an adequate but not excessive amount of carbon dioxide, and no great decrease in the supply of oxygen; there is some rebreathing, but owing to the limited capacity of the mask (250 c.c.) some air in ordinary breathing will be drawn from the outside. In the Clover, on the other hand, the amount of carbon dioxide may be twice as great as in the open method, and the oxygen has fallen towards the limit at which disturbance from want of oxygen generally arises.

The administration of ether introduces a vapour which displaces a corresponding volume of nitrogen, oxygen and carbon dioxide. According to the observations of Hewitt and Legge Symes[1] upon a Skinner's mask and pad, the gaseous mixture contains 5 to 15 per cent. of ether by weight, which, as Connell[2] shows, represent 1·99 and 6·38 per cent. by volume. Owing to its large proportion in the inspired and expired air, nitrogen will be the gas chiefly displaced by the vapour of ether. These percentages of ether are sufficient for anæsthesia.

[1] *Lancet*, 1912, i, p. 215.

[2] *Ann. Surg.*, 1913, lviii, p. 884.

TABLE II.—OPEN METHOD.

Schimmelbusch Mask.

	Carbon dioxide vols. per cent.	Oxygen vols. per cent.	Remarks
Mask with 15 layers of gauze and pad on face	3·09	16·97	Mask on face for 2 min.; sample taken over 45 sec.
	3·13	17·06	Ditto
	2·98	17·28	Sample taken over 20 secs.
Mask with 2 layers of domette and pad on face	2·52	17·94	Mask on face for 2 min.; sample taken over 45 sec. during 11 respirations
	2·81	17·04	Sample taken over 30 sec. during 9 respirations

TABLE III.—CLOSED METHOD.

Clover's Inhaler, with Big Bag (5,750 c.c.).

	Carbon dioxide vols. per cent.	Oxygen vols. per cent.	Remarks
Sample from mask and bag	5·36	13·74	Mask on face for ½ min., lifted after fifth breath; respirations 8; instantaneous sample at end of period
	5·82	13·37	Mask on face for 1 min., lifted three times; respirations 16; instantaneous sample at end of period
	5·21	14·08	Mask on face for 2 min., lifted after each fifth breath; respirations 40; instantaneous sample at end of period

Clover's Inhaler, with Small Bag (3,500 c.c.).

Sample from bag	5·18	15·32	Mask on face for ½ min., lifted after fifth breath; respirations 11; instantaneous sample at end of period
	4·92	15·79	Mask on face for 1 min., lifted three times, after each fifth breath; respirations 21; instantaneous sample at end of period
	5·94	13·86	Mask on face for ½ min.; no fresh air; respirations 11; instantaneous sample at end of period

The following tables give a comparison of the different methods during the administration of ether. The analyses were made by Haldane's method after the removal of the ether by strong sulphuric acid; the difference between the sum total of carbon dioxide and oxygen and 100 represents the nitrogen.

TABLE IV.—OPEN METHODS.

Ordinary Open Ether.

Subject	Age in years	Operation	Duration of anæsthesia in minutes	Carbon dioxide vols. per cent.	Oxygen vols. per cent.	Remarks
M.	60	Rectal examination	17	2·60	18·26	Mask with 15 layers of gauze; 1/100 atropine; sample taken over 2 to 3 respirations
M.	17	Radical cure of hernia	30	2·69	17·39	Mask with 15 layers of gauze; 1/100 atropine; sample taken over 42 sec.
				2·33	17·87	Sample taken over 45 sec.
F.	44	Exploration of kidney	40	3·38	17·12	Mask with 15 layers of gauze; 1/6 morphia, 1/100 atropine; sample taken over 30 sec.
				1·79	19·02	,, ,, 35 ,,
				1·94	18·22	,, ,, 11 ,,
				2·33	18·21	,, ,, 15 ,,

Warm Ether.

F.	35	Removal of appendix	31	2·69	17·92	Mask with 15 layers of gauze atropine 1/100, morphia 1/6; instantaneous samples
				2·80	16·56	Ditto ditto
				3·18	16·45	No ether for 5 min.; instantaneous sample in expiration
F.	25	Removal of appendix	32	0·86	19·49	Mask with 2 layers of domette; atropine 1/100, morphia 1/6; instantaneous sample during inspiration
				2·11	18·19	Instantaneous sample in expiration
				2·02	18·21	Instantaneous sample at end of expiration
M.	28	Gastro-jejunostomy	57	3·69	16·77	Mask with 2 layers of domette; 1/6 morphia, 1/100 atropine; sample taken over 25 sec. and before incision
				3·96	16·23	Sample taken over 26 sec.
F.	17	Deformed toes	37	2·04	17·66	Mask with 2 layers of domette; 1/6 morphia, 1 100 atropine; sample taken over 17 min.
M.	11	Acute Appendix	43	1·34	18·11	Mask with 12 layers of gauze; 1/150 atropine; sample taken over 16 min.
M.	35	Hæmatocele	32	2·26	18·42	No injection; mask with 12 layers of gauze; sample taken over 30 sec.
				1·79	18·59	Mask with 2 layers of domette; sample taken over 35 sec.
				2·03	18·41	Ditto ditto

TABLE V.—CLOSED METHODS.

Clover's Inhaler with big bag (5,750 c.c.).

Subject	Age in years	Operation	Duration of anæsthesia in minutes	Carbon dioxide vols. per cent.	Oxygen vols. per cent.	Remarks
M.	17	Catherization of ruptured urethra	17	5·23	13·41	1/100 atropine; sample taken from mask and bag over about 1 min.; after every fourth breath one of air
				4·83	14·46	Sample taken from mask and bag in about ½ min.; some air at each breath
				5·61	14·68	Sample taken from bag at end of the operation; mask had been lifted at each inspiration

Hewitt's Inhaler with big bag (5,750 c.c.).

F.	51	Carcinoma of breast	53	5·09	13·38	1/6 morphia and 1/100 atropine; sample taken slowly from under mask
				4·13	15·56	Ditto ditto
				3·24	16·46	Sample from bag during 12 respirations
M.	61	Epithelioma of hand	20	2·74	15·47	1/6 morphia and 1/100 atropine; sample taken from mask during 8 respirations
				6·36	10·70	Sample taken from apex of bag during 8 to 9 respirations

In considering the results given in the tables, it is necessary to remember that the composition of the air in the mask is varying, owing to the respiration of the patient and the fluctuations in the amount of ether vapour. At the very end of expiration it will contain the highest percentage of carbon dioxide and the lowest percentage of oxygen; it will approximate to the composition of alveolar air if the mask is small and not very permeable. On the other hand, at the end of an inspiration the differences will be reversed, the composition in the case of a deep breath will be that of the air of the room, unless the capacity of the mask is so great and its permeability so low that the air outside cannot penetrate readily. With the warm ether method[1] the anæsthetist is able to alter at will the composition of the air under the mask: with twenty-seven pulsations of the hand-bellows per minute

[1] *Lancet*, 1916, i, p. 70.

2·25 litres of air were delivered, with twenty-five pulsations 2 litres. The average amount of air delivered by an ordinary pulsation was 80 c.c., that of a full pulsation 125 c.c. In order to form some estimate of these fluctuations in the open method, we have taken both instantaneous samples, and continuous samples varying from twenty seconds to seventeen minutes, and have recorded also the number of respirations.

In the case of the closed methods the lifting of the mask makes it difficult to form an estimate of the average composition of the air breathed by the patient.

When ether is administered by the open method, the air breathed by the patient is of more uniform composition than is the case with the closed methods. In the former there is enough carbon dioxide to act as a stimulant to the respiratory centre, and sufficient oxygen to remove the danger of lack of oxygen; in the latter the patient breathes air which may at one moment be pure air, at another, air containing as large an excess of carbon dioxide as 6·36, and oxygen as low as 10·7 vols. per cent. There is no doubt that a safe anæsthesia can be obtained by a skilled anæsthetist using the so-called closed method, but it is necessary to insist that it is a semi-open method; the patient cannot breathe continuously into a closed system unless fresh oxygen is supplied and the excess of carbon dioxide is removed. The stimulating effect produced by such high percentages of carbon dioxide is obtained during rebreathing at the expense of a corresponding decrease in the supply of oxygen, to a point indeed which is dangerous. This fact has received recognition from some anæsthetists who use oxygen with the closed methods.

Haldane and Priestley's[1] work shows that the respiratory centre is so sensitive to carbon dioxide that a prompt effect is seen in the ventilation of the lungs when the percentage of the gas in the inspired air reaches unity. The following table gives examples of the results obtained by them upon a healthy man.

TABLE VI.

Carbon dioxide, percentage in inspired air	Average depth of respirations in cubic centimetres	Volume breathed per minute. Normal = 100	Average frequency of respirations per minute
0·79	739	111	14
1·47	978	137	13
2·84	1,154	191	16
3·73	1,330	196	14
4·84	1,662	245	14
5·48	1,845	311	16
6·02	2,104	631	27

[1] *Journ. Physiol.*, 1905, xxxii, p. 249.

A man inspiring 3 vols. per cent. of carbon dioxide notices the increased breathing thereby produced, but when he is at rest finds no discomfort; with 6 vols. per cent., however, there is generally distress, flushing of the head and neck, and headache.

The range of pulmonary ventilation in adults is about 4½ to 10 litres per minute. Ether in low concentration produces hyperpnœa, but in higher concentration a diminished ventilation of the lungs. A. L. Meyer[1] found that the percentage increase with 2·7 per cent. of ether was 20, with 6 per cent. of ether 29, and with 10·3 per cent. of ether a decrease of 4·7 per cent. Upon this increased respiration produced by ether Yandell Henderson has laid great stress in connexion with the theory that acapnia, or the washing out of carbon dioxide from the blood, is an important factor in shock and death under anæsthesia. It is probable that too much is claimed for acapnia and the use of closed methods, for the provision of a large percentage of carbon dioxide during rebreathing has introduced the danger of want of oxygen. The respiratory centre may be over-stimulated by the pressure of carbon dioxide and the effect of want of oxygen, whether the latter be produced by direct action or by acid products formed in the tissues. As already mentioned Bryant and Yandell Henderson noticed in the method which they recommend two or three cases of cyanosis out of seven administrations. Deeper breathing than is necessary means extra work thrown upon the nervous, muscular and vascular systems of the patient and has the disadvantage that larger quantities of ether may be taken into the alveoli of the lungs.

From the law of excitation it would follow that sudden variations such as obtain with the closed methods will produce corresponding changes in the depth of anæsthesia, and for the avoidance of reflex responses a deeper anæsthesia than is absolutely necessary will be maintained. With the open methods the mask can be kept on continuously; there will be no such sudden variations in the carbon dioxide and oxygen, and if the ether be dropped on regularly, or better, blown in as warm vapour, a steady pressure of this vapour can be maintained. Anæsthesia appears to depend upon a definite pressure or tension of the ether in the blood and tissues, and when the optimum tension is obtained, sudden variations above will introduce the danger of overdose, and those below will disturb the balance in the opposite direction.

[1] *Journ. Physiol.*, 1914, xlviii, p. 51.

It has long been known that lack of oxygen will produce anæsthesia, and there seems little doubt that, with the Clover method, it is often an accessory to the anæsthetic effect of the ether. In healthy individuals lack of oxygen of short duration may not be serious, but it is necessary to insist that the ideal is a free supply of oxygen. In a similar way an excess of carbon dioxide may not produce more than unnecessary respiratory and cardiac activity; but this, in patients with impaired resistance, may make the difference between success and failure.

We wish to express our thanks to the surgeons of Guy's Hospital for the facilities given to us during our observations.

DISCUSSION.

Dr. LLEWELYN POWELL: I rise to put in a word in favour of the much-abused Clover's inhaler, as I use it every day. But it is no more a truly closed method than is the gauze mask a truly open method. In my Clover's inhaler I have a "window" cut in the side of the tube which fits the bag on to the inhaler, and by pushing this tube in or out less or more air is given to the patient, who may thus be kept a good colour. In using the "open" method I am very keen on having a bottle that will deliver the ether in drops, so that the strength of ether vapour that the patient breathes is kept at a constant level. If relatively large quantities are poured on at infrequent intervals, you get a series of "accentuations" and a less smooth and satisfactory anæsthesia. So many and complicated factors go to the production and maintenance of anæsthesia that it is almost impossible to conduct any one administration as a scientific experiment.

Dr. Z. MENNELL: I do not wish in any way to appear to criticize the most interesting figures which have been put before us this evening, but I should like to ask Dr. Pembrey two questions: Was not the patient who was inhaling only something under 10 per cent. of oxygen very cyanosed with the closed method, and is not 1·8 per cent. ether a most remarkably small percentage with which to anæsthetize a patient when using an open method?

Dr. BLOMFIELD: I am anxious to get Dr. Pembrey's opinion upon the preliminary use of morphia in connexion with open ether. It has been recently stated by an American authority that the practice is bad because morphia depresses the respiratory centre, and that this effect should not be combined with the slight CO_2 of the open method, which has already reduced the stimulation of the respiratory centre. Clinically it has been my practice, and I believe that of many others, to value the use of preliminary morphia,

particularly when open ether is employed, because it makes effective anæsthesia more certain. Ought we to take into account this new fear of acapnia? In my own opinion acapnia, clinically, is a bogey, and lack of sufficient oxygen a much more constant danger.

Dr. PEMBREY (in reply): Dr. Shipway and I agree, as we have already stated, that the Clover, as used by experts, is not a closed inhaler. It is not clear, however, from Dr. Powell's remarks, how much air can enter by the "window." It is probable that, during the stage of induction there is a considerable reduction in the oxygen and increase in the carbon dioxide. Dr. Mennell has raised the question of cyanosis. That is a difficult question to answer, for a purplish colour may be due to congestion, and in typical cyanosis there is an ashen grey colour. Congestion is produced by an excess of carbon dioxide. Bryant and Yandell Henderson observed slight cyanosis with 8·35 vols. of oxygen. The percentages of ether mentioned by Hewitt and Legge Symes are 5 to 15 per cent. by weight, which, according to Connell, represent 1·99 and 6·38 per cent. by volume. In answer to Dr. Blomfield's question about morphia, it is necessary to point out that the open method used in our observations was not a truly open method, and there was enough carbon dioxide in the mask to act as a stimulant. In such a method acapnia is not observed.

Dr. SHIPWAY (in reply): Much of the confusion on the subject of acapnia has arisen from the different meanings given to the term "open ether." An advantage of the open method lies in the fact that a uniformly light anæsthesia can be easily maintained. The value of regular dosage is known, and is strongly impressed upon the anæsthetist when he uses the intratracheal insufflation method.

Section of Anæsthetics.

President—Mr. GEORGE ROWELL, F.R.C.S.

(*February* 2, 1917.)

Anæsthetics at a Casualty Clearing Station.

By GEOFFREY MARSHALL, Captain R.A.M.C., S.R.

SURGICAL operations performed at a Clearing Station are for the most part urgent. It is often imperative to operate on men within a few hours of their injury while they are still suffering from the effects of shock and hæmorrhage. The patients have had to travel some miles from the line by motor ambulance over indifferent roads, and many have been exposed to cold and wet. A correct choice of anæsthetic is of the first importance: the patient's life will be as much imperilled by faulty judgment on the part of the anæsthetist as by a wrong decision on the part of the surgeon. There are other cases in which the condition is rendered grave by sepsis, especially gas gangrene; but there remains the majority whose wounds are slight and whose general condition is good.

ANÆSTHETICS USED.

The methods of anæsthesia I have employed are: Ether and chloroform by the open method; ether and chloroform by Shipway's warm vapour apparatus; intravenous ether; spinal anæsthesia with stovaine; nitrous oxide and oxygen; local infiltration with novocain, &c.

Let us consider the choice of anæsthetic in the various types of cases. We will deal first with the lightly wounded, as they are both the most numerous and the least interesting. Our patients have not been prepared for an anæsthetic, so that when brought into the theatre the bowel is full and often the stomach as well. In winter months,

difficulty is further increased by the prevalence of bronchitis. A large proportion of the men have cough with expectoration. Autopsies on men who have died of wounds, even when they have had no anæsthetic, commonly show the lung tissue to be congested while there is excess of secretion in the tubes. In spite of these failings, the lightly wounded are good subjects for anæsthesia. They are for the most part young and healthy; they are placid, and have little fear of operation.

The work of a Clearing Station comes in rushes, so that for slight cases the main considerations are safety, speed, and convenience. The ideal anæsthetic is one with which induction is rapid, and recovery complete a few minutes after operation, so that the patient is in fit condition for early evacuation by ambulance train. Apparatus is subjected to much wear and tear, so it should not be complicated or delicate.

Of the anæsthetics I have used, gas and oxygen meets these requirements best. Its only drawbacks are that the apparatus is somewhat cumbersome and the materials costly. Local anæsthesia can only be employed in a small number of cases on account of the multiplicity of wounds and their lacerated and soiled condition. Ether remains the most generally used anæsthetic. The great majority of slight cases are anæsthetized by Shipway's warm vapour method. For induction the mixed vapours of ether and chloroform are used; the process is free from struggling, so that it is seldom necessary for an assistant to stand by the patient. It is rapid: in a hundred cases which were timed induction was invariably complete in five minutes. Anæsthesia is maintained with ether alone. There is an absence of secretion, and atropine is not given unless the patient has signs of bronchitis. Consciousness is regained quickly, and vomiting has occurred in only 26 per cent. of all cases, including abdominal cases. Since the warm vapour method was introduced in this Clearing Station last winter, the drop-bottle has passed out of use. Compared with the open method there is a saving of at least 60 per cent. of ether. There is much less diffusion of the anæsthetic into the atmosphere of the theatre. This is an important consideration to those working in it at times of sustained pressure.

Spinal Anæsthesia.

In choosing an anæsthetic for the more seriously wounded, the one overwhelming factor is safety. We require a method which will not be harmful to a patient suffering from the shock of injury, and one

which will minimize the shock of operation. It has been urged that spinal anæsthesia would meet these requirements and would therefore be of great value in military surgery. For men wounded in the lower extremities I found it a convenient and satisfactory method at a base hospital; cases of profound collapse did not occur. The same good results were obtained at a Clearing Station in all patients who had been wounded not less than forty hours before operation. Of the more recently wounded, however, more than half showed signs of cerebral anæmia with great fall of blood-pressure shortly after intrathecal injection of stovaine. These signs were pallor, nausea, retching, vomiting, and loss of consciousness. More rarely I have seen extreme restlessness, and in one case convulsions. The radial pulse disappears and the patient presents an alarming picture of collapse which may necessitate interruption of the operation. It has been stated that collapse during spinal anæsthesia is not dangerous. I have seen two cases in which it proved fatal, and have heard of a number of similar fatalities in recently wounded men.

It is to the man whose wounds are less than forty hours old, and who has lost blood, that spinal anæsthesia is dangerous. This is shown by an analysis of fifty consecutive cases of wounds of the lower extremities operated on at a Clearing Station under stovaine spinal anæsthesia. The drug was used in 5 per cent. solution, in most cases with glucose. A dose of 1 to 2 c.c. was given; when smaller doses were used anæsthesia was incomplete, or came on so slowly as to make the method impracticable at a Clearing Station. During injection the patient was placed in either the Barker or sitting position, head and shoulders were kept high for the first fifteen minutes, and then horizontal.

Of the recently wounded patients, by no means all collapse under spinal anæsthesia. It is important that one should be able to recognize beforehand which cases will tolerate this procedure. Is there any physical sign which will prove a reliable guide? The appearance of the patient is of little assistance, the pulse-rate and blood-pressure do not help us at all. A valuable indication is obtained by determining the concentration of the blood. The method I employ is to estimate the percentage of hæmoglobin in the patient's blood by means of a a Haldane hæmoglobinometer. This method is simple, sufficiently accurate, and only takes a few minutes to complete. A low percentage of hæmoglobin—i.e., dilute blood—in a man recently wounded, may be taken to mean that he has lost blood. Control observations on healthy

unwounded soldiers showed the normal range of hæmoglobin to be from 97 to 120 per cent. with an average of about 110 per cent. as against my standard indicator. In practice I find that if a recently wounded man has a hæmoglobin percentage of over 100, it is safe to administer stovaine intrathecally. If the reading is below 100 per cent. he will almost certainly show a serious fall of blood-pressure and symptoms of collapse. In these fifty cases the hæmoglobin percentage, blood-pressure, and pulse-rate were recorded before the injection of stovaine. After injection, blood-pressure and pulse-rate were registered at intervals of about two and a half minutes for not less than fifty minutes. The blood-pressure was estimated by means of a Riva-Rocci sphygmomanometer with stethoscope over the brachial artery.

We will divide the fifty cases into three classes:—

Class A.—Men operated on within forty hours of receiving their wounds, whose blood was dilute—i.e., hæmoglobin under 100 per cent.

Class B.—Men operated on within forty hours of receiving their wounds, whose blood was *not* dilute—i.e., hæmoglobin 100 per cent. or over.

Class C.—All cases in which a greater interval than forty hours had elapsed between wounding and operation, whether the blood was dilute or not.

In Class A—i.e., short interval cases with dilute blood—we have twenty-two examples. Of these twenty-two all but three showed symptoms of collapse after injection of stovaine. The average fall of blood-pressure was 57 mm. of mercury. In only three cases was the fall of pressure less than 35 mm., the greatest fall was 99 mm.

In Class B—i.e., short interval cases in which the blood was not dilute—there are sixteen examples. Of these sixteen thirteen showed no untoward symptoms whatever after injection. Of the remaining three one complained of nausea, and in the other two pallor was the only sign. The average fall of blood-pressure was 17 mm. of mercury, and the greatest fall was 33 mm.

In Class C—i.e., men wounded more than forty hours—there are six examples. None showed any symptoms of collapse. The average fall of blood-pressure was 19·7 mm., and the greatest was 35 mm.

If we divide the cases into classes according to the length of time which elapsed between reception of wound and operation, we find that, until we deal with intervals exceeding forty hours, cases with dilute blood suffer a big fall of blood-pressure, while the fall of pressure in cases with blood of normal concentration is less than half as great.

When the interval exceeds forty hours the fall of pressure in both types is small and about the same.

Interval	Average fall of blood-pressure in cases with: Dilute blood	Blood not dilute
1 to 10 hours	72 mm. ...	19 mm.
11 to 20 ,, ...	45 ,, ...	14·6 ,,
21 to 30 ,, ...	57·5 ,, ...	17·7 ,,
31 to 40 ,, ...	71 ,, ...	25 ,,
41 to 50 ,, ...	28 ,, ...	31·5 ,,
51 hours to 23 days	10 ,, ...	7 ,,

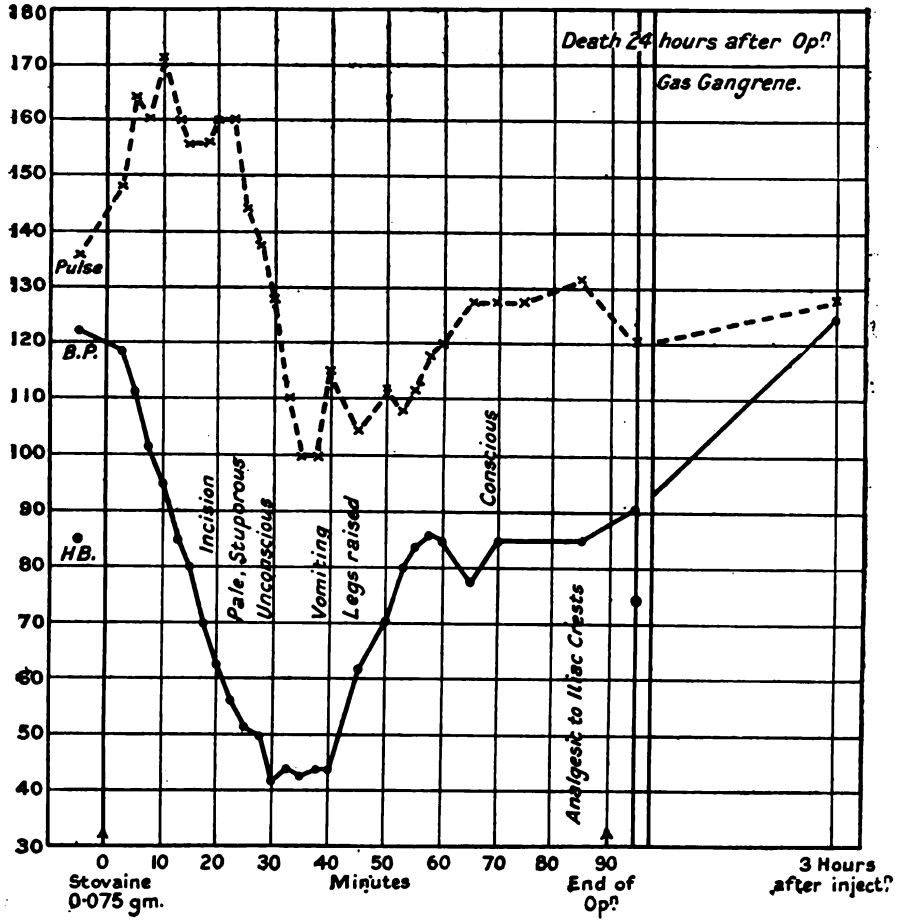


CHART I.

Spinal anæsthesia level 3 in. above umbo and buttock. Class A. Shell wound, leg, twenty-one hours; wounds excised and drained. Hæmoglobin, 85 per cent.; blood-pressure fell 81 mm.

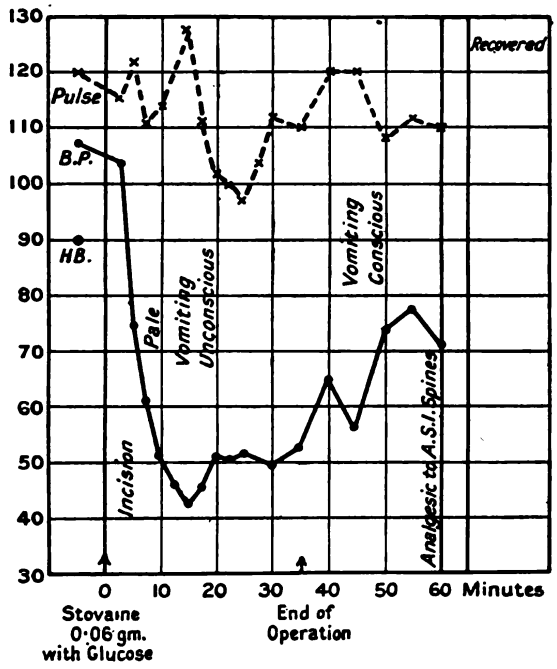


CHART II.

Spinal anæsthesia level umbilicus. Class A. Bomb wounds, neck and legs, seven hours. Left fibula fractured; patient's colour healthy; operation wounds excised. Hæmoglobin, 90 per cent.; blood-pressure fell 66 mm.

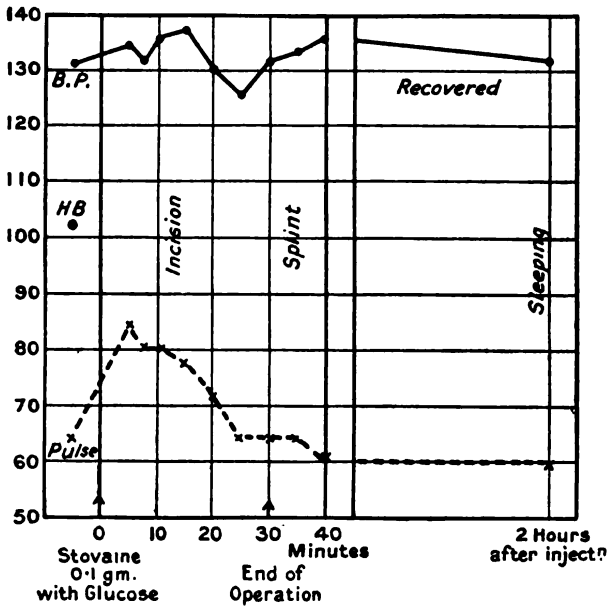


CHART III.

Spinal anæsthesia level iliac crests. Class B. Shell wound, thigh, sixteen hours; patient's colour healthy; wounds excised and projectile removed; symptoms *nil*. Hæmoglobin, 102 per cent.; blood-pressure fell 6 mm.

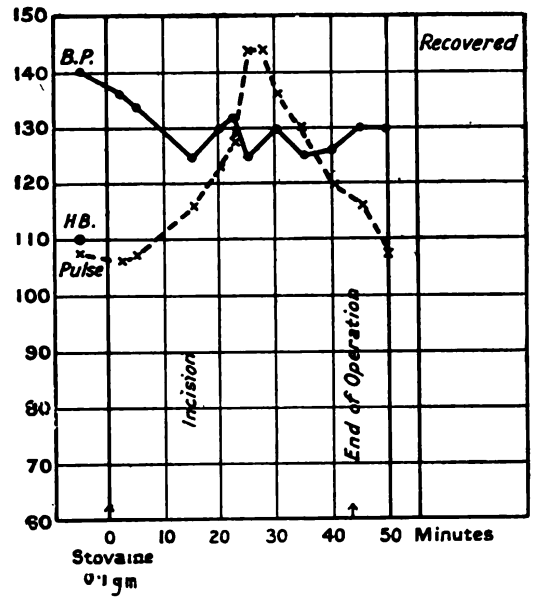


CHART IV.

Spinal anæsthesia level costal margin. Class B. Bomb wounds, buttock and thigh, twenty-one hours; patient's colour healthy; wounds enlarged and metal removed: symptoms *nil*. Hæmoglobin, 110 per cent.; blood-pressure fell 15 mm.

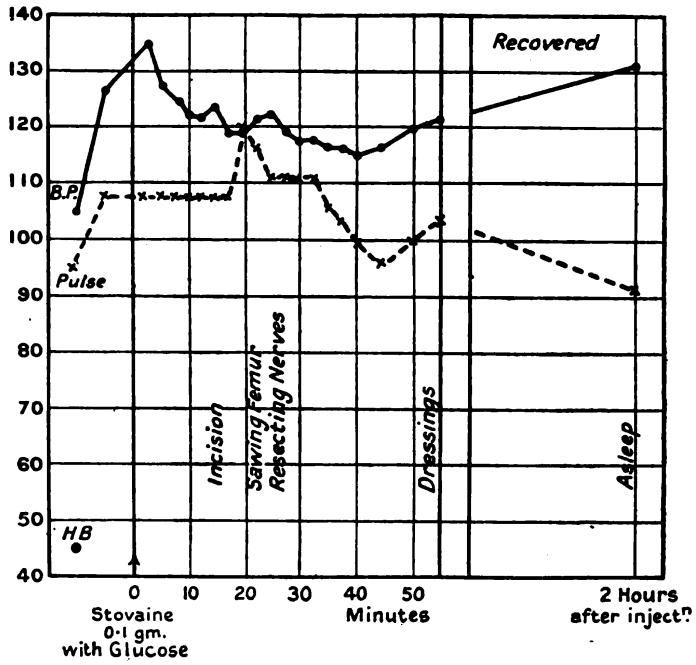


CHART V.

Spinal anæsthesia level 1 in. below umbilicus. Class C. Shell wounds, thigh and femoral artery, twenty-three *days*; temperature 102° F.; foot gangrenous; amputation lower third of thigh with flaps. Hæmoglobin, 45 per cent.; blood-pressure fell *nil*.

I said that neither the blood-pressure nor the pulse-rate indicate whether a recently wounded man is a suitable subject for intrathecal stovaine. We have seen that these cases may be divided into two classes according to whether the blood is dilute or not, and that these two classes react very differently to spinal anæsthesia. There is, however, little difference in the average initial pulse-rate and blood-pressure of the two types. Thus—

	Class A	Class B
Average initial blood-pressure ...	130 mm.	129 mm.
Range of ,, ,, ,, ...	90 to 182 mm.	115 to 150 mm.
Average initial pulse-rate ...	105	88
Range of ,, ,, ,, ...	70 to 140	64 to 140

As regards the appearance of the patient, some of those in Class A were obviously pale but many were not, although estimation of the hæmoglobin showed their blood to be dilute. These patients suffered collapse as profound as those in whom loss of blood was obvious clinically. The deduction I would draw from these observations is that stovaine should not be administered intrathecally to men who have been wounded less than forty hours, unless it has been demonstrated that their blood is of normal concentration.

Whether other drugs, such as novocain, would be equally dangerous I have had no opportunity of determining. We have found the heavy type of solution more satisfactory than that without glucose. The level of anæsthesia is more easily controlled when using the heavy solution. As regards fall of blood-pressure, results were about the same with the two solutions. The dose of stovaine varied from 0·05 to 0·1 grm., and within these limits fall of blood-pressure was not proportional to dose of drug. Some of the greatest falls of pressure were associated with the smallest doses of stovaine, and vice versa. Nor was the fall of blood-pressure proportional to the level of anæsthesia.

I will leave it to others to explain why men who have recently lost blood should collapse under spinal anæsthesia. Perhaps loss of blood is not the only factor. In secondary hæmorrhage there is loss of blood without shock of injury. Do these cases collapse after the injection of stovaine? I have no experience.

As regards prevention or combat of the collapse, the most important factor is position of the patient. Fifteen minutes after injection the head should be lowered, and it should be kept low for at least an hour. The practice of propping the patient up on his return to bed is dangerous. One patient in this series, who had no alarming symptoms

when in the operating theatre, was propped up on his return to the ward. He became blanched, pulseless, and unconscious. He recovered when the head was lowered, the legs raised, and pressure put on the abdomen. Another patient, whose head and shoulders were raised on his return to the ward, died straightway.

Subcutaneous injection of strychnine appears to be without value, both as a preliminary measure to prevent collapse, and subsequently in its treatment. Intramuscular injection of pituitrin proved useless in combating the fall of blood-pressure. Intravenous saline caused temporary improvement in the one case in which it was tried, but the blood-pressure fell again after one and a half hours, and the patient died. This last case was a man with a penetrating wound of the abdomen. Our experience of spinal anæsthesia for these cases has been limited and unfortunate. Three men with penetrating wounds of the abdomen were each given 0·07 grm. of stovaine. In each case the injection was followed by a great fall of blood-pressure, and death within a few hours. Lest you should attach undue importance to the personal equation, I should like to say that with spinal anæsthesia for appendicectomies our experience has been free from all alarms.

Wounds of the Limbs of Extreme Severity.

The type of case I refer to is the man suffering from shock. The wounds are recent, and one or more of his limbs are shattered. His face is pale, and the pulse flickering or imperceptible. Another characteristic of the badly wounded man is his low surface-temperature. If put to bed and surrounded with hot bottles his condition usually improves. The blood-pressure is taken every hour, and, if it is rising, operation is delayed. This delay must not be too long, or gas gangrene will supervene. The surgeon may be compelled to amputate a limb, and the anæsthetist is faced with a pulseless patient who has to undergo a brief but severe operation. The lives of many of these patients may be saved if correct procedure be followed. In the first place morphia should be withheld before operation, or given only in small doses. A recently injured man is particularly susceptible to further shock, and this susceptibility is greatly increased by large doses of morphia. It is my experience that a badly injured patient has a poor chance of rallying if he has received more than ¼ gr. of morphia before operation. If chloroform be used, the patient is likely to die on the table. With ether the patient's condition actually improves during operation, but

he will collapse an hour or two afterwards. If the ether be given intravenously, the patient's condition improves strikingly during administration, but there is profound collapse, which is often fatal, within the next two hours. The cause of death is not œdema of the lungs; in no case have I seen any evidence of this condition either clinically or at autopsy. In several cases there was œdema of the liver, and in one patient who died an hour and a half after intravenous ether the gut was œdematous from stomach to rectum.

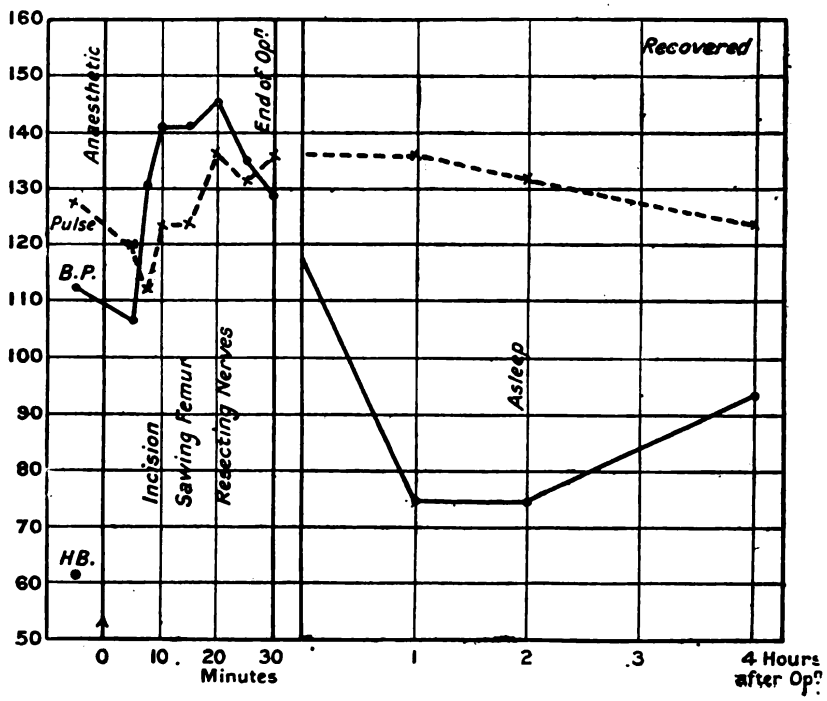


CHART VI.

Warm ether vapour and oxygen. Shell wound, leg, thirty-six hours; tibia shattered; amputation lower third of thigh; collapse during first two hours after operation.

Spinal anæsthesia is contraindicated, as I have already shown. Incomparably good results are obtained with gas and oxygen, and no other anæsthetic should be used for this type of case. Anæsthesia may be so light that the patient will move when nerves are resected. There is practically no evidence of shock from the operation, even when this is an amputation through the upper part of the thigh. In few of these cases has the blood-pressure fallen 15 mm., or the pulse-rate risen

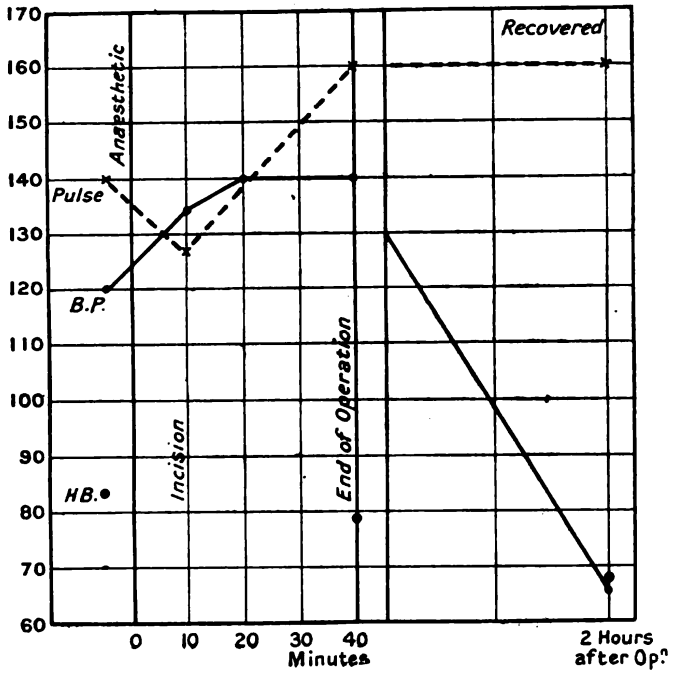


CHART VII.

Intravenous ether, 6 per cent., 45 oz. Shell wound, thigh, femur fractured, twenty-two hours; excision of wounds and drainage; bad collapse two hours after operation.

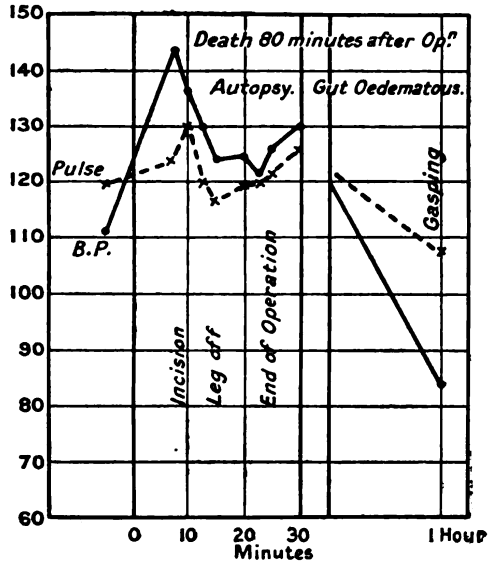


CHART VIII.

Intravenous ether, 6 per cent., 60 oz. Shell wound, leg, six days. Secondary hæmorrhage twelve hours before second operation. Hæmoglobin, 43 per cent. Circular amputation mid-thigh; collapse and death.

more than ten beats per minute. The patient is fully conscious five minutes after operation, and can literally "sit up and take nourishment." There is no collapse during the next few hours, and the subsequent progress is notably good. (*See* Charts VI, VII, VIII, and IX.)

There is another class of patient who is gravely ill but who is *not* suffering from shock—I mean the septic case. Early sepsis commonly takes the form of gas gangrene. In a typical case the patient vomits repeatedly, his face is of a pale muddy colour, his pulse feeble and running. In spite of this apparently desperate condition, such a patient is a much more favourable subject for anæsthesia than one who is suffering from shock.

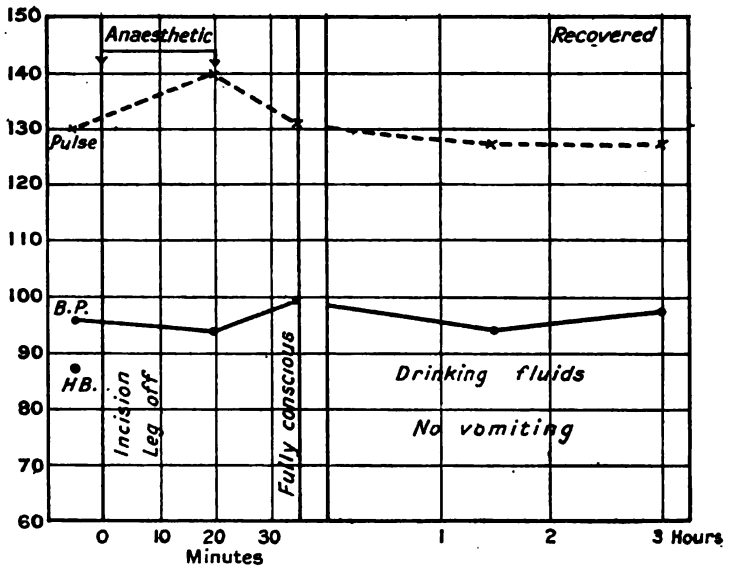


CHART IX.

Nitrous oxide and oxygen. Shell wound, thigh, twenty-one hours; lower end of femur smashed; patient pale and vomiting; circular amputation mid-thigh; no collapse, and practically no effect on blood-pressure or pulse-rate.

Intrathecal stovaine, which causes collapse in the recently wounded man, has no such effect on this same man some days later, although sepsis may have rendered his general condition much more serious. This same distinction is seen with ether anæsthesia, whether the ether be given intravenously or by inhalation. The collapse which occurs after operation on a man who is suffering from shock or recent hæmorrhage, is not seen in these later and septic cases. Some of the most

brilliant results have been obtained with intravenous ether; the improvement in the patient's condition, which occurs during administration, is maintained afterwards, and vomiting seldom recurs.

Gas and oxygen also gives excellent results. Chloroform is to be avoided: if this drug be used the man's blood-pressure will fall after operation, and he is likely to die within the next twelve hours. (*See* Charts X and XI.)

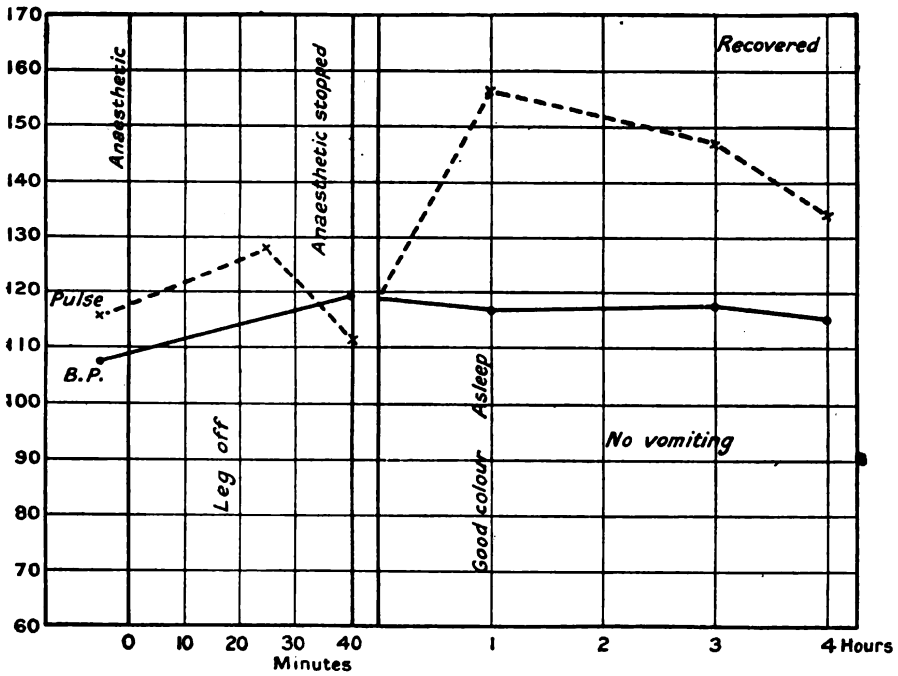


CHART X.

Intravenous ether, 7 per cent., 44 oz. Shell wound, both thighs, fifteen days; left thigh amputated, thirteen days; infection of right knee-joint and thigh muscles; temperature, 101° F.; persistent hiccup and vomiting; amputation lower one-third of right thigh with flaps; no collapse.

WOUNDS OF THE HEAD.

There is now general agreement that chloroform is a bad anæsthetic for head cases. Operation may be performed under local anæsthesia; all tissues of the scalp are infiltrated in a circle widely surrounding the site of incision. We generally use a 0·2 per cent. solution of novocain with adrenalin. No pain is felt even when bone or dura are dealt with. On the other hand, the forcible cutting of bone is disturbing to the patient, so that where mentality is unimpaired general

anæsthesia is preferable. Warm ether vapour is exceedingly satisfactory. The vapour is given by means of a catheter passed down the more patent of the two nostrils; thus the mask is dispensed with and the surgeon has a clear field. The ether is vaporized by passing oxygen through it. Breathing is easy and noiseless and there is no congestion, whatever the position of the patient's head, so that hæmorrhage is not unduly provoked.

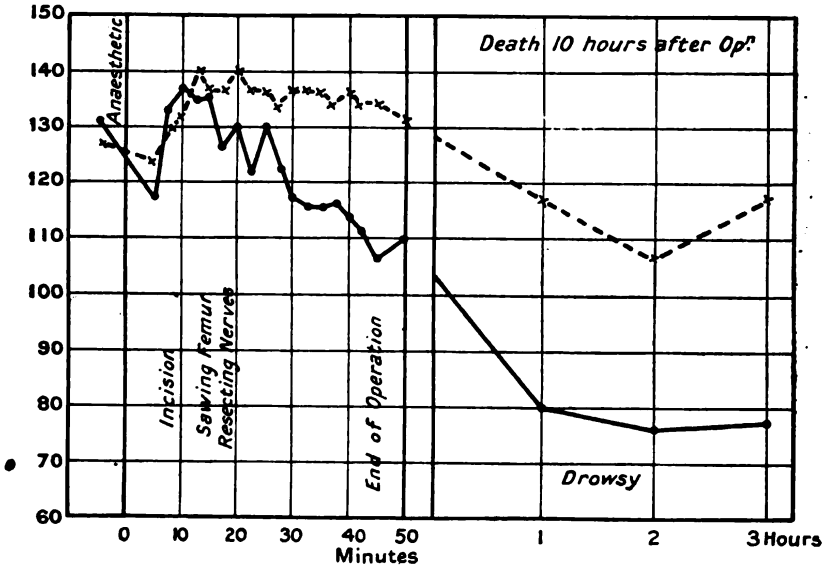


CHART XI.

Warm chloroform and oxygen. Shell wound, seven days, knee-joint infected. Late case, septic, but in fair condition; blood-pressure fell after operation (re-amputation lower one-third thigh) and patient died ten hours later.

WOUNDS OF THE ABDOMEN.

It is in this group of cases that the warm vapour method has shown to the full its striking advantages. The quiet induction, free from struggling, may save much loss of blood from wounded vessels in the peritoneal cavity. The easy breathing and diminished heat-loss leave the patient in remarkably good condition at the end of a long operation. With regard to heat-loss it is interesting to note that with warm ether vapour I have never seen the so-called ether tremor or shivering fit, which is commonly associated with open ether. The absence of vomiting makes it possible to give fluids by the mouth within two hours of the patient's return to the ward. Men with abdominal wounds are particularly liable to develop bronchitis, perhaps owing to the deficient

movement of the lower part of the chest. With open ether 54 per cent. of our abdominal cases had bronchitis after operation. With warm ether vapour the percentage has dropped to 14·7. These figures were obtained from two comparable series occurring in the same months of two successive years; only those cases were counted which survived operation more than forty-eight hours.

During the progress of an ether vapour anæsthetic, the blood-pressure shows a tendency to rise. If the operation involves much manipulation of gut and pulling on peritoneum, the pressure will fall. This fall, however, will be slow, and the process may be continued for hours without reducing the blood-pressure to a dangerous level.

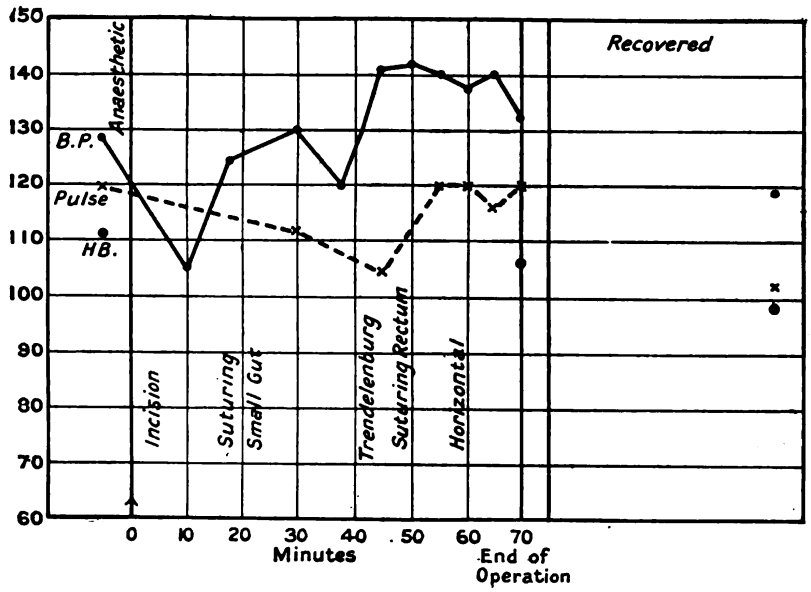


CHART XII.

Warm ether vapour and oxygen. Gunshot wound, abdomen, ten hours; patient pale; gut kept inside abdominal cavity during operation; operation suture of several holes in ileum and one in rectum; no fall of blood-pressure.

Exposure of gut outside the abdominal cavity produces a much more serious effect on the patient. If more than 2 or 3 ft. of gut are so exposed, after a few minutes the blood-pressure commences to fall rapidly and it continues falling until the gut is returned to the abdomen. This effect is seen when the stomach and omentum are exposed, and even with the great omentum alone. The covering of exposed viscera with pads soaked with hot saline does not prevent this effect on the

patient's condition. Nevertheless it seems probable that the cause is heat-loss from exposed blood-vessels. Exposure of gut produces much less effect on a man who is not under an anæsthetic. I have seen men arrive from the line with several feet of intestine prolapsed through a wound, yet their blood-pressure was within normal limits. In one case more than two-thirds of the small gut had been outside the abdominal cavity for at least four hours, yet this man's blood-pressure was 142 mm. of mercury and his pulse-rate only 108: the patient recovered. Surgeons should be urged to make large incisions and work as much as possible with the gut lying inside the peritoneal cavity.

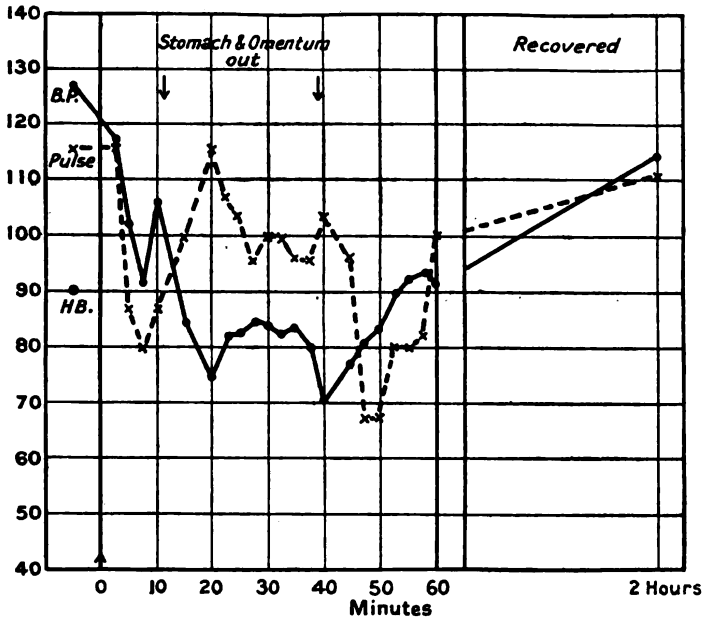


CHART XIII.

Warm ether vapour and oxygen; subcutaneous saline 1½ pints. Gunshot wound, abdomen, six hours; tear in liver packed; two holes in stomach sutured; stomach and omentum outside abdomen during operation; blood-pressure fell 48 mm.

Apart from copious hæmorrhage there is one other procedure which causes rapid fall of blood-pressure during abdominal operations. This is turning the patient on his side. The effect is produced only if the patient has been under the anæsthetic for a considerable time before being turned. At the end of an abdominal operation the patient may be in good condition; he is then turned on the right or left side, in

order that the surgeon may excise a wound in the back. In a few minutes there is a great fall of blood-pressure and the radial pulse disappears. It may be hours before the patient recovers this lost ground. The indication is that wounds of the back should be dealt with before laparotomy, as turning the patient has no ill effect during the first half hour of an ether anæsthesia. (*See* Charts XII, XIII, XIV, XV, and XVI.)

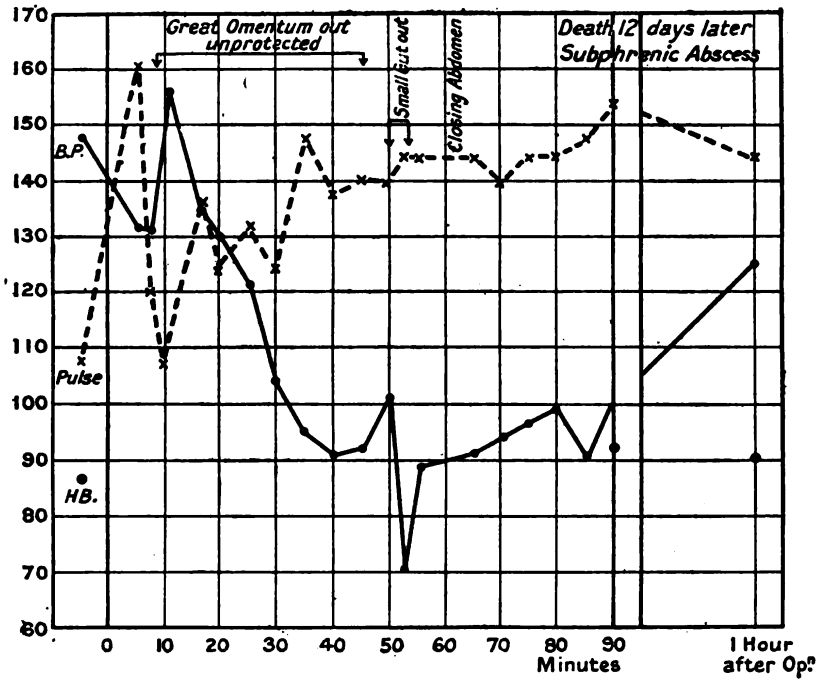


CHART XIV.

Warm ether vapour and oxygen. Gunshot wound, abdomen, arm, and chest, nine hours; hole in stomach sutured; great omentum only exposed outside abdomen; blood-pressure fell 55 mm.; further fall towards end when small gut was brought out; death at end of twelve days.

For abdominal cases I give oxygen with the ether vapour; no atropine is administered before operation as I have not been able to discover any advantage from giving it. Ether gives better results than chloroform in these cases. With chloroform the blood-pressure falls steadily, and if operation be prolonged the patient may die before the abdomen is closed, or shortly after. There is one type of abdominal case for which chloroform has advantages—this is the man who has a

penetrating wound of the chest as well as of the abdomen. Here ether cannot be used, as it will, in the majority of cases, provoke fatal intra-thoracic hæmorrhage. To these patients I now give hyoscine $\frac{1}{100}$ gr., atropine $\frac{1}{100}$ gr., and morphia $\frac{1}{6}$ gr., forty minutes before operation. This is followed by a minimal amount of warm chloroform vapour with oxygen. With this sequence our recovery rate has greatly improved in the chest-abdomen cases, while in the men who died there was no evidence of fresh bleeding into the chest.

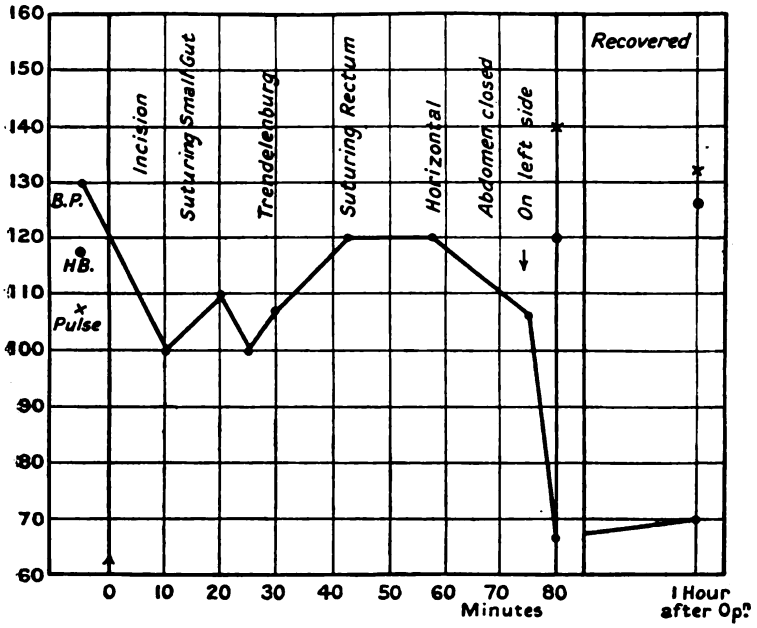


CHART XV.

Warm ether vapour. Shell wound, abdomen, two and a half hours; holes in small gut and rectum sutured; patient turned on side sixty-five minutes after commencement of anæsthetic; blood-pressure fell 30 mm.; patient remained pulseless for two hours.

With regard to fluids, it has been our practice to give three pints of normal saline subcutaneously during operation. For the collapsed cases this seems to be useless; they do not absorb the fluid. Autopsies on men who have died as late as thirty hours after operation have shown the bulk of the fluid to be still in the subcutaneous tissues near the site of injection. To these collapsed patients we give saline intravenously, towards the end of operation. Only a very temporary effect is produced on the blood-pressure if transfusion is completed in the early

stages of operation. I find that hypertonic saline raises the blood-pressure, slows the pulse-rate and dilutes the blood for a longer period than does the normal solution. I hope to give definite records illustrating this point at some later date.

In concluding I wish to acknowledge my debt to my commanding officer and to the medical officers of the Clearing Station to which I am attached. They have given me every assistance in making observa-

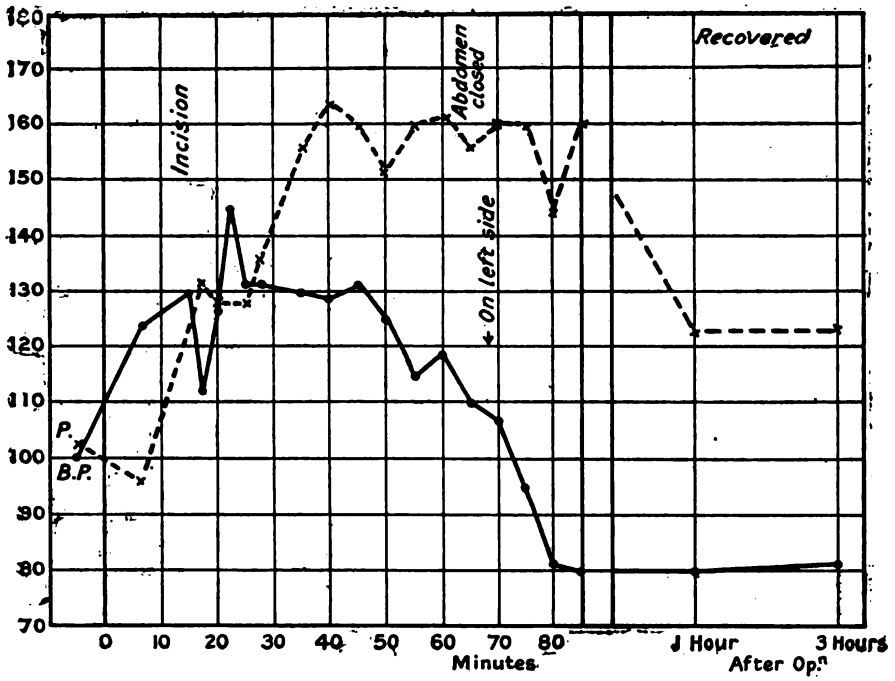


CHART XVI.

Warm ether vapour and oxygen. Shell wound, abdomen and leg; operation, suture of holes in small gut and colon; patient turned on side after seventy minutes of anæsthetic; blood-pressure fell 43 mm., and patient was pulseless for an hour.

tions on cases under their care. They have authorized me to say that they are in substantial agreement with the views expressed in this paper. I must add that our views on the choice of anæsthetic for the more difficult cases met with at a Clearing Station are subject to frequent revision. I welcome this opportunity of provoking criticism from those whose experience is so much greater than mine.

Description of Charts.

Explanation.

The continuous line with black dots represents systolic blood-pressure in millimetres of mercury.

The dotted line with crosses represents pulse-rate per minute.

The black dots represent hæmoglobin percentage (normal would be about 108 per cent. with my standard).

Scale for above three curves is marked up the left-hand vertical line.

The next vertical line marks beginning of anæsthetic.

The double vertical line on the right marks the point where the patient leaves the operating table.

Scale of time is marked along base-line. During operation it is marked in minutes, after operation in hours.

DISCUSSION.

Mr. Bellamy Gardner: Captain Marshall has shown us the effects and requirements of severe shock and hæmorrhage such as we can experience only to a slight degree in civilian practice. We must realize that the weak anæsthetics and gentle treatment needed in the presence of profound shock must not be advocated for wounded soldiers as we see them in home hospitals, where their health and muscular development render them amongst the most resistant types for anæsthesia.

Mr. H. E. G. Boyle: I believe that gas and oxygen, with a little ether when necessary, given by a Gwathmey apparatus, provide us with a better anæsthesia and more favourable after-state than can be obtained by any other method. I wish to know Captain Marshall's opinion with regard to patients who have been gassed and who subsequently take anæsthetics. In one such case a man who had been gassed some weeks before was given gas and ether and chloroform. Nothing abnormal occurred, but subsequently I was informed that he died on the third day and that his room smelt strongly of chlorine.

Colonel Hugh Rigby: My contribution to this discussion is merely the impressions of a surgeon and onlooker. Seeing many busy clearing stations I had good opportunities of judging the popularity and value of different forms of anæsthesia employed. Intraspinal, intravenous, and inhalation anæsthesia, all came before my eyes. The first was good in patients in fair condition with lower limb injuries; it was most convenient and economical in times of stress. Stovaine was always used and gave the best results combined with glucose. A case which showed the possible danger of ether infusion impressed me strongly, for the death which followed three hours after operation was

attributed to the cooling of the solution employed. I saw alcohol infused on one occasion only, and little was achieved beyond giving the patient, a German, a pleasurable sense of exaltation, much to the disgust of the anæsthetist. With regard to inhalation anæsthetics the choice was often difficult. The seriously wounded to be dealt with were of three classes: (1) Those suffering from shock due to injury and exposure; (2) those who had, in addition, suffered from severe hæmorrhage; (3) those who were the subjects of acute toxæmia from infection, usually with gas-forming organisms. A warmed ether vapour, with or without chloroform, was the popular anæsthetic, and those who used the method were of opinion that struggling, vomiting, and lung complications were diminished by its use. Gas and oxygen was absolutely invaluable in desperate cases.

Mr. H. TYRRELL GRAY: Captain Marshall associates the fall of blood-pressure during spinal anæsthesia with the degree of concentration of the blood. He has not made out a case strong enough to justify so definite a view. Blood-pressure readings at much shorter intervals are required. The stovaine glucose solution causes collapse more readily than Chaput's solution of stovaine in saline. There are many causes of collapse during spinal anæsthesia: firstly, *stovaine poisoning* from absorption of the drug through the cranial venous sinuses, which it reaches by diffusion in the cerebrospinal fluid; secondly, *cerebral anæmia*, which may be caused by mental disturbance, and by paralysis of the lower intercostal and abdominal muscles; thirdly, the suddenness with which paralysis spreads to the thorax and the consequent extent of the compensatory respiratory movements by accessory muscles. I believe the mental factor plays a most important part in the results observed by Captain Marshall and should like to see his observations repeated on cases in which spinal analgesia was combined with a liberal dose of morphia and some ether inhalation. I cannot agree with Captain Marshall's view as to the part that spinal analgesia may play in leading to gas gangrene. The period of low blood-pressure is too short to have such an effect, nor has it been shown that venous congestion predisposes to the onset of gas gangrene. Moreover, the lowest blood-pressures are by no means seen during spinal anæsthesia.

Captain MARSHALL (in reply): With regard to the administration of gas and oxygen, I use Hewitt's apparatus, which is the only one available. During induction I keep the valve at "four parts oxygen" and then gradually increase the proportion of oxygen, avoiding stertor and cyanosis. If there be a tendency to cyanosis when the valves are delivering the maximum proportion of oxygen, I cut out the gases altogether and give air. I have been fortunate in not having had any trouble with regard to vomiting into the respiratory passages. In only two cases have I seen alarming symptoms during administration; these cases were consecutive and were both men suffering from advanced sepsis. A distinguished anæsthetist has stated in one of the journals that gas and oxygen is dangerous in septic cases, and at first these two cases seemed to support that opinion. On investigation, however, I found that all

the oxygen inlets of my apparatus were stopped up by lubricating grease, and after clearing them I had no further trouble even in the septic cases. The President has stated that he has found that a preliminary injection of pituitrin minimized the fall of blood-pressure in spinal anæsthesia. I have not made use of the drug in this way but shall try it in future; I have only given it after collapse has occurred and then no beneficial effect is obtained. Mr. Tyrrell Gray says that the blood-pressure charts are of little significance and that only drum-readings are of any value. I agree that drum-readings are the ideal, but believe that pressure readings taken at intervals of a few minutes give a very useful indication of the effect of anæsthetics and operative procedures on the patient's condition. It is the general experience of all skilled physiologists that in a smoothly conducted experiment the blood-pressure readings proceed on an even curve, and that abrupt and wide oscillations do not occur except as a direct and transient result of some accidental factor which is of no significance in the general curve, and ought to be eliminated. If blood-pressure readings in the human subject are continually showing the wide oscillations that have been described by Mr. Tyrrell Gray, it would be almost inconceivable that not a single one of these high oscillations should have been caught in the hundreds of observations the results of which are exemplified in these charts. The fall of blood-pressure in spinal anæsthesia is attributed by Mr. Tyrrell Gray to psychic disturbance. This seems improbable, as excitement causes a rise and not a fall of pressure. Moreover, why should the fall of pressure occur only in those whose blood is dilute? Is it suggested that a low percentage of hæmoglobin indicates that the patient will undergo a psychic disturbance in half an hour's time? If the psychic factor is abolished by general anæsthesia, the fall of pressure is not prevented. My experience is that with combined spinal and general anæsthesia the fall of pressure is more profound than when either form of anæsthetic is used separately. I consider that the fall of blood-pressure is due to the action of the stovaine in blocking the impulses which maintain the tone of the peripheral circulation: when an inactive sample of stovaine is injected into the theca practically no effect is produced on the blood-pressure. With regard to shock in wounds of the thigh, I have not found this severe except in cases where the bones or vessels were involved. It has been suggested that the fall of blood-pressure which occurs when a patient is turned on his side is due to dragging on the mesentery and consequent afferent stimulation. This explanation seems far-fetched, it is even doubtful if the mesentery would be dragged on appreciably. Is it not more probable that the cause is an interference with the mechanisms of respiration or circulation? The absence of shock in amputations of the thigh under gas and oxygen anæsthesia makes one wonder whether "afferent stimuli" are not being given more than their due in the theories of Dr. Crile and Mr. Tyrrell Gray.

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SESSION 1916-17

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1917

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Section of Balneology and Climatology.

President—Dr. WILLIAM GORDON.

(*November* 9, 1916.)

DISCUSSION ON THE TREATMENT BY PHYSICAL METHODS OF MEDICAL DISABILITIES INDUCED BY THE WAR.

Opened by WILLIAM GORDON, M.D.

IN opening this discussion I shall make what I have to say as brief as possible, and mainly by way of preface. For my clinical war opportunities in this direction have been limited, and I am anxious to allow as much time as possible to those who have much more to tell you than I. If my remarks seem at first a trifle desultory, I trust second thoughts will acquit them of being unnecessary or inopportune.

I congratulate the Section on the distinguished list of speakers who are going to place their experience before us. I would thank them for coming, and I would also thank Captain McClure for the very great trouble he has taken—in the midst of many other duties—in securing them.

The title of our subject needs a short passing reference. As it differs considerably from that of our last discussion on war disabilities, it might be thought that in some particulars we had receded from opinions earlier expressed. There could be no greater mistake. The present subject-matter is only complementary to the former, and we are still discharging the duties which our carefully arrived at conclusions have imposed upon us.

Another point (which arises out of the personnel of the meeting) is one which intimately concerns the future of the Section. This meeting, as you notice, is not merely a London meeting, invaluable as London

meetings have been, not merely an English meeting in the pre-War sense. It is an English meeting in a new and truer sense which the War has brought home to us—a sense which ignores distance, however great, and recognizes only kinship. It is a world-wide England which must put its shoulder to the wheel in the coming toils of peace.

Now, when the War is over there can be little doubt that civilization will take a new step forward. Great movements of men for civilized purposes and removals of great national dangers have, in the past, preluded such advances. In such a forward move medicine must share, and our Section stands especially to gain from what are likely to be the new conditions. To recognize the flood tide is the first essential if we are not to miss it. New fields should be open to us, new help—if we seek it—forthcoming. It should be remembered that in climatology, dominated as its study is by physical conditions, problems which may be insoluble in one region of the globe may be soluble in others. We want widespread collaboration, with whatever new organization is necessary to obtain it. Above all, we want to enlist in our labours the rising genius of England Overseas.

We are also most fortunate in having with us to-day our distinguished confrère, Dr. Quiserne, Director of the Annexe to the Grand Palais Corps de Reéducation Physique in Paris, to whom we already owe so much of our knowledge of the methods there employed. It is of the greatest importance to us that he has been so good as to take the trouble to be present. May I venture to say that we welcome him not merely for himself, not merely for the great value of what we shall learn from him, but as one of that great and gifted nation, with whom we hope for closer ties and wider interchange of thought from the present time onward.

Lastly, coming to our immediate business, the War has brought to us a vast number of new and interesting cases; nerve cases, functional and organic; heart cases, chiefly neurocardiac and myocardiac; so-called "rheumatic," "myalgic," "fibrositic", disabilities; so-called "trench-feet"; so-called "trench nephritis"; for many of which some measure of physical treatment has proved of remarkable value. We are happy in having those present who can speak authoritatively on each and all of them. There is no doubt that to many of us, in the therapeutics of the War, physical methods have taken an unexpectedly high place. Whilst we in no way depreciate the value of drugs (some of which, like salicylate of soda, seem to me to have been less used than they should have been), we must recognize that there are a

considerable number of cases which, having resisted medicines, have been greatly benefited by physical means.

I would like to mention a simple form of appliance from which, in cases like sciatica, or the severe leg pains following so-called "trench fever," I have gained the most valuable help. It consists of a metal shade, with a thirty candle power carbon lamp, fitting to an ordinary electric light junction. I had it made by one of our orderlies at No. 1 Hospital in Exeter whilst waiting for our Dowsing installation. A patient suffering from trench fever had not slept for nights without morphia. After ten minutes' use of this lamp he was much better, and after six such daily applications he needed no more hypodermics. I am now using a similar lamp for an obstinate case of sciatica at the Devon and Exeter Hospital, with immediate and remarkable benefit.

Another useful means of treating obstinate "myalgic" cases is an imitation Droitwich bath, if I may call it so—i.e., a hot bath of brine, 6 oz. to the pint, in which the patient remains about twenty minutes. But it does not suit certain cases, of whose exact characters I am not yet sure.

I have not used the whirlpool bath for medical cases. Its frequent superiority to radiant light and heat in cases of traumatic disability is incontestable.

One word in conclusion is unavoidable. I think it is nothing short of a calamity that—be the cause what it may—it has proved so difficult to gain a far more rapid comprehension (so badly needed in the interests of our sick and wounded) on the part of the profession generally of the immense benefit disabled men can derive from physio-therapeutics. The responsibility for this calamity does not lie at the door of the Royal Society of Medicine.

Dr. Quiserne.[1]

Let me first of all discharge the debt of gratitude I owe you when you did me the very great honour of admitting me to the ranks of your Foreign Corresponding Members. Circumstances had not until to-day permitted me to express this gratitude to you personally, and I hasten to seize the opportunity you offer me this afternoon to tell you how deeply I feel the honour you have done me, and are now doing me, in inviting me to share in your labours. I am at the same time both

[1] Director, Annexe of the Grand Palais Hospital, Paris.

proud and happy—happy especially—if my French colleagues and I, in bringing you the results of our physio-therapeutic researches, have been able to assist you in alleviating the sufferings of your countrymen, who are uniting their efforts so valiantly to those of our soldiers for the common triumph of those principles of liberty and right which we two allied and friendly nations are defending.

In the remarkable report drawn up last year by our colleagues Dr. Fortescue Fox and Dr. J. Campbell McClure, upon the work of the physio-therapeutic ward at the Grand Palais and the results obtained therefrom, these gentlemen pointed out to you that there was neither originality nor novelty either in the methods used or in the employment of apparatus, but only in the manner in which the latest physical agencies were turned to account. "The value of the practice at the Grand Palais Hospital consists, therefore, not in the novelty of the elements employed, but in the skilful adaptation and combination of physical agencies in dealing with the effects of wounds. By associated and successive treatments daily repeated—including heat, moisture, massage, electricity and movement—it is claimed that a different and more lasting effect is produced than can be obtained either by the same agencies singly or by any other form of treatment."

This combination of the actions of the latest physical agencies, whose value and importance you have so well understood, still continues to be the actual basis of your method. The results obtained, those already known to you and those which we are getting at the present moment, are the results obtained not only in the physio-therapeutic ward of the Grand Palais, but in all the affiliated departments of this hospital, and in all the other physio-therapeutic wards of the military government of Paris. This method of application is the invariable rule.

Practice and experience have possibly caused us to look upon certain applications of physical agencies as being more useful and more indispensable than others, but still we are bound to state that, of all the physical agencies employed, and of all the methods of application, there is not one that is useless or harmful, if it be applied with discretion and with good apparatus.

We have continued to make great use of baths of warm running water, and the results obtained have been so encouraging that the number of "eau courante" baths given as 2,124, has in five months been greatly increased, and in identical proportions both at the Grand Palais Hospital and at other establishments.

In the department under my charge at the Institute Zander, in the Rue d'Artois, for practically the same number of wounded treated, the treatments by bathing in running water have increased by 10 per cent. those of the preceding year. For my own part, and from what I have been able to see in the other physio-therapeutic wards of the hospitals, I consider that this method gives the most satisfactory results in all cases where trophic lesions persist as a consequence of prolonged suppuration. You can judge from this how large a field is open for the employment of this procedure, which is now in routine use in all the physio-therapeutic departments of the hospitals of the entrenched camp of Paris.

Encouraged by the results obtained from ordinary spring water by the simple application of a raised temperature combined with movement, we may well ask ourselves if thermal waters used in the same manner and with discrimination might not give even more satisfactory results. Within the military zone of Paris we had at our disposal only one thermal establishment, the sulphur springs of Enghien. Dr. Jean Camus, head of the Physio-therapeutic Departments of the Military Government of Paris, who had been struck by the results obtained from the employment of the local baths with running water, had a special compartment for local baths fitted up in the physio-therapeutic wards at Enghien, thus completing the hydro-therapeutic installations already existing, and I know that the results came up to his expectations. It is therefore important that we should utilize these methods on a wider scale in the different thermal stations, and ascertain by means of carefully chosen chemical observations whether the effects of the thermal waters, in conjunction with those already noted as regards ordinary water, would not give yet better results, as was the case at Enghien. This past summer, moreover, a number of physio-therapeutic wards have been doing good work in the various thermal stations of France, and Dr. Durand-Fardel, to whom fell the task of inspecting these departments, expresses himself in his report as highly satisfied with the results obtained in the various spas where they had been at work.

In the report addressed by Dr. Camus to the members of your Committee in the month of December, 1915, he makes use of the following words: "I have nothing but praise for the treatment by means of warm water, and above all by running warm water, of wounds received in the War." This is the verdict of every one of us in all the physio-therapeutic departments under our charge.

I have made a point of speaking at some length upon this question of baths of running water, because I know from conversations that I have had the pleasure of having with some of you, and from the discussion that you started last year upon the subject, in consequence of Dr. Gordon's communication, how much it had attracted your attention and how greatly it had interested you.

The increased use of hydro-therapeutic applications has had its corollary in the increased use of thermo-therapeutic applications, of the simple hot-air bath as well as of the light bath. I have noted in the course of my practice excellent results from combining the two methods of the dry heat bath following upon the running water bath. It appears as if the use in succession of these different elements of treatment prepares the tissues better for the other operations of massage and of mobilization (that is, the restoration of mobility by manual or mechanical means), with which we follow them up. In joint stiffness, centred in the suppurating forms of arthritis of the different joints, the effect of wounds caused by bullets or shell splinters, by the use in combination of dry heat, treatment by running water, and gentle manual massage, I have obtained really remarkable results, which have encouraged me to persevere along the same lines. I will not tax your patience by the recapitulation of clinical observations, but in several cases of joint stiffness, the effect of pionæmic arthritis of the knee, I have seen the angle of flexion pass in a relatively short time from 138° to 60°, and even to 48° in such cases, in spite of the severity of the lesion.

The question of massage and of manual mobilization has been one of the hardest for us to solve, on account of the large number of wounded requiring treatment and the small number of specialists in these lines at our disposal. Perhaps, with the admirable hospital staffs that you have at your command, this question has not presented such difficulties to you. As for us, we have tried to find a remedy, as suggested by Dr. Camus in his report on the work of the Grand Palais Hospital, by creating as far as possible a specially trained staff of hospital workers. We have succeeded to a certain extent, and thus manual mobilization holds once more in our branch of the medical service the place of importance that it had only lost from the want of skilled operators. There is no doubt whatever that manual mobilization is the method of mobilization that should be preferred, provided it is carried out under proper conditions.

In our different departments the importance of mechano-therapy

seems to have diminished in proportion to the improvement in our skilled hospital staffs. I am telling specialists like yourselves nothing new when I remind you of the prejudice that many surgeons have against all methods of mechanical mobilization. Personally I consider that this prejudice is often justified, the surgeon not knowing how to apply the mechano-therapeutic apparatus. This method of mobilization is a two-edged sword which, wrongly used, may yield the most deplorable results. The choice of the method, and hence even the choice of the apparatus itself, is therefore of the first importance.

When Dr. Fortescue Fox and Dr. Gordon did me the honour of visiting my ward in the Rue d'Artois, I was able to show them a complete mechano-therapeutic installation, but the great expense necessitated by such apparatus is often out of proportion to the limits of other ordinary military physio-therapeutic installations. During the War the only important and indispensable instruments consist, in my opinion, of active or activo-passive apparatuses. In the case of all these instruments, even if one does not arrive at perfect results, one always feels certain that there will be none of those unfortunate results liable to follow the use of purely passive apparatus when it is entrusted to more or less experienced hands. Preference must therefore be given to active apparatus that has undergone careful experimentation. Those of the series which you have introduced in the Physical Clinic in London are based upon the same method as those of Zander, and have given the best results.

I have now passed in review before you the improvements that we have thought it right to effect as a consequence of experience acquired in the practice of methods which have given us the highly satisfactory results with which your delegates have acquainted you. My next task is to discuss the new methods by which we have been able yet further to lessen the percentage of those incapable of work amongst a large number of wounded and above all, amongst the very seriously injured.

Struck by the results which methods of active mobilization, manual as well as mechanical, had given us in the case of our wounded, we were led to seek to cultivate in them every opportunity for active mobilization. The physio-therapeutic depot having been reorganized during the month of March, and the patients in course of treatment having been mustered according to the nature and the region of their wounds in different groups in the depot, we succeeded in organizing, under medical supervision, a methodical course of training for each group by appropriate games and gymnastic exercises which were quite

independent of the regular hours of treatment. Quite appreciable results were obtained immediately, and, as regards our more slightly wounded, they were able to leave the hospitals much sooner than would have otherwise been possible. These games and exercises had the advantage of occupying the wounded and of renewing their desire for movement and giving them confidence in themselves, and also of submitting them again to the influence of military discipline. It was with this idea that, at the end of March last, we decided upon the creation of a so-called training company for all who had completed their course of treatment, to which all those who would soon be fit enough to rejoin their depots and resume service could be sent.

Being thus subjected to military exercises and gymnastics identical with those in use at the barracks, but graduated and supervised by a doctor, these convalescent wounded undergo a methodical course of training, and thus we have been able to send them back to the Army in a better condition and fitter for the harder physical drill of the depots. At the same time the ceaseless medical supervision to which these men were subjected made us better able to judge of their degree of fitness, and, if necessary, to dismiss them from the training company if they were manifestly not yet capable of the services required of them.

The good results the methods of training of which I have just been speaking had given us, in the case of wounded on the road to recovery, led us to consider whether it would not be possible to find in manual work a means of active mobilization. We thought that this system might have the advantage of occupying the wounded more satisfactorily, so that those who, owing to the serious nature of their disabilities, might come to look upon themselves as hopeless invalids, unfit for any work whatever, would be endowed with the certainty that in spite of their infirmities they could, within certain limits and with the aid of certain rational adaptations, resume their trade or learn a new one which would again supply them with a means of subsistence.

In order to realize this object Dr. Camus sought to establish at the Grand Palais a centre for professional re-education, in the same building as the physio-therapeutic depot. Having enlisted the interest of a committee of enlightened philanthropists, which had been founded in Paris under the title of "The Union of Foreign Colonies for the Professional Re-education of the Wounded," he was able to put his scheme into execution, thanks to the generosity of this Committee.

Schools were started at the Grand Palais, workshops for small

mechanical objects, carpentering, shoemaking, cabinet-, frame-, and soap-making, hairdressing, industrial design, &c., and under the medical direction of Dr. Vallée and the technical direction of M. Ascher they were soon in full swing. Having been placed under medical supervision, the wounded undergoing treatment, who are generally men who have been badly injured, whose course of treatment is bound to be long, or who have serious and definite disabilities, make their choice of the workshop they wish to enter, after a medical commission has decided whether they are capable of undergoing the manual exercises of professional re-education without danger. After they have been admitted they work under the direction of foremen chosen from amongst the wounded, and selected for the post by skilled professionals on account of their suitability, and the Committee of the Union of Foreign Colonies, in order to encourage and interest them in their work, allots them a salary which, although a very small one, is one of the reasons why this institution has been such a brilliant success. Indeed, owing to the methodical and active training entailed by manual work, we have seen our patients getting better more rapidly, and the average percentage of their incapacity diminishing still further; so much so, that this setting up of schools for professional re-education side by side with the centres for physio-therapeutic treatment appears to us at the present moment to be practically a necessity. It is the almost inevitable complement of the treatment, the cure of the mental and moral, as well as the bodily hurts, of the wounded, in order that the sufferer's self-confidence may be restored to him. These institutions are, therefore, a work of necessity from a social as well as from a medical point of view, since, whilst helping the doctor to reduce the nation's expenditure, they renew at the same time the self-confidence of the wounded, and prove to him that he is still capable of supplying his own needs without being a burden to himself and to his neighbours. But one point upon which we must insist is the need for attentive and incessant medical supervision. Personal observation, and the results obtained from the Training Schools for Re-education in France which are not medically supervised, absolutely confirm this idea. The results of re-education without medical supervision, and apart from military supervision, seem to us to have given percentages inferior to ours.

In this question of professional re-education we have always endeavoured to arrange that the new occupation chosen by the wounded man who is forced to give up his former calling should resemble, as far

as possible, that which he has been obliged to abandon. For instance, in the case of a man who has been an ordinary carpenter, and who has been rendered incapable in consequence of his wound of continuing to follow this trade, we should try to make him a joiner or a cabinet-maker, so that he should profit by experience already acquired. This has proved easy as regards artisans, but less so in the case of agricultural labourers and all kinds of workers on the land. As we did not wish to see this category of the wounded forsaking the country and coming to swell the numbers of workers in factories, thus increasing the depopulation of the countryside, it became necessary to do for them what had been done for the town workers and create for them a centre of professional agricultural re-education.

This centre has now been set up at Juvisy, near Paris. Thanks once more to the unwearied generosity of the Committee of the Union of Foreign Colonies, the centre, which works in conjunction with a physio-therapeutic ward and a physio-therapeutic depot, is actively carrying on its labours at the present moment. In the space of a few months Dr. Camus, assisted by the members of the Committee of the Union of Foreign Colonies, has founded a depot capable of accommodating several hundreds of wounded, and a physio-therapeutical department exactly like the one at the Grand Palais. This department, in which are to be found all the apparatus required for the application of methods of treatment in use at the other centres of physio-therapy, may be cited as the type of centre to be installed at a minimum expenditure. In fact, at a cost of 12,500 francs, it has been found possible to fit it up with electric apparatus, apparatus for hydro-therapeutic and thermo-therapeutic treatment, for massage, mobilization and mechano-therapy, capable of being used for about 500 wounded, all workers on the land by profession. The less seriously injured of these, who take up work in the fields under medical supervision, hasten their cure by means of the active mobilization to which they are subjected; others more seriously injured and incapable of carrying out the heavy work of the fields will specialize in less fatiguing occupations (bee-keeping, arboriculture, market gardening on a small scale, breeding, dairywork, &c.). From results so far obtained we are convinced that we shall get results as marked and interesting from this agricultural re-education as have already been yielded by the professional re-education of artisans.

I am hoping that my very imperfect *résumé* of what we are doing in this new line that we have taken up, will have interested you in the

FIG. 1.
Wounded soldiers at Juvisy (near Paris).

FIG. 2.
Agricultural re-education of wounded soldiers at Juvisy (near Paris).

work we are carrying on. For we are firmly of opinion that in this most absorbing question of the physical treatment of wounded soldiers, we should aim at everything that can stimulate and set in motion the will to get well. What we have been seeking, then, have been the purely medical methods which have given us the results you know of, and we are now persuaded that the school for professional re-education, side by side with the physio-therapeutic centre, is as necessary as this branch of the medical service itself.

The lowering of the figure of incapacity for work, obtained from the treatments in the case of each wounded soldier, has varied from 20 to 30 per cent. for those who have been cured and who have left our hospitals to take their place in the ranks once more. The figure for men who have been sent into the auxiliary army, that is to say, who have been recognized as unfit for campaigning purposes, has varied from 15 to 20 per cent. The figure for invalided men, that is to say for the mutilated or seriously wounded, has varied from 8 to 10 per cent., and this is the one which has shown the greatest increase in comparison with previous reports since the opening of our schools for professional re-education, for before that it used to be lower than 8 per cent. Time has not allowed of my giving you, in this connexion, the statistics of the saving effected by this lessening of incapacity for work, but it exceeds the figure of £80,000, which would have been given you as last year's record of improvement.

Finally, the figure for those completely restored to health has remained about the same, and varies from 60 to 80 per cent. in the different wards of the Grand Palais Hospital. In the department under my charge, where I have only officers in my care, and where the average degree of incapacity is 15 per cent. higher than in the wards where the men are treated, the average of cures has remained the same as last year, between 51 and 52 per cent., 269 out of 500 wounded treated in one year having gone back to their military duties, and nineteen only having been invalided home. As regards the others, 172 were still undergoing treatment at the time that the statistics were drawn up, and forty-six, although unfit for campaigning work, had been given employment in the depots or in the various headquarters services of the Army zone.

Such, gentlemen, are the results that I have been able to bring before you; they confirm those communicated to you by your delegates, and they show the necessity for departments similar to those that we have now inaugurated, supplemented by schools for professional and

agricultural re-education. The experience we have acquired has led us to remark that centres in which 500 to 600 wounded are treated are more feasible, under ordinary conditions, than such vast centres as the Grand Palais, and that the results in these hospitals, from the point of view of the returns, are perhaps even more satisfactory.

Captain D. A. CLARK, C.A.M.C. (Granville Canadian Special Hospital, Ramsgate).

Before entering into a discussion of the work of the Medical Service at the Granville Canadian Special Hospital, it might be well to explain that before entering the Granville Hospital all our patients have had treatment from two or three months to a year or more in other hospitals. They have reached a stage of persistent chronicity, resisting treatment, and have been passed on from hospital to hospital until they reach the Granville, many of them in an antagonistic mood, with little faith in medical treatment, or, as is the truth in the case of not a few, they have become quite reconciled to hospital life and comforts, and are quite prepared to remain there for the duration of the War, realizing from much experience, that if they still adhere to certain well tried symptoms such as pains in the back, headaches, nervousness, &c., the medical officer is more or less powerless in their presence. Thus one can safely say that a large percentage of the cases which come under medical service at the Granville Hospital are amongst the most difficult with which to cope. The Granville Hospital is, however, unique amongst the hospitals of the Canadian Service in that it has special facilities for the treating of such cases, a short description of which may be interesting.

A complete outfit of therapeutic apparatus of the very latest pattern has been installed, some twenty rooms being solely devoted and equipped for the various branches of treatment. In the department of electro-therapy the following are employed: galvanism, faradism, ionization and ionic medication, the sinusoidal current, high frequency, auto-condensation and the electro-water bath, the "eau courante" bath, the needle and shower baths, the water massage bath, the plunge bath, and the Scotch douche. The radiant heat—local and general—radiant light, and the blue arc light, are employed in light and heat methods. These treatments are given, as a rule, along with and in alternation

with massage. In this department there is a staff of eighteen masseuses and masseurs, to one of whom the patient is definitely allotted and who treats the case throughout under the supervision of the medical officer in charge. There is also provided a complete high-power installation for radiography and screening. In addition to this there are what may be termed the educational departments, consisting of the gymnasium, the light duties and workshops, the athletic sports, and the indoor recreations. The gymnasium is provided with a complete equipment of the standard and with some very original mechanical devices for the special education of the individual muscle groups. The patient is placed under trained instructors under the personal supervision of a medical officer, and enters one or more of the special classes, or undergoes general exercise or Swedish drill. In the light duties the patient is encouraged to undertake some work suitable to his disability and agreeable to his personal inclinations. He may choose the ordinary hospital light duties such as clerical work, ward duties, &c., or take a position in one of the departments of the arts and crafts—the machine shop, carpentering, cabinet work, wood carving, cigarette making, printing, tailoring, cobblery, saddlery, market or landscape gardening, &c.

In athletics, all sports such as baseball, football, tennis, cricket, field sports, &c., are encouraged and where possible made compulsory. For these excellent facilities are available in the large private grounds at Chatham Annex. In addition to this there is a large recreation room, with fully equipped stage, devoted to the use of patients, where concerts are given nightly and the patients are encouraged to take part.

Apart from its therapeutic value, the educational department makes the hospital largely dependent on its own supplies, the splints, surgical appliances, and a large part of the gymnasium apparatus, are constructed by the patients, and the carpentry and cabinet work, electrical and motor repairs, &c., are carried out by them. In this way the patient's interest is diverted from himself, his aches and his pains; he is happier and more contented, and his recovery is all the more rapid.

The medical officers in charge of the various departments keep in close touch with the patients and materially assist the Consulting Board of the hospital by their weekly report on each patient, and in their disposal of the cases. It is rather remarkable to note what importance symptoms, practically forgotten on the athletic field or in the workshops, suddenly assume when the patient presents himself for examination.

The cases of the medical service at the Granville Hospital may

be roughly divided into shell shock, including all functional neuroses, whether due to shell explosion or not; true nerve lesions; and general cases such as myalgias, neuritis, &c. Fortunately I had access to a paper, written by Major Colin Russel just before he sailed, dealing with certain psychogenetic conditions from shell shock arising out of a study of sixty cases at the Granville Hospital. Upon this I shall largely draw in dealing with this most interesting and valuable phase of the work done under his supervision. In the study of these cases I had the privilege of being associated with him.

The term "psychogenetic," as used by Major Russel, includes those cases of shell shock exemplified by monoplegias, paraplegias, mutism, localized muscular spasms, myoclonus, &c., and while not dealing with all cases of shell shock, does include a most important class from an economic view-point, for if not recognized and cured, these patients would remain indefinitely disabled, an expense to their country, and entitled to receive large pensions. The disability in all is purely mental. Some are probably malingerers, but it is by no means easy to prove this in actual practice. Some give a history which points to a certain amount of deception at the beginning of the disability and only later, and apparently by a process of auto-hypnotism, become genuinely convinced of their disability. Although these cases are admitted with a diagnosis of shell shock, this is not the main factor, as many have not been exposed to shell fire, nor had any personal contact with shell explosion.

In his series of sixty, Major Russel found that the time these cases had spent in France averaged 2·8 months, and excluding eight patients who spent a fairly long time in the trenches, the average was reduced to 1·9 months. This means from the time they left England, and not necessarily much of it was spent near the front trenches. It appears then that this is not the type of case that stands punishment well. In fact, the not unusual history is that they gave out under the first serious bombardment. It is a significant fact that the wounded are practically immune from shell shock, that functional neuroses are amongst the rarest of the conditions found in surgical patients, in view of the fact that the wounded must necessarily have been exposed to the effects of shell explosion to as great or a greater degree than the unwounded. Only eight of the patients in this series received a wound and only two of these patients might be considered in a sufficiently serious condition to necessitate their invaliding to England. The disabilities in the rest were of a trivial nature.

To recognize the true cause of the disability in these cases, a thorough examination is, of course, necessary, particularly a systematic examination of the nervous system, to exclude with absolute assurance any organic lesion of the peripheral nerves, cord, or brain, as it sometimes happens that the functional symptoms are superimposed on a genuine organic disability. It would appear that this examination is often neglected, as although in this series the patient had been disabled an average of 126·6 days before being admitted to the Granville Hospital, in most of them the cause of disability was still unrecognized. When one compares this with the length of time spent in the Granville Hospital, which averaged fifty-eight days, and when one realizes that this time was not taken up with curing these disabling symptoms—in fact, in all, with some half-dozen exceptions, the actual disability disappeared in from fifteen minutes to two hours—but in teaching the patients to recognize and correct the underlying mental process which had permitted such a condition to exist, one must readily see that there is here an opportunity for considerable economy.

Of the total of sixty in this series, 71·4 per cent. were recommended as fit for full duty, 16·1 per cent. for temporary base duty, and 12·5 per cent. to be discharged from the Army; these last, not on account of any gross disability, but rather on account of their inherent mental make-up unfitting them for military service. In the great majority of cases one is able to exclude any organic disease; the patient receives this assurance, and the nature of the case is stated to him frankly. As a rule he promptly jumps to the conclusion that he is suspected of malingering, but this idea can readily be dismissed with a little sincerity and tact on the part of the medical officer. With the absolute conviction that there is no organic lesion, exhortation and the firm assurance to the patient that he can be cured if he will, often brings about a flicker of movement and finally complete control. But frequently one seems unable by any amount of reassurance or reasoning to incite the patient's will to action, and it is then necessary to introduce a sufficient incentive for the patient to move the limb. It is not difficult to create the necessary incentive; all that is needed is a strong, unfamiliar and unexpected stimulus. This results in a reflex withdrawal of the part before any cerebral inhibition can step in to prevent it, and the patient having once seen the limb move at his own initiative, soon takes control of it. It is surprising what can be accomplished, even in cases in which, as in our experience, the paralysis has lasted as much as sixteen and even twenty-two months. In a case of the last

mentioned duration the patient had developed complete paralysis of the arm, following a slight flesh wound sustained in the retreat from Mons, and had received a pension for one year. Within half an hour he had recovered the use of his arm and hand so completely that he could catch a heavy object thrown to him quite readily. Another patient when admitted had complete paraplegia for sixteen months. He had suffered from mutism, associated with paralysis of all four extremities as a result of shell shock. He recovered his voice shortly, and a few months later the use of his arm as a result of hypnotism, but apparently the hypnotist could not influence the legs, for they remained completely paralysed and anæsthetic up to the hips and the muscles were flabby and considerably atrophied from disuse. Within one hour from the commencement of the first treatment he could walk, and the following day was out walking on the promenade after sixteen months in bed.

The tremulous cases of shell shock, whose outstanding feature is a general lack of emotional control, and who readily suffer a relapse or exacerbation of symptoms after any excitement or fear, and who cannot stand loud noises, who complain of headaches and dizziness, loss of memory, &c., can quite readily be seen to be analogous to those with loss of self-control, as in the type of case we have been discussing. But we can readily recognize the great difficulty in demonstrating to these patients that they can control themselves if only they will. This difficulty has not been satisfactorily overcome, but by the aid of the soothing and psychic effects of hydro-electrotherapy and general massage, teaching the patient to relax his muscles, and getting him interested and occupied in some form of light duty in the workshops, the deep-cut mental impressions of his terrifying experience become dulled by the superimposed impulses of healthy thoughts and interests, and rarely fail to give marked relief.

As a matter of interest I have made a study of the number of treatments given and a dissection of the four classes of discharge: (*a*) to full duty, (*b*) to light duty, (*c*) as permanently unfit, (*d*) transferred to other hospitals, for the months of June, July, August, and September, with the following results. The number of treatments given in the various departments during these months average 21,742 per month, including in massage an average of 5,974 per month; galvanism and faradism, 1,183; ionization, 467; electric water baths, 478; radiant heat and arc baths, 1,087; "eau courante" baths, 2,556; high frequency, 412; temperature-contrast baths, 229, &c., &c. During this period there were 1,470 patients discharged from hospital, 756 of

whom went to full duty, 281 to light duty, 269 were discharged as unfit for further service, and 112 transferred to other hospitals. In an attempt to classify these I have arranged them as follows:—

Disease or injury	Total discharges	Duty	Light duty	Unfit	Transferred
Amputations	150	0	1	37	112
Arthritis, including joint injuries...	365	199	84	81	1
Nerve lesions and contractions ...	328	148	116	63	1
Shell shock	259	180	33	45	1
Myalgia	100	65	18	17	0
Nerve disturbances secondary to febrile diseases	88	68	7	12	1
Miscellaneous	180	96	22	14	48
Total	1,470	756	281	269	164

The total number of hospital days for these patients averaged seventy-two days. But it must be pointed out that this large number is chiefly due to: (*a*) the large number of nerve lesions requiring prolonged treatment; (*b*) the large number of amputation cases awaiting to be fitted with artificial limbs, and undergoing training for the use of the same; the average number of days for those that are ultimately discharged during the months as unfit being ninety-two days, for light duty one hundred and twenty-two days, and for full duty fifty-eight days. The percentage of these various classes to the total discharge from the opening of the hospital in November, 1915, to August 31, 1916, may prove interesting: Admissions, 2,783; discharges, 1,973; discharged to full duty, 1,284 or 65 per cent.; discharged to light duty, 288 or 14·6 per cent.; discharged to Canada as unfit, 161 or 8 per cent.; transferred to other hospitals, 240 or 12·6 per cent.

Dr. KING MARTYN (Bath).

From the commencement of the War to the present date 2,220 invalided soldiers have been treated by the healing waters of Bath. Of this number 1,390 have been treated in the Royal Mineral Water Hospital and the remainder by the kindness of the Corporation at their bathing establishment, free of all charges. These soldiers have come from several institutions—the Red Cross Hospitals and the Bath War Hospital and the three hospitals for officers—Lady Dudley's, Lady Strathcona's and Lady Eva Wemyss's. The average period of treatment has been about five to six weeks.

At the Mineral Water Hospital our work has been greatly increased by the absence of five of the staff with the British Expeditionary Force. We have had to cope with the hardest type of cases, men who have already been treated in many hospitals before coming to Bath. Some of them have been in as many as seven different hospitals in Great Britain. It is very rare for us to get a case fresh from over-seas. Hence the cases may be roughly divided into the very chronic and intractable—the frankly incurable—the true malingerer and the unconscious malingerer. For these reasons the work has not been very edifying but that results are obtained is evinced by the fact that of the 1,390 cases 1,180 have been discharged "relieved," being able either to rejoin their units or perform munition or other work. The cases run through the whole gamut of those diseases of "rheumatic" nature produced by damp, cold and injury—fibrositis and perineuritis are the most numerous. A large proportion occur in men who have been sufferers before the War from some such disease or diathesis which has recrudesced owing to the conditions in which they are placed. The treatment has been carried out in the new and well-equipped baths of the hospital which embrace every form of hydro-therapy together with all forms of electrical treatment and wet and dry massage. The Corporation also have most generously thrown open to the hospital their very complete Zander Institute.

The Bath War Hospital, which was opened in the spring of this year, is not intended for the treatment of "rheumatic" cases and others of that type. Here we get surgical and medical cases straight from the British Expeditionary Force. A few cases have been sent to the Corporation Baths but as the hospital is one and a half miles from the Bathing Establishment the difficulty of transit and the risk of chill negatives the treatment of many such cases. Through the generosity

of a Bath resident—Mr. Cedric Chivers—the hospital is now in possession of a very complete establishment for the treatment of soldiers who, after injuries and so on, have developed wasted muscles, stiff joints, painful scars, in consequence of injuries received. This department, of which I take charge, comprises whirlpool baths made by Shanks of Birmingham, radiant heat baths, every form of electrical treatment and a very complete and carefully planned Zander Institute, a great many of the instruments having been made by the Engineer of the Corporation Baths. Besides this treatment the men play football, quoits, skittles, and a game called spiro-pole, which gives free play to the arm and shoulder muscles and of which they never seem to tire.

With regard to the various forms of treatment the procedure is much the same as one has been following for the last twenty years in the case of civilian patients, the only difference being that we are much hampered by the shell shock element producing the unconscious malingerer, and by the fact that whereas the civilian is, as a rule, most anxious to get back to his work, many of these poor soldiers do not, or cannot, co-operate with the physician. From an extended experience we, at the Mineral Water Hospital, have found the following forms of treatment most beneficial: (1) The deep bath at 98° F. with the deep douche under the water, (2) the Aix and Vichy massage douche baths, (3) the alternating Scotch douche, (4) the local steam Berthollet baths, (5) the radiant heat baths followed by douching and massage, (6) ionization and galvanism, and (7) mesmerism. With regard to mesmerism, I do not think the good results of it can be over-estimated in cases of shell shock. Men who have returned with shattered nerves and waking nightmares of the War have, under the suggestive treatment of our psychologist, Dr. Lavers, been able to sleep and recover their equanimity without recourse to drugs.

The particular disability to the treatment of which I would like to refer is "trench foot." Already there are signs that we are to be faced with a plentiful crop of these cases this winter. A convoy arrived at the Bath War Hospital this day at 1.30 a.m., and out of 120 cases, fifty were men suffering from "trench foot." Most of these men had been invalided from the trenches on November 3. The cases presented much the same features as those with which we have now become familiar—the intense hyperæsthesia of the sole or dorsum of the foot—the patchy anæsthesia and the occurrence of some trophic sloughs of the skin. From a long experience of these cases we find that the same treatment is not applicable to all, but taking the majority of cases

it seems that in the early acute stage it is best to paint the feet with methyl salicylate, cover them with a thin sheet of cotton wool, and keep off the pressure of the bed-clothes with a cradle. As the acute stage wears off we have found that radiant heat and gentle faradism and the Schnee bath do good. Massage, until all acute symptoms have quite subsided, undoubtedly aggravates the symptoms. Personally, I should be glad to hear of any improvements in the technique of the treatment of these most troublesome cases from other members who may have had large experience of them.

Sir JOHN COLLIE, M.D.

The discussion this evening on the treatment of medical disabilities due to the War by physical methods would be incomplete unless reference were made to the mental attitude of the patient and to the personality of those who treat him. Massage, for instance, without suggestion, and physical exercises without the patient's will being brought to bear on them, are useless. Thus it is found that gymnastic exercises performed to the accompaniment of music have not the same value as those where, in its absence, the attention is concentrated on each movement. Useful work, however simple, which co-ordinates groups of muscles, is found to be much more rational and useful than ordinary gymnasium exercises. A carpenter, for example, with a stiff wrist and fingers, the result it may be of immobilization of the hand and forearm for many weeks, is most likely to make a rapid recovery if he is submitted to a short course of vigorous passive movements and is then encouraged to do some simple work to the nature of which he is accustomed; brain, muscle, and nerve co-operate with amazingly satisfactory results.

In the treatment of neurasthenia and functional neuroses the personality behind the treatment is much more the determining factor than the treatment itself. Hence it is that some doctors, masseurs, and nurses are successful in luring their patients back to a healthy mental state, whilst others, adopting the same methods in similar cases, fail time after time. In no case can any method be successful unless the physician has confidence in the line of treatment he is pursuing, and is able to inspire his patient with hope. It is fortunate that psychotherapeutics had become an established method of treatment before the

commencement of the present War. The chief feature of neurasthenia and the results of high explosives is a loss of control by the higher nerve centres over the lower centres. The condition in the main is of mental origin, and therefore requires psychological treatment. The extent of the disability rests not so much on the amount of shock sustained as upon the personal equation of the sufferer. All people with a neuropathic heredity are potential neurasthenics. The essential remedies for neurasthenia are those which alter or adjust the mental attitude of the patient towards his condition and his environment. Even in the absence of organic disease there is always in the neurasthenic a profound mental impression of invalidism which is very real to him, to which he naturally clings as the passport to that sympathy which he thinks he requires, and which, in the absence of psycho-therapeutic treatment, may last for many months. The sooner the patient is convinced he is going to recover, the sooner will he do so. If in treating functional paralysis, say of the arm, we demonstrate to the patient that the muscles are still alive, by any means, as, for example, electric stimulation, and that therefore there is obviously no irreparable paralysis, the patient is convinced when he *sees* the muscles move. Soon a slight voluntary movement follows, and progress towards recovery is continuous and marvellously rapid. The function of the conscious brain of our waking hours is recognized by everyone, but that of the subconscious brain, which never sleeps, is not fully appreciated. It is, nevertheless, a very real factor in our mental processes.

One of the methods recorded by Crile in treating of "Shockless Surgery" consists in cutting off afferent impulses from the operation site by means of hypodermic injections of a local anæsthetic in *addition* to the administration of general anæsthesia. It has been found that by preventing painful sensations reaching the brain, even in the unconscious state, the brain is less disturbed and recovery less eventful. It is by subconscious cerebration we are inspired by ideas, that names and facts are recalled. It is on this phase of consciousness that suggestion acts, and it is in this way that we must influence the character and conduct of those unfortunate soldiers whom we are called upon to treat in such large numbers for neurasthenia and shell shock. Suggestion finds a very legitimate place in the treatment of this class of case. Fixed ideas can often be replaced by suggesting others of a more hopeful and cheerful character. Drugs are generally useless; indeed they may be harmful, for the patient is apt to pin his faith on them to the neglect of the necessary mental effort of making an "optimistic inventory of

his mentality." In this particular class of case I am an advocate of psychotherapy by persuasion, and believe that success to a large extent depends upon how skilfully this is applied both to the symptoms and to the moral make-up of the individual.

It should never be forgotten that much time and suffering will be saved if from the very first a careful watch be kept on the beginnings of introspection. Contrast this method with the line of treatment as indicated in a note which I received from a doctor, who had under his care a man suffering from a very mild form of neurasthenia, produced by nothing more serious than a check to his ambition: "He drank the thermal water activated with added radium; he had the incandescent light, followed by the static wave to the spine and foot, and some packs of mustard bran over the liver and stomach; and I gave him a purin-free dietary. I also made application of the electric cautery over the cervical ganglia of the sympathetics." I stopped this nonsensical treatment, and sent the patient back to work, which he has done continuously and well ever since.

The hypersensitiveness and neuralgias of the neurasthenic are evidence of the bankrupt condition of his nervous force. His hypersensitiveness prevents his turning a deaf ear to the increased beating of his heart, the sagging movements of his intestines, and various other normal sensations which healthy people ignore. In his case, however, these bodily stimuli fill the field of his consciousness, and it is no wonder that he is convinced he is seriously ill.

I believe that to treat so-called concussion of the spine, functional contractures, hysteria and neurasthenia which are the result of morbid mental processes, by physical means, not only fixes the idea more firmly in the mind of the soldier, but localizes the disease.

It is always difficult to induce men of the working class to ignore what are merely abnormal sensations, for their education is very incomplete and their perspective with regard to themselves blurred. Delay in return to work, introspection and self-pity demoralize when the work habit has been broken. Those suffering from functional nerve disease are too often at the mercy of the unhealthy environment of their own homes where their symptoms are inevitably reinforced by the sympathy of their friends. Temporary residence and the calm, monotonous life of the country, with outdoor agricultural work, is an ideal condition for those whose nervous systems have not yet fully recovered their balance, and I believe much good could be done if the Statutory Committee would keep a register of farmers in those localities where the

accommodation and the environment is suitable, who would temporarily accommodate convalescent neurasthenics. These people command our sympathy, though we must not show it. They insist on viewing themselves in the wrong perspective, and their mental vision is distorted. They see but a partial aspect of their own case. Even healthy people are apt to look at things from a purely personal point of view. Groups of thought run along the line of least resistance, and every repetition makes the trodden path more passable. In the neurasthenic these to some extent become automatic and are reproduced with but a trifling stimulus. The neurasthenic conjures up memory pictures so persistently that the repetition becomes a habit.

Cases of psychic neuroses, of which we now see so many, would be reduced in number, and their character would be less severe, if it were appreciated that the fundamental and underlying cause in all cases is psychic in origin. We have all heard of the young ladies who complain of their complete inability to take ordinary walking exercise and who genuinely believe it, but who admit to dancing many hours of the night, sometimes two or three nights in the week.

Men do not suffer in the same way as animals. The human race adds to its physical pain evil forebodings and a vague dread of future permanent incapacity. Many men invalided out of the Service are unconsciously haunted by an apprehension of re-conscription, which, although it dominates them, is scarcely recognized as fear. They are ignorant of the fact that without an Act of Parliament nothing of the kind is possible.

I believe this pre-occupation of our patients—often unknown to us—is directly connected with retarded recovery, and is in some cases the starting point of obsessions which are so intractable to treatment.

Major BLACK, C.A.M.C. (Command Depot, Heaton Park, near Manchester).

In the remarks I propose to make, it would be a guide to me could I know whether those present possess general knowledge as to the nature, the origin and the modes of treatment at a Command Depot.

The PRESIDENT: I think that but few people possess this knowledge.

Major BLACK: In that case, if I were to put into a few sentences what a Command Depot is, it might explain much that has already been so excellently said.

I have been fortunate enough to see the first stage of our cases in France, that is, last year, and the second stage in the hospitals all over the kingdom during part of this year, and now it has been my good fortune to reach the third stage of the cases. The least interesting stage, I am sorry to say, is in our hospitals in France, because there we get the men straight from the trenches, covered with mud, and inside three weeks we say "Good-bye" to them, and we never know whether our results have been good or whether they have been bad, or what the subsequent history has been. In the hospitals in England we have the opportunity of seeing the results in a vast number of interesting cases. But of those cases about which you have had such extremely interesting information from those who have spoken before me, you do not see the conclusion, for now they go to that admirable institution, a Command Depot. A Command Depot is a place to which soldiers from the hospitals of the kingdom are sent when they have reached a certain stage; for example when their wounds are sufficiently healed, and they are then able to lead the life of a soldier in a hutted camp, and they require certain definite treatment, together with appropriate outdoor exercises. I have visited other Command Depots but I am personally concerned with that at Heaton Park, which is 4½ miles to the north of Manchester. The arrangements there will give you an idea as to what treatment can be applied, as to the class of cases which go there, and as to what cases should be sent there and what not. We have there an admirable Mechano-therapeutic Department. The ingenious appliances which exist there were instituted by my predecessor, Major Tait McKenzie, who has now returned to the United States. Captain Barclay assisted him in that work. Of some of those you have heard this evening. They consist of mechanical appliances to deal with practically every condition, whether affecting joints or muscles or any other part of the body resulting from injuries received in this War. We have, of course, an Electro-therapeutic Department, and you have heard details of the appliances used in it; ours do not differ materially from those used in other places except perhaps in their being more extensive. The mechanical appliances of which you have heard, which are in use in the Canadian Special Hospital, are very similar to those we possess. We also have a Hydro-therapeutic Department; you have heard something this evening about hydro-therapeutics and it is with regard to the results we have obtained there from one special method that I wish to lay some facts before you. We also employ massage, and it will interest

you to know that I, personally, have found the blind soldiers who have been trained as masseurs absolutely efficient and satisfactory. That I take to be due to two facts: first, that magnificent sense of touch which the blind in every case develop sooner or later; and secondly, and more essential still, what seems to exercise a considerable influence on the patient—and you have heard the psychological aspect described by the previous speaker—the blind masseur concentrates his whole mind on what he is doing, and it is obvious to the patient that he is doing so. One can watch this mental effect, which is a very material one. I prefer a blind masseur.

Now when we come to a meeting like this I think we all come with the hope that I myself entertained when I came this evening, that someone will not only tell us something we do not know, but also something which will be useful to us in our own work. I shall try in the course of my remarks to suggest one or two points from my experience in this War, which I trust may be of some little use to those of you who are kind enough to listen to me.

First of all as to the kind of cases which are taken into a Command Depot. The list is so long that it would save your time and prevent my wearying you, were I just to tell you the kinds of cases which should *not* be sent to those depots. The cases which ought not to be taken in there are cases that require special treatment other than that to be mentioned. For instance, what is the good of sending to us, as some of my professional brethren persist in doing, cases of perforated drums with a purulent discharge from both ears, the men being deaf as well? What can we do with such a patient in a Command Depot? That is one example. What, too, is the use of sending to us cases of serious valvular disease of the heart without compensation, or cases of albuminuria or chronic bronchitis? From those examples you will see what are suitable and what are unsuitable cases for our treatment. The work done in a Command Depot bears a relation to what I have told you, plus a most elaborate, carefully designed and carefully worked out system of physical training under medical supervision, combined with the military side of it, such as route marching, extending from what is called very light route marching, that is to say less than a couple of miles at the men's own pace, up to 12 to 14 miles with a good load, that is full route marching.

The advantage to be gained at the Command Depot—and this may induce you to send us as many of the right sort of cases as you can—consists in the men leading a healthy outdoor life, and we take

care that they have as much of that kind of life as it is possible to let such cases lead during the day. The point I want to bring before you, which is really the whole object of my speaking at all, is to beg those of you who are in charge of hospitals not to put into practice, and to banish from your minds, that now historic phrase "Wait and see," in relation to these cases or a large proportion of them. Please do not wait because you will not see. Instead of doing that please send them to a Command Depot. The one trouble I have in life in dealing with those cases—and this has been particularly alluded to by Dr. Quiserne who spoke of his experience in France—is that many of them have been kept too long immobilized, for then all the mechano-therapeutics and all electro-therapeutical measures fail to succeed.

You have this evening heard of the psychological type of neurasthenics, the shell shock cases, the cases of disordered action of the heart. When we get those cases early enough we succeed in a percentage which would astonish you if I were to give you the figures. But if we get them later, when they have been dragging along under every imaginable kind of treatment in other hospitals, and I may say particularly auxiliary hospitals, we naturally fail with them.

We have at Heaton Park an installation which we call the pool bath. Our large pool bath takes twelve men. It is about 3½ to 4 ft. deep, with an immersed seat running round it, and the heat of it is maintained at 92° F. to 93° F. The room in which it is placed is but dimly lighted, and it is absolutely quiet. Cases of shell shock and disordered action of the heart we leave in that bath for about an hour at a time. A trained hospital orderly is in attendance, and he enjoins silence. At the end of the hour's immersion they dry themselves and are put into rest rooms, where they are supposed to remain for an hour. Many of them are subjects of insomnia, and we find that in this rest period after the bath a large proportion of these fall asleep. And we let them sleep on if they will. Our experience of the pool bath—and I should like to see it installed in many other places—is that, in the case of disordered action of the heart, the heart's action becomes steadier day by day. But we find that it takes us longer to get the heart steady enough than we thought it would—that is to say, nearly four weeks on the average. Then we place the man, experimentally at first, according to the degree of progress he has made, either upon remedial exercises, very carefully graded, or upon our full scheme of light physical training. Our experience is that these hearts remain steady if the men do the exercises gradually. During October we have

managed to get nearly one-third of our cases up to full physical training, which, as I think you know, is a very heavy physical exercise indeed. And we have succeeded in sending back to the firing-line—not merely for garrison duty abroad or at home—about four cases out of every thirty of disordered action of the heart where it was clearly functional. If we get these cases of shell shock and disordered action of the heart early—and you have heard some interesting facts about them—I am quite convinced—and Dr. Radcliffe, my Medical Officer in charge of that department is as convinced as I am, for he has done admirable work on the subject and kept careful records—that we can succeed in sending 90 per cent. of them back to duty. But they should be sent early to a Command Depot and not kept in your own hospitals. We may be undue optimists in that matter, but that is the conviction which has arisen in our minds as a result of our experience in the last few months. It is new, but we have kept careful records.

Another method to which I should like to allude is the "Eau courante." One speaker alluded to trench foot. Where our other methods have proved unsuccessful in troublesome cases of trench foot, the method of which he spoke is the one I have used all along, and in the earlier acute cases in France I used to employ nothing but methyl salicylate as a local application. But if further treatment is required we employ the "Eau courante," particularly with compressed air and a turbine, to the exclusion of other methods if they can be avoided. You will find that in trench foot this treatment will yield astonishingly good results, so that the patients will be able to do light route marching and physical exercises within four weeks.

With regard to the sort of cases which should come to us quickly but do not, may I, as a physician, now say something to the surgeons? If surgeons would only abandon the craze for immobilization for long periods, they would save me using, every day of my life, words not to be found in the dictionary. In every case sent to us by surgeons who believe in mobilization early and not long delayed, we succeed absolutely. But where the men have been kept in a rigid position too long we fail, and so do the surgeons. The cases to which I am particularly referring are derangements of joints, badly-united fractures, injuries to ligaments, tendons and muscles, and those in which nerve suture or tendon transplantation has been carried out. Those are the cases which we would like to get early, and in which our mechano-therapeutic appliances have a chance. We see some patients who have been six, eight, and ten months in bed, the arch of whose foot has gone

back, so that they have flat foot or drop foot. It takes a long time to get them right. Please send them to us early, and our remedial measures will enable them to march again. Then there are cases of claw-foot and various deformities due to gunshot injuries of the tarsus and metatarsus. Let us have them early, and they can be got right. Another class of case giving great trouble is that in which there is wasting of the quadriceps following injury about the knee-joint. These cases sometimes go back to duty too soon, and the retro-patellar pad, owing to its being pressed up, sets up a recurrent synovitis. Do not send those cases straight to their regiments; send them to a Command Depot to be put through their proper exercises. Many cases in which nerve suture has been performed are not placed under the best conditions before they come to us. Some musculo-spiral cases, with dropped wrist and damaged external popliteal, and cases with no correcting boot, should be sent to the Command Depot, where, in addition to other remedial measures, we can fit them with proper appliances, the object being to avoid putting undue strain on the damaged ligaments, &c.

There is one matter to which, so far, there has been no allusion to to-night, and it is a relief to me, as a surgeon, to turn round and say where the physician has failed. We have endless trouble with gastric cases in my Command Depot, and those in medical charge of other depots tell me they have the same experience. These occur often in men who have suffered from malaria abroad; they occur also in the neurasthenic and neurotic cases—shell shock cases; they are accompanied by acidity and much gastric discomfort. I have been conducting some experiments—and I should be greatly obliged if you would do so also—and I accidentally found, in treating chronic malaria, of which I have had a very large experience, that berberin much improves the gastric condition. But I found this alkaloid was much too expensive to give it in sufficient quantity. It occurred to me that the gastric condition, which is the asthenic butyric type, would also benefit from hydrastinin, as it contracts involuntary muscle and has a particularly beneficial action on stomach muscle. So I thought I might try hydrastis, which contains berberin and hydrastinin, and my success, so far, has been striking. To those, therefore, who have been patient enough to listen to me, I make the suggestion that you try that drug in these gastric cases. I refer to the cases in which there is loss of tone and great relaxation of the stomach wall. If you examine with the X-ray you do not find it, but there is great relaxation after taking food, and great acidity. At our depot we receive quite a museum of

decayed teeth, which of course the dentist removes, and I think the condition is partly due to them and to the concurrent gastric atony. I shall be glad if those of you who try this drug will let me know your results at a future date.

Dr. F. P. NUNNELEY (Llandrindod Wells).

The following remarks are based upon experience gained in the Red Cross Auxiliary Hospitals for Officers, Brighton. This institution, which affords accommodation for 134 officers, is situated at the eastern end of Brighton, on the sea front, about 150 ft. above sea level. It is housed in seven buildings close together, and consists of five hospitals, a physical treatment department and a nurses' home, the whole being under one administration.[1] The equipment includes a good modern operating theatre and a dispensary. The X-ray work[2] is done at the Howard Home (Officers' Section, No. 2 Eastern General Hospital), and pathological and bacteriological investigations are made at the Sussex County Hospital, both of which institutions are close by.

The physical treatment department is equipped with whirlpool baths (French and motor pattern) and apparatus for treatment by means of radiant heat, vibratory massage, ionization and other electrical methods. There is a staff of three masseurs and seven masseuses. In addition to the officers resident in the hospitals, a considerable number attend as "out-patients." More than 100 officers are treated daily. The majority of the patients have previously been in other hospitals, and their number includes surgical and medical cases at every stage of illness, from the man who arrives in a wheeled couch to be saved by sea air to the convalescent who needs nothing more than a course of physical treatment to fit him for a return to the fighting line. Open air treatment is the rule; no patient remains in bed unless it is absolutely necessary. If he is helpless he is transferred from his bed to a wheeled couch which is brought to his bedside, wheeled into the lift, and thence to the open air, where he remains the whole day if the weather permits it.

It is perhaps worth mentioning that we have found that the most

[1] Another hospital of thirty-three beds will be opened in a few weeks' time.

[2] An X-ray apparatus is now being installed in one of the hospitals.

comfortable and expeditious method of conveying "stretcher cases" from London to Brighton is by rail, in a wheeled couch. The patient is lifted from his bed to the couch in which he is taken by ambulance to the station. He is wheeled into the guard's van in which he travels to Brighton, where he is met by another ambulance which conveys him to the hospital. He is not moved from the wheeled couch until he is lifted on to his bed. The whole journey takes about two hours "from bed to bed," and the patient is spared all the discomfort and fatigue of a long journey in an ambulance by road.

Among the various methods comprised in the term "physical treatment," hydro-therapy has been but little used outside the spas and watering places. This may be partly due to the fondness of the public for electrical treatment in some form, but more probably to the cost of installation and the inconvenience of working hydro-therapeutic apparatus. In the "whirlpool bath" of the motor type we have a compact and convenient apparatus which can be fitted up in any room and can be worked from the hot and cold water supply of the average house. This method of treatment we owe to Dr. Quiserne and his *confrères* at the Grand Palais, while its introduction to this country and subsequent development is largely due to the efforts of Dr. Fortescue Fox and certain other members of this Section.

The first baths made in this country were naturally copied from the French model. In this type of apparatus the water passes into the bath through a number of jets and flows out through an opening near the top. The whirlpool is thus produced by a stream of rapidly flowing water. To obtain a satisfactory whirlpool, a pressure of 50 ft. is required, and the consumption of water is inconveniently large. To obviate these disadvantages a bath has been devised in which the whirlpool is produced by an electrically driven turbine placed under a grating at the bottom of the bath. The bath is filled with water at the required temperature which is maintained by adding a little hot water from time to time, while a corresponding amount automatically passes out through the waste pipe. An apparatus is fitted by means of which compressed air can be forced through the water, which is thus thrown into a condition of violent effervescence. A hand jet is also provided for giving douches. There is, however, one great drawback to the motor bath worked from a low-pressure water supply—an effective under-water douche cannot be given; since a pressure of at least 30 ft. is required for this. In the French baths, which were till recently in use at the Red Cross Auxiliary Hospitals for Officers at Brighton, the

jets are movable, and can therefore be used for giving the under-water douche and the whirlpool bath at the same time. There can be little doubt that the good results which have been obtained are largely due to this combination.

All the leg baths at present in use take the form of cylinders, in which immersion above the middle of the thigh is impossible. At my suggestion, therefore, Messrs. Shanks and Co. are making a motor bath fitted with a seat, which can be moved up or down and adjusted to any angle to accommodate any kind of stiff hip. If the knee only requires treatment the seat is fixed above the level of the water, and the uninjured leg can be kept dry. If the hip-joint is to be treated the seat is lowered and fixed at the appropriate angle, but both limbs are necessarily immersed.[1]

The following observations are based upon work done with baths of the French type: The period of immersion is usually of twenty minutes' duration; the temperature should be as high as can be comfortably borne—in most cases from 110° F. to 120° F. Before the limb is immersed, the bath is filled with water at a temperature of about 100° F. and the temperature is gradually raised to the limit of tolerance. It will frequently be found that the higher ranges of temperature, 110° F. to 120° F., cannot be borne at first, but as a rule, after one or two treatments, tolerance is acquired. It is necessary to proceed very cautiously when treating cases in which nerves have been injured and there are areas of anæsthesia or partial anæsthesia. The skin supplied by the injured nerves is frequently in a very atrophic condition and scalding of these areas may take place without the patient having complained of any discomfort in the normal portions of the limb. Very shortly after the limb has been immersed in the bath, the skin becomes flushed, pain is relieved and a feeling of comfort is experienced. The tissues are more supple and movements can be made which previously were painful or impossible. After the bath the limb is found to be in a condition of considerable hyperæmia. The skin is red and feels hot and it is probable that the internal temperature of the limb also is temporarily raised. There is usually a slight increase in bulk, varying in the case of the thigh from $\frac{1}{2}$ in. to $\frac{1}{3}$ in. in circumference. The tissues are soft and relaxed and will bear manipulations which, before the bath, would have been too painful. In a large majority of cases, the whirlpool bath is used as a preparation for subsequent

[1] This bath has now been installed and is proving very satisfactory.

massage and manipulation. In the Red Cross Auxiliary Hospitals for Officers, Brighton, radiant heat was formerly used for this purpose. When the whirlpool baths had been installed, they were substituted for the radiant heat in every possible case; so that the views of masseurs and patients who had had experience of both methods of treatment could be obtained. The opinions expressed were unanimously in favour of the baths. The massseurs said that the tissues and joints were more easily manipulated and the patients that the manipulations were less painful. Subsequent experience has confirmed the correctness of these early observations. Adhesions are frequently and almost painlessly broken down and function seems to be restored more rapidly. Some members of my staff have found that when there is great tenderness they can employ deeper massage and obtain more movement while the limb is still in the bath than if they wait till afterwards. But the whirlpool is not only a thermal bath; in virtue of the lavage and elastic pressure produced by the rapidly moving water, it must be regarded as an efficient form of gentle massage. In cases where the use of hand massage is contra-indicated by the danger of disturbing the barriers erected by Nature against the spread of infection, the whirlpool bath is of considerable value. An increased flow of blood is induced by its thermal qualities whilst resolution and removal of inflammatory products is facilitated by the massage of the rapidly moving water. When nerves in the vicinity of a wound have been slightly injured, but not destroyed, treatment is apt to be extremely difficult. The application of heat frequently increases the pain, whilst massage—which may be urgently needed for the preservation of the utility of the limb—is rendered impossible by the pain which it causes. In these cases, the whirlpool bath at a "neutral" temperature acts not only as a substitute for hand massage, but also relieves the pain to a remarkable extent.

The pain referred to the missing hand or foot, so frequently felt after amputation, is rapidly allayed by the whirlpool bath. The effect of the bath seems to be increased if one of the jets is allowed to play directly on the tissues covering the nerve which is apparently at fault.

In my very limited experience, the use of the whirlpool bath, as a preliminary to the breaking down of adhesions under anæsthesia, is of doubtful value. Owing to the hyperæmic condition of the tissues, the advantage gained by the decreased amount of force required seems to be more than counterbalanced by the increased bruising which ensues.

So far as my information goes, the whirlpool has not yet been employed in the treatment of recent wounds, but it seems probable that

its use in this connexion would be very valuable, especially when a large sloughing area could be exposed to the action of the water. Owing to the difficulty of cleansing the motor-bath, it would be necessary to use an apparatus of the French type.

I have had no experience of the "pool bath" but I have found the reclining bath at a temperature of from 97° F. to 99° F. for twenty minutes at bed-time of great value in cases of sleeplessness following shell shock and in other nervous conditions. The continuous galvanic current has proved to be very useful in sciatica and other cases of nerve injury when other measures have failed. The positive pad is placed on the lumbo-sacral region and the foot in a bath connected with the negative pole: a current of from 10 to 25 ma. is passed for twenty minutes.

During Major Black's admirable description of the Command Depot at Heaton Park, I listened, in vain, for some suggestion as to the treatment of officers. I would suggest that every Command Depot should have its officers' section and that the men should be divided into companies and platoons commanded by officers undergoing treatment of a kind similar to their men. The men would be encouraged by the example of their officers while the officers would be stimulated to do their best by the duty of setting an example to their men. At present an officer who is unfit for any strenuous work is sent to "light duty" which in most cases means an hour or two's office work in the mornings. If he requires massage or electrical treatment, he is generally kept on sick leave doing nothing, although capable of several hours' work a day. The result is that, if he is young, he gets into the bad habits of idleness, while, if he is older, he is apt to become morose and despondent. A reasonable amount of work combined with suitable treatment would be no less valuable to the individual than to the State.

Dr. EDGECOMBE (Harrogate).

With reference to the work that is being done at Harrogate for the treatment of wounded and invalided soldiers, the Royal Bath Hospital (200 beds), Grove House Hospital (60 beds), and Beaulieu Hospital (25 beds), receive patients from the Second Northern Base Hospital at Leeds, the cases sent being those suitable for treatment by physical

methods. They comprise mainly the "rheumatic" series—arthritic, myalgic, neuritic, fibrositic—and, in addition, wound disabilities, functional nerve disorders, shell shock, neurasthenia, trench feet, &c. Besides these there are three other hospitals, founded by the Grand Duchess George of Russia, mustering 114 beds. These hospitals receive patients direct from the Front, surgical and medical cases of all kinds, the former preponderating. In all there are available at Harrogate 400 beds, through which about 3,500 invalided soldiers have passed up to date. The hospitals are staffed by ten medical men, all doing voluntary work. For such cases as require physical treatment by mineral waters, baths, massage, and electrical procedures, the resources of the Royal and Victoria Baths are made freely available by the Corporation. Since the outbreak of war 23,000 free treatments have been given, besides 15,000 at the Royal Bath Hospital, such treatments consisting chiefly of massage douches (Aix and Vichy), sulphur baths, needle douches, dry massage, local hot air and steam baths, radiant heat, and electrical treatments, such as the D'Arsonval current, the Bergonié treatment, and diathermy. Officers and men have been treated free up to three months ago, but since then, owing to extreme pressure, it has been found necessary to charge officers half fees, except in needy cases, which are many, to whom the charge is waived.

For reports from the various hospitals I am indebted to the following: Drs. L. J. Hobson, C. Gibson, Hinsley Walker, F. Johns, and David Brown, of the Royal Bath Hospital; L. B. Hayne, of Grove House; Neville Williams and R. Campbell Ward, of Beaulieu, and Mr. H. Frankling, of the Grand Duchess George of Russia's Hospitals. From these reports the following epitome may be given of the modes of treatment adopted for various disabilities.

For the prevention of fibrous thickening and contracture in the neighbourhood of healing wounds, massage is begun at the earliest possible moment, before the wound is healed, provided it be free from sepsis. In later cases of healed wounds, with thickening of soft parts or contracture of joints, massage and passive movements are aided by previous exposure to dry or moist heat, the liability of heat to activate any latent focus of sepsis there may be present being borne in mind. The Berthollet local steam bath, peat baths, local and general, hot sulphur baths, and the whirlpool bath, are alternative methods of preparing the affected part for subsequent massage and movements. In the later stages further procedures include active movements and mechanical exercises with suitable machines.

The "rheumatic" manifestations—arthritis, local neuritis, fibrositis, myalgia, and so forth—are treated by the sulphur waters internally and by baths, local or general, according to requirement, such as sulphur baths, massage douches, hot air, peat baths, &c. In cases of "trench foot," after a preliminary period of rest with dry dressings and anodyne applications, the best results have been obtained with diathermy. The constant current, in the Schnee 4-cell bath, has been useful, and some cases have done well with the high-frequency current.

Cases of "irritable heart" ("D.A.H."), with or without valvular disease, have been improved by sedative sub-thermal baths, either of sulphur water or the effervescent Nauheim bath.

Cases of neurasthenia and other functional nerve disorders, shell shock, &c., have benefited by subthermal baths, the electric immersion bath, massage douches, and the high frequency current.

Local nerve lesions after injury have been treated by the galvanic and faradic current, and the Bergonié treatment has been useful in cases of temporary loss of function after spinal concussion.

Major C. W. Buckley, R.A.M.C. (Canadian Special Hospital, Buxton).

There appears to be a tendency to overlook the value of mineral waters in the treatment of certain of the conditions under consideration, and to assume that ordinary water used in douches and baths of various kinds will produce the same effect. This idea has led to unfortunate results in certain directions, and I take this opportunity of pointing out the error, and shall at any time be glad to demonstrate the effect of mineral water bathing, &c., to any who may have the opportunity of visiting the hospitals at Buxton, where mineral water treatment is the chief method used, although almost every variety of physical and electrical treatment is also available. I have observed that the longer the experience of the medical officer in charge of the case the more he tends to the exclusive use of the mineral waters, the less his experience the more he is attracted by the glamour of electricity and other spectacular methods. It is therefore, perhaps, not surprising that in this war, in which an enormous number of medical disabilities have called for treatment, mineral water resources, being limited, should have been overshadowed in their effects by those physical methods

which are available so much more widely. It has interested me greatly, however, to note that not infrequently cases have been sent to Buxton for treatment from the convalescent camps and command depots, where a wide range of physical treatment is available, because such methods have failed to do what was expected of them. The enormous strides in the treatment of physical disability among soldiers which have been made by the establishment of the convalescent camps and command depots is a great tribute to the Director-General, and to the adaptability of those who have had the work in hand. I think that a further step of much importance might now be made by *linking up the mineral water hospitals with the system of convalescent camps*, so that men might be transferred from one to the other, for a course of mineral water treatment for example, and then sent back to the camp to complete his convalescence by means of physical drill, &c., without the intervention of a general hospital. The atmosphere of the general hospital is, I am convinced, bad for the victim of shell shock, myalgia, &c., and yet cases of this description often linger there for weeks or months. Small Voluntary Aid Departments and hospitals without military organization are even more unsuitable.

Dr. R. ACKERLEY (Llandrindod Wells).

It seems to me there is a danger that in the treatment of wounded and invalided soldiers too much attention may be devoted to mechano-physical therapy by those who, like most of us present, believe in it, and too little to removing initial causal factors of disease and continuous systemic conditions. In a very large number of cases there is oral or nasal sepsis, which has either not been treated at all or only inadequately treated. Surely the first thing we should do is to eradicate this sepsis. When this course is pursued the improvement obtained by other methods of treatment is much more likely to be permanent. Then, again, in a large number of cases, what is being effected by mechanical treatment is—apart from improved circulation or improved function of muscle or organ—an elimination of toxic or waste matter. This will be assisted very greatly by adopting in *all* hospitals and Command Depots, the method in vogue at nearly all spas of freely flushing the body by copious water drinking on an empty stomach. As long as the water is

a bacterially safe one it does not matter much whether it is hard or soft, or whether it is lightly mineralized or not. After all the main ingredient of the waters at all spas is—water. The value of this adjunct to mechanical treatment may be illustrated by a single case. Several years ago a patient was sent so me by the late Mr. Edmund Owen, in the month of April. On or about the previous Christmas Day he had ruptured the tendo Achillis of one leg, and had been crippled ever since. There was a large mass of fibrous tissue at the seat of rupture. The tendon was shortened, and he could walk but very little and only with pain and difficulty. I told him he must be massaged. He replied that he had been massaged for several weeks without any good result. I found he had employed, in a provincial town, the same masseur I proposed to send him. Both patient and masseur were sceptical about any good resulting from further massage. However my advice was taken. In addition to massage he had ordinary spa treatment, including free flushing. In less than three weeks the swelling of the tendon was much reduced, and the patient was walking up and down hill without difficulty.

Captain Howard Humphris, R.A.M.C.(T.).

So much has been said to-day, and so well said, that it leaves me very little to say. At the Third London General Hospital we are using physical measures, *inter alia*, in treatment of septic and non-septic wounds, to render them less septic and to promote their healing; the principal treatments we employ are ionization to the wound and (sometimes) vibro-massage over the dressings. We are using ionization for scar tissue, with the object of loosening it and improving the appearance, and have had good results, especially on the face and near the orbital regions. In stiffened joints diathermy is our favourite method, but light followed by massage is used quite extensively.

I quite agree with what Dr. Quiserne says about light rendering more extensive and more effective massage possible. I am rather inclined to think that this is the rôle played by the whirlpool bath, and it is this rather than any special curative effect which has earned it its fame.

Local paralyses with foot and wrist drop receive a good deal of attention. For trench nephritis we use radiant heat baths. While

speaking of radiant heat baths I should like to call attention to an accident which happened to a patient the other day. A blister appeared over the tibia, corresponding to the area of a plate which had been inserted in order to unite a fracture. It is as well to ascertain whether the part being treated has been plated or not.

In trench foot the most useful modality I have used is the static brush discharge, and I am sorry to note how little static electricity is being used in this country. Not even in the splendidly equipped Granville Canadian Hospital, Ramsgate, apparently has it a place. But where it is used, for instance at the Third Southern General Hospital, Oxford, convincingly good results are being obtained daily. When we consider that from an efficient static machine we can get currents which will induce painless muscular contractions, diminish local swellings and congestions, produce local vibratory effects and relieve local pain, it is easy to see of what value it is in adhesions, in joint affections, in paralyses, in neuritis, and in general rheumatic affections; and I can only hope that before this war is over the utility of static electricity will become more generally recognized.

Dr. Bezly Thorne.

I shall only state generally that, judging by my own observation, by the evidence of officers of the Royal Army Medical Corps, who having been restored to health by balneological treatment are in a position to form a comparative judgment, and the evidence of patients who have been subjected to one or more of such methods as employ heat, light, massage, electricity, and exercise in gardening, games and light drill, that balneological treatment stands first and foremost among therapeutic agents. The beneficial changes which it induces are more rapidly effected, are more complete in degree and range, and more durable in result than those attainable by other means. The reason is not far to seek. All such affections as trench foot and rheumatism, shell shock and other nerve affections not dependent on grave lesion, such as tremor, restlessness, mental depression and despondency, loss of power of mental concentration, and partial convalescence from acute illness, including affections of the respiratory and circulatory organs, are associated with some degree of cardiac dilatation and impairment of cardio-vascular function. As those changes are not generally of the grosser

kind it is easy to overlook them or to regard them as negligible conditions. As a matter of fact they are the keystone on which the syndrome, whichever it may be, depends. The virtue of balneological treatment is that, while it relieves the outlying conditions it corrects the central defect and affords to nature opportunities of repair and recovery otherwise unattainable except perhaps after tedious delay. It is needless to say that the means must be adapted to individual cases, especially in relation to their powers of endurance and reaction, and that there should be such attention to technical details as cannot be expected of nurses and attendants apart from medical supervision.

The subject under consideration was laid before the Section of Surgery last July, in an interesting and instructive communication; but I was able to elicit the fact that, as regards baths, there had been no mineralization, and that for adaptation to individual cases the regulations of temperature and of length of immersion were alone relied upon. I hope I may be forgiven for saying that balneological treatment, under such conditions, is a comparatively futile proceeding and may easily be harmful, more especially if immersion be unduly prolonged and the patient's power of reaction exhausted. As regards the "eau courante" or "whirl" bath, it is only the well-known and long-used "strombad" under another name, with the difference that the "strombad" affords the stimulating and therapeutic advantages of mineral and gaseous constituents. More than twenty years ago I was giving such baths in this country by means of an electrically propelled mechanism. The effects of moving water are, however, amply secured if free effervescence be maintained throughout the immersion.

This is not the occasion for entering minutely into details of technique, but it may be stated briefly that, for the complaints which I have enumerated, immersion should be complete and should only in exceptional cases exceed from ten to twelve minutes; that, generally speaking, the baths should be mineralized with both sodium and calcium chloride; that their efficacy is enhanced by the addition in varying proportions of the commercial radium salt; that effervescence should not be introduced at the beginning of the course; and that the temperature of the bath should only in exceptional instances be below 90° F., or above body heat. Further, it is important that, in all cases of fibrositis, neuritis, and arthritis, the body should not be dried but enveloped in blankets as it emerges dripping from the bath, the patient lying in them until he is perfectly dry before taking the usually prescribed hour's rest.

In confirmation of my plea for balneological treatment I may perhaps be allowed to cite, in the briefest possible manner, three of my more recent cases. Case No. 1 is that of a brigadier, aged 56, who broke down with cardiac failure in November, 1914, while training a division. After consulting various authorities and undergoing several treatments, he was placed on half pay last summer. He completed a balneological treatment last September, and on October 28 he wrote to me that he was walking from eight to twelve miles daily without fatigue and had never felt stronger in his life. No. 2 is that of a captain who broke down in October, 1915, with what was pronounced to be heart-strain. After four months of rest and treatment he was invalided out of the service. He commenced a course of baths on September 25 last. On November 4 he wrote that he was feeling "A1," and only wished that a kind Providence had led him to the treatment earlier. No. 3 is that of a captain of seven years' service. He was invalided from Gallipoli to a base hospital for dysentery from September to October, 1915, and again, for heart trouble, from January to March last, and then sent to England on sick leave. He is now just coming to the end of a course of twenty-eight baths. A few days ago he informed me that he was gazetted as resigning his commission on the ground of ill-health. "But," he added, "I am perfectly well, and feel better than I have done for years." And, indeed, he stood before me the picture of health, in the pink of condition, and without a pathological flaw discoverable in his system.

No less striking are the results obtained in the other affections which have been enumerated, more especially in shell shock and trench rheumatism, including multiple myositis; and when it is borne in mind that the patients had undergone other treatments for periods varying from three months to a year with little or no success, I think it will be recognized that the test of the mineralized bath was a crucial test.

I am able to look back on the time when, except for gynæcology and the treatment of venereal disease, there were no special departments in general hospitals. I hope I may live to see the day when, in addition to those which have since been instituted, every such hospital may be equipped with a balneological installation, not to compete with or supplant our many excellent British spas, but to teach their value and application to succeeding generations of students, and to remove a reproach which is only partially redeemed by the still inadequate recognition accorded to the physical treatment of disease.

Mr. MAHOMED (Bournemouth).

Having seen the whirlpool bath installed at the Red Cross Clinic for Disabled Officers, it appeared to me that while for constitutional ailments it might be necessary to make the whole contents of the bath whirl, yet for the class of cases furnished by the War, it was frequently only necessary to effect this whirling in the neighbourhood of a limb. I therefore designed an instrument which possesses the dual functions of mixer and douche, with valves to govern the hot and cold supplies, so that they can be adapted to convey a current of water of any desired heat, or are able to supply cold and hot currents alternately; a contrivance which I consider capable of producing valuable stimulating effects. The apparatus can be fitted to any bath by using rubber pipes with the ordinary hose attachment. I have used this with some success in a case of injury to nerve (from shrapnel), with atrophy of the peroneal muscles; and with decided benefit to some fingers which had lost power through section and subsequent suture of tendons. The middle phalanx, two years after injury, presented the appearance of mummification, the skin being tightly stretched over the bone with absorption of subcutaneous structures. It is now possible to wrinkle the skin over the bone and function is returning. I could wish for more support on the part of my *confrères*, and of the military authorities, who, as you know, have acquired the Mont Dore Hotel at Bournemouth as a military hospital for 500 convalescent soldiers, but do not use the baths there.

Captain SAWDON, C.A.M.C. (Canadian Hospital, Buxton).

My connexion with the Canadian Hospital at Buxton (300 beds), the Devonshire Hospital (200 beds), and the Voluntary Aid Detachment Hospital (50 beds) enables me to testify with some assurance to the value of hydrotherapy in the treatment of invalided soldiers, incapacitated from rheumatism, fibrositis, neuritis, shell shock, neurasthenia, spondylitis, and allied complaints. The all-essential factor in the treatment of the cases at Buxton is the bathing in the warm radio-active waters from the springs and the imbibing of the same waters in regulated quantities. Accessory modes of treatment play

their part in the treatment, but in these days of new-fangled and fantastic accessories the importance of the mineral water is apt to be lost sight of. From time immemorial the "healing waters of Buxton" have been resorted to, and have become famous for alleviating ailments similar to those from which our soldiers now suffer, and their efficacy is unimpaired. At the Special Canadian Hospital some 67 per cent. of these chronic cases have been discharged as fit for duty; of the remainder half have been sent to their base for light duty, and the rest back to Canada for discharge. At the other military hospitals equally good results are being obtained.

To explain how these waters act, and how they eliminate toxins, would take up too much time in this discussion. Only too frequently we see patients who have spent months in various hospitals, completely restored to health in a month after a course of bathing. Much time and needless suffering would be saved if patients were sent to us earlier, before their cases become too chronic. At the same time it is of no use sending to us acute cases, or cases not sufficiently advanced in convalescence after an acute attack. The baths chiefly employed are, briefly:—

The Natural Mineral Water Swimming Bath, built over the warm springs, in which the healing properties of the waters are combined with the physical exercise of swimming.

Warm mineral baths, in which the patients are immersed in a deep bath, and an undercurrent douche is played upon the affected parts. This undercurrent douche is of exceptional value, and has been in use at Buxton for scores of years, and is in principle and practice equally as good as the "eau courante" bath. It is the best means we have of applying deep massage to parts.

Wet massage baths, in which the patient lies in a shallow bath of water, and is at the same time massaged.

Peat baths, general or local. Peat from the moors is mixed with mineral water at 110° to 120°. This bath is useful in cases of synovitis and periarticular swellings.

Accessories which are found useful include:—

(*a*) Counter-irritation with the electrical cautery; (*b*) ionization; (*c*) spinal galvanism; (*d*) Scotch douche: this alternating hot and cold douche to the spine we have found most useful in shell shock; (*e*) the greatest use is made of physical exercises and mechano-therapy of the usual up-to-date kind.

I should like to say that in my opinion if the nomenclature of

diseases was not so restricted, it would tend to more accurate classification of exact diagnoses.

Before I conclude may I draw attention to the incidence of "flat foot" in our hospitals. It is getting more common every day, for the most part in those men who have been invalided for several months. I believe it to be due to the wearing of felt shoes in the wards. These I think should be discontinued. As a rule, the condition is very soon rectified by the wearing of "crooked boots."

Section of Balneology and Climatology.

President—Dr. WILLIAM GORDON.

(*January* 25, 1917.)

Chairman—Dr. LEONARD WILLIAMS.

On the Distribution of Deaths from Lightning Stroke in England.

By A. G. S. MAHOMED.

WHEN I last addressed you I performed some platform experiments to demonstate phenomena connected with the passage of weak but high tensioned states of electrification through various rocks. I endeavoured to prove that in the case of soft sedimentary rocks the same electric condition was conveyed to the atmosphere, but that in the case of dense hard rocks like Purbeck marble an opposite electrical condition, due to induction, was conveyed to the superincumbent atmosphere. I thought that this was one cause of the different local electrical conditions which are found. Following out this line of thought I considered that the distribution of thunderstorms must be also probably affected by the nature of the rocks forming the subsoil in different localities.

It occurred to me that light might be thrown on this point by discovering where the greatest number of deaths from lightning stroke took place. I therefore wrote to the Registrar-General for information. Dr. Stevenson told me that the places where death from lightning stroke took place had only been registered during the period 1862 to 1875, and he courteously placed at my disposal books giving the annual returns

for that time. I subsequently wrote to the authorities for Scotland and for France, but no records of distribution were forthcoming.

The popular belief is that thunderstorms follow the rivers, because of the good conducting qualities of water. If this was true, as we live on an island, storms ought to take place with some regularity round our coast line, unless configuration or the disposition of vegetation or other causes determined certain variations. We shall see, however, that the coast line has not much influence, nor even the river valleys, on the distribution.

My first step on receiving the reports was to dot on a map of England the places where death from lightning occurred, and the result (fig. 1) is shown in the map. It was a work of a little difficulty, because the names of the parishes were given, and these often required a reference to the " Gazetteer " to identify them, and the names even of towns are often duplicated, as Newport (Isle of Wight), and Newport (Mon.). There are also twelve Whitchurchs, two Shorehams, two Yarmouths, two Tunsteads. In all, 237 deaths took place in the period, excluding duplicate or triplicate deaths due (by the date given) to the same storm, but they did not occur at 237 places, because the same place was frequently visited by storms in different years. Of this I shall have more to say later. On looking at map (fig. 1) it will be noticed that there is something peculiar in the distribution. There are certain parts where no deaths occurred, and other areas where they are frequent. The first glance suggests that they are determined by the S.W. wind, as the greater part are in a line from Devonshire to Lincoln, but the S.W. wind is prevalent nearly everywhere, and there are some areas where no deaths are noted.

I will now ask you to look at the map (fig. 2), which is a physical map of England, and you will at once perceive that the great mass of the deaths are on the plains. In Cumberland and Westmorland, all down the Pennine range, in Cornwall and Devon there are no deaths, and but few in Wales. The deaths chiefly occur on what geologists call the Oolitic Upland. These formations are called Oolitic, as you know, because most of the rocks constituting it have a rather soft granular appearance suggestive of little eggs. They are sedimentary rocks, chiefly clays, marls, limestones, and comprise the Purbeck and Portland stones, which are hard, Kimmeridge and Oxford clays, the Great Oolite, London and Wealden clays.

The configuration of the plain has been likened to the palmar surface of the hand. The palm corresponds to the Midlands, the

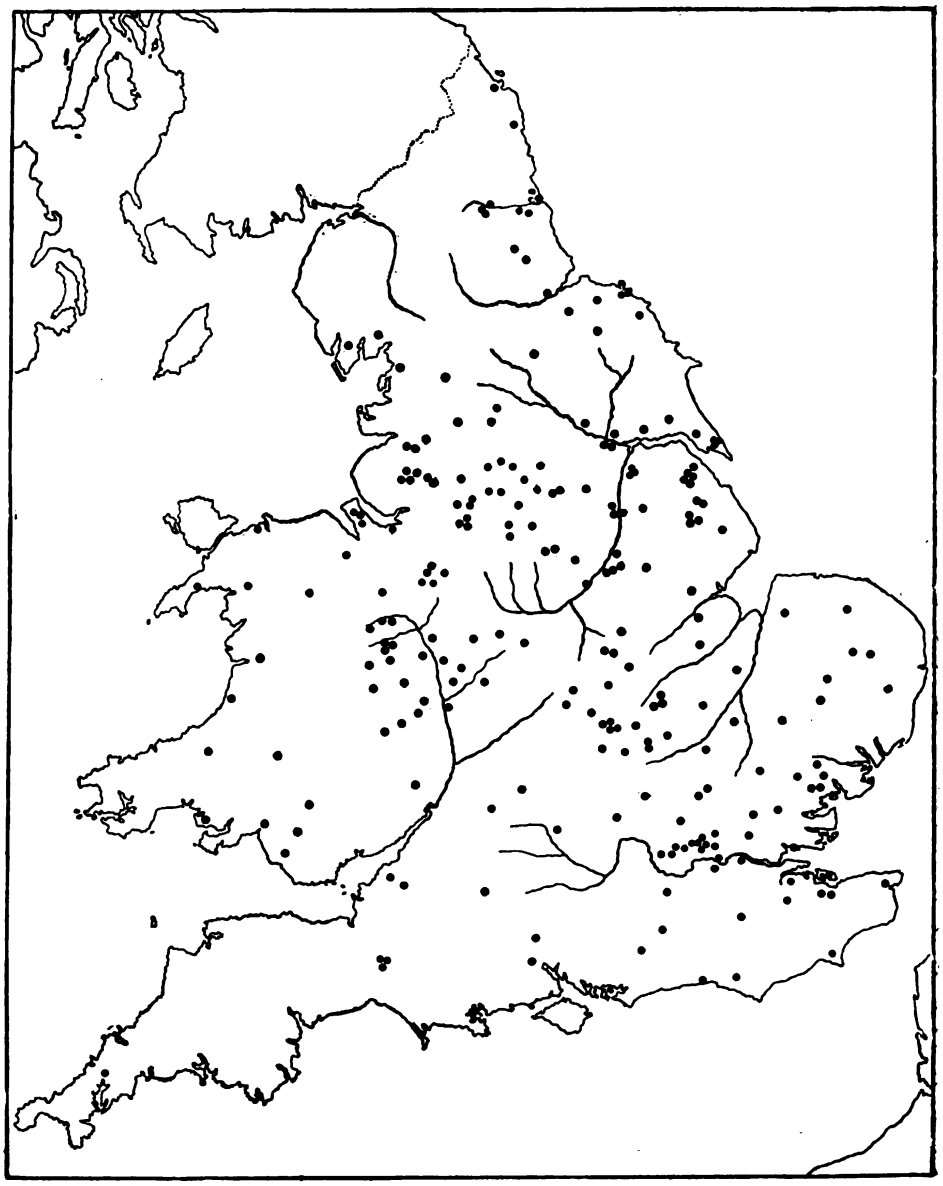


FIG. 1.

Map showing the distribution of 236 deaths from lightning stroke between 1862 and 1875.

thumb covers the Wirral peninsula, and the fingers, if I could abduct them sufficiently, point to the N.E. coast, Lincoln, East Anglia, and the Weald. The mountains occupy the west half of England, and the rivers descending from them extend across the plain to the eastern seaboard. The mountains in the north subside to the level by wave-like slopes and occasional plateaux, but the Cambrian group present steep escarpments towards the plain, and about Shropshire several outliers standing up as pillars in a comparatively flat country: such are Brown Clee, the Stiper Stones, Longmynd, &c. On examining the map showing the distribution of deaths again (fig. 1), you will agree that the large majority are on this plain, but there are a few in outlying districts: on the East Coast at Hexham, Newcastle, Whitby, Scarborough; in South Lancashire at Wigan, &c., and at Yeovil. Some of these are the sites of important coalfields, and there is no doubt that this circumstance has an influence in their selection. You have a shaft descending into the crust, and spreading out into a number of galleries. This forms a kind of condenser. You have the earth core—the layer of imprisoned air—a dielectric—and the rock between the underground air and the upper air, just as you have in a condenser, a layer of tin-foil, a layer of paraffined paper, and then another layer of foil. You have generally, as well, tram-lines in the galleries, and a big crane operating the cage by an iron chain, connecting the two conductors. If a thunder cloud sails over the landscape surely a discharge will take place here. This explanation accounts for Hexham, Newcastle, Wigan, and the Cannock Chase group. But there are still some other localities to be explained. In order to consider this more closely I marked on another map (fig. 3) certain places where deaths took place on more than one occasion. There are eighteen places where two deaths occurred on separate occasions; there are fourteen places where deaths were registered on three different dates, and two places, Gainsborough and Caistor, where deaths were registered four times. There must be some special reason for certain localities to be thus repeatedly visited.

First, let us consider why the deaths occur on the plain: is it (1) because of its flatness? (2) because it contains the rivers? or (3) because of some other quality inherent in the plain, as, for example, its geological formation? Of course we are considering the occurrence of deaths from lightning, not the occurrence of electric storms. There is no doubt that storms are more common in the mountains than they are in the valleys, but I think the discharge is from cloud to cloud, as occurs in summer lightning. You may often see these discharges on

FIG. 2.

Physical map, showing disposition of mountains and rivers.

a fine summer evening. You can see the cloud masses which are sparking, but you do not hear the thunder because they are too high up. In regard then to the first proposition, that the flatness is in some way a determining cause: to prove their relation it must be shown that where the plain is flattest there are the favourite sites for lightning stroke. If you look at maps (figs. 2 and 3, the physical and the recurrent sites maps) you will observe a little group of repeated deaths at Northampton, Newport Pagnell and St. Neots. These places are on rising ground. There is another group in Lincolnshire: Caistor, Gainsborough and Glanford Brigg; they also are on rising ground, the Lincolnshire Wolds. A third group are near the Welsh border escarpments, at Atcham, Cleobury Mortimer, &c., and a fourth at the end of the Pennines. It is evident that the hypothesis of flatness will not account for the selection.

Is it then because of the conductivity of the rivers? Look at the Thames valley: densely populated almost throughout. Three deaths occurred at Hackney during the period; in the rest of the valley there is hardly a death. Look at the three great rivers that enter the Wash. There are very few deaths till you get some distance back, where the ground rises. The Trent valley also contains some places where deaths occurred, but they are not particularly near the river. We must therefore also dismiss the hypothesis of the plain containing the majority of rivers as the cause of its being the situation of deaths.

There remains the third possible explanation, that there is something in the geological formation. I have already said that a portion of the plain is called the Oolitic plateau. Indeed, the whole plain is formed by comparatively soft rocks. There are the Purbeck and Portland stones, Kimmeridge and Oxford clays, the Cornbrash, a rubbly limestone, as well as Forest Marble, Great Oolite, London and Wealden clays. Above the Oolites are the chalks and greensands, and below it the coal measures, Liassic, Triassic and Permian beds, and the older sedimentary and the igneous rocks. I sent a list of the localities where two or more deaths occurred to Mr. J. B. Hill, a Government geologist, and brother of one of our members. He passed it on to the Geological Survey. The Director, Mr. Strahan, was kind enough to send me a statement of the underlying rock in each place, with the superficial deposit. I have appended the note to this paper (*see* p. 60). I will briefly summarize the information thus: Of the thirty-two localities where two or more deaths took place, seven are on coal measure or

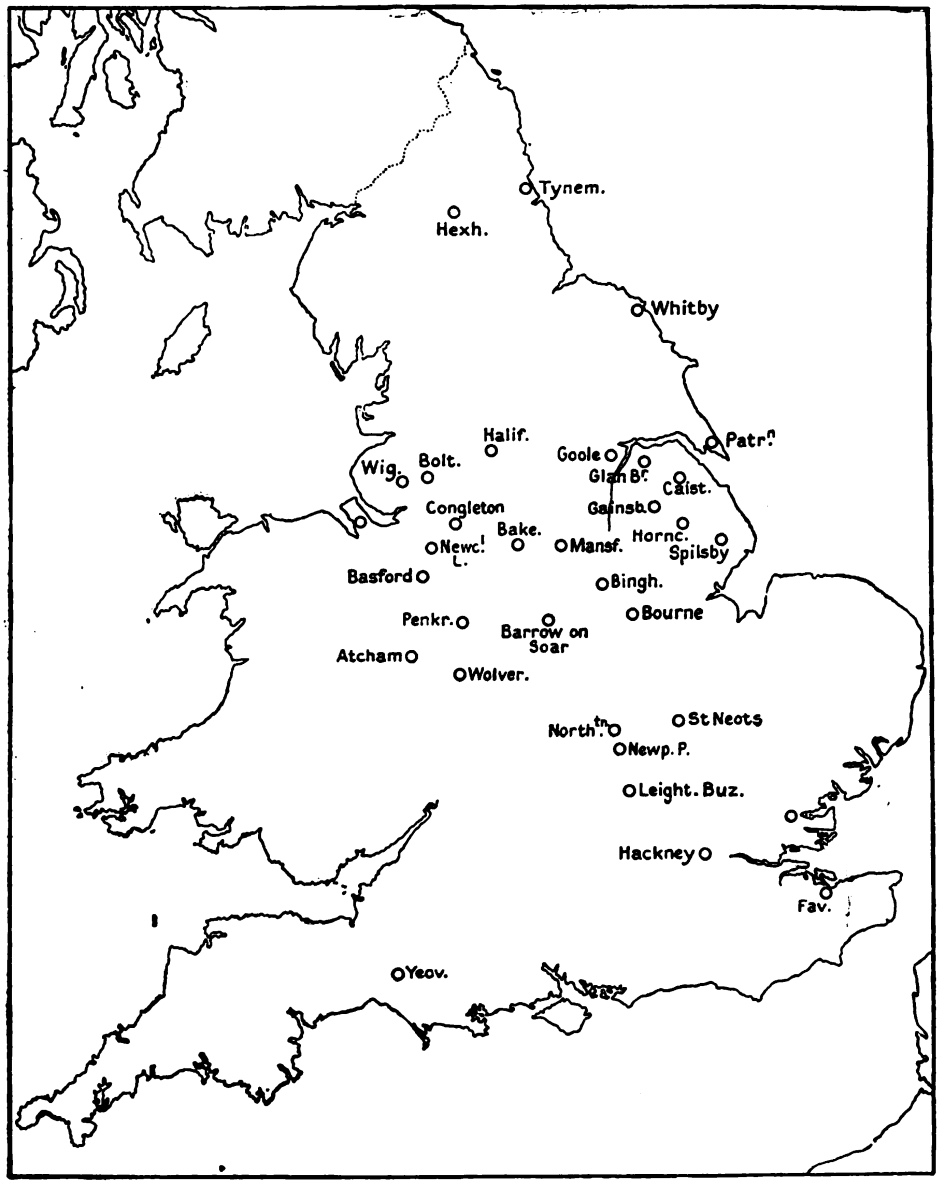


FIG. 3.

Situation of places where deaths have occurred on two or more separate occasions—i.e., favoured sites.

carboniferous limestone; six are on Oolitic rocks; five on Keuper marls (Triassic); five on Permian; four on chalk; three on Liassic rocks and two on London clay.

The coal measures, as I have said, may owe some of their liability to lightning stroke to the fact that the ground is honeycombed by mining, and to the chains and machinery used about shafts. The other rocks are chiefly clays, softer limestones, gaults, &c., and the chalk. Of these, the limestones are chiefly found on plateaux or escarpments; the clay on flat lands, and the chalk on rolling downs. Soon after I had made these observations I came across Mackinder's "Britain and the British Seas." This observer, speaking of the formation of England, and of the central plain more particularly, gives the diagram which I here reproduce (fig. 4). In it, the carboniferous and all older rocks are represented in black; the more resistant of the newer rocks are shaded in grey, the softest rocks are left white. You will at once see that the lighter area comprises the storm area, or rather I should say the death-from-lightning area. This is more apparent if you cut out the deaths on coal-fields, which we may assume are determined more by man's work in burrowing and the erection of machinery, than by geological characteristics—that is, on map (fig. 3) cut out Hexham, Tynemouth, Bolton, Wigan, Newcastle-under-Lyme. Looking at maps (figs. 3 and 4) we may conclude that the deaths are (1) chiefly on the plains; (2) do not follow the rivers very closely: observe the Thames Valley, lower part of Severn and Wash areas, and compare the Tyne and the Tees; and (3) they do correspond to the red clays.

After I had written this paper, we had a series of thunderstorms—in the first part of 1914, I think, but it may have been 1913. Deaths occurred at Ormskirk, two in Staffordshire, of five children at once at Wandsworth, and others at West Thrutton, Biggleswade, Pontefract, and Rochdale, and Shelsey Beauchamp in Worcestershire. You will see they all occur in the area noted (fig. 5). There were casualties to cattle and property also at: Northampton, tram struck; Huddersfield, house struck; Swansea, house struck (twice in two years); Warwick; Malton, Yorkshire, horses killed; Blandford, sixty sheep killed; Llangollen, house struck.

If you will permit, we will now turn for a moment to the methods used in a laboratory when it is sought to bring about a spark discharge. A static machine is a convenient source of energy, and the usual plan is to connect one pole to a hollow brass insulated ball, and the other to an insulated brass horizontal rod tapering to a point at one

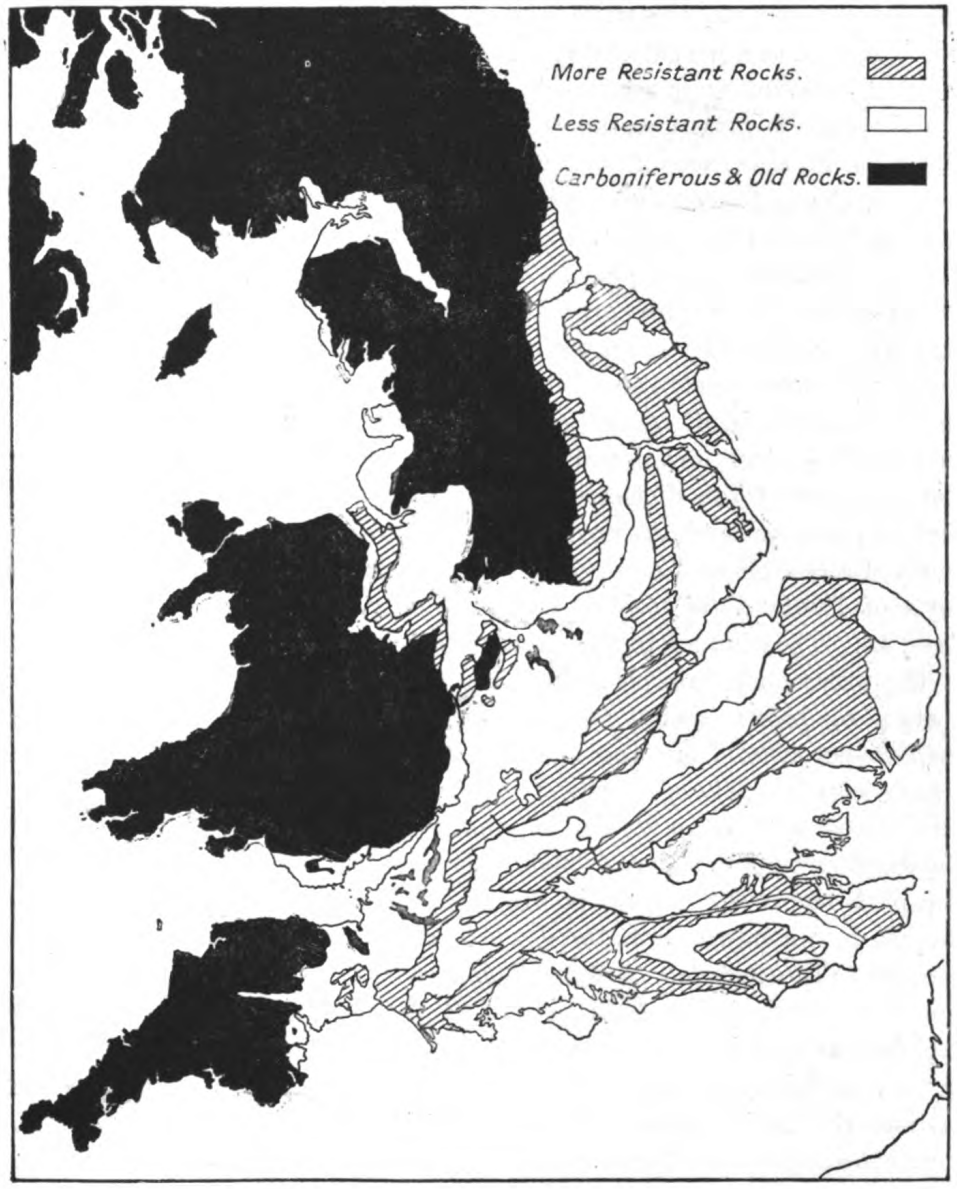


FIG. 4.

The more and the less resistant belts of the English plain.
From Mackinder's "British Isles."

end. These conductors are charged up with electricity, and the point is moved slowly towards the ball, and at a certain spot a discharge takes place. Now if, anxious to apply these laboratory methods to secure a natural phenomenon, you were to get into a balloon and sail over England at a height of, say, 3,000 ft., with a charged cloud attached to you which you were anxious to discharge, I think you would wait till you got over a plain covered with a red impermeable clay—that is a rock with no air spaces in it—smooth and dense, and therefore capable of being charged up to a good negative potential, and then if you were to cut the rope and let the cloud sink down to earth you might count on a sharp discharge taking place. This is the theory I put forth to explain the selection of certain areas in the reported cases of death from lightning. Some of you may remember that at Bournemouth I demonstrated that the resistant rocks such as Purbeck stone, slate, &c., when placed between insulated copper plates, the lower of which was given an electric charge, developed a charge of opposite sign on the upper plate because of the dielectric capacity of the stone. The softer rocks, such as chalk or sand, do not do this, but after a while the upper plate received a charge of like sign from conduction. Now the mountainous parts of England are constituted of these hard resistant rocks, granite, slate, &c. They induce in the manner described a high positive potential in the atmosphere above them. They also condense clouds on their upstanding peaks, which as the sun draws them up acquire a high positive potential from the atmosphere, and by induction from other higher clouds. These clouds do not discharge to earth because the earth is covered by an insulating rock. They either discharge to other clouds of an opposite sign or sail away over the plains until they arrive at a part where the surface is not insulated by a resistant rock, but is covered by a conducting material which allows the negative earth charge to come to the surface. A spark discharge now takes place, and human beings or cattle in its path perish. I think this theory offers a fair explanation of the occurrence of selected death-from-lightning areas. It also explains why the slightly rising ground and chalk downs are particularly liable. The chalk holds water, hot sun draws it into the air, in the night clouds are formed on the peaks, and these clouds receive at first a negative charge. While they are partly in contact with earth positively charged clouds at higher levels induce a positive charge in them. They ascend and drift away ready to discharge to a good earth.

The view that the conductivity of the soil is a determining factor in

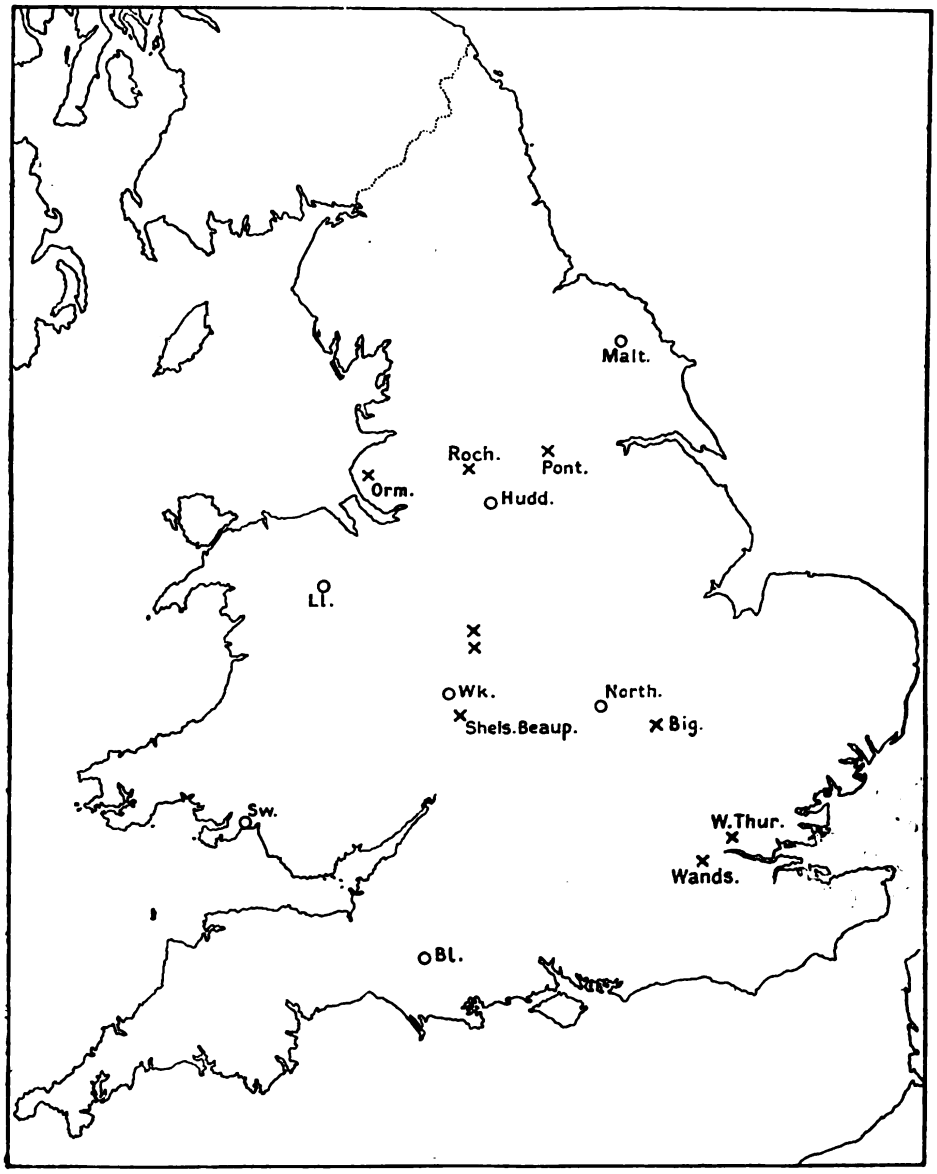


FIG. 5.

Casualties occurring in 1914 after the paper was written. The X represents deaths; the O fires, or injuries to cattle. They are all in the area of selection described.

lightning stroke receives a wonderful confirmation from the experiments of E. E. F. Creighton, described in the *Proceedings of the American Institute of Electrical Engineers* for June, 1908. Engineers in America have to maintain the inviolability of lines conducting electric power for many miles over open ground in areas subject to electric storms. All sorts of arresters are set up to convey the atmospheric surges and direct lightning strokes to earth without injury to the line. The observations of engineers in charge of such lines and arresters are very full, precise and informative. They are a witness to the scientific skill and enthusiasm of their profession. Not less so are the records of the U.S. Department of Agriculture—Weather Bureau. A most interesting paper by W. H. Alexander in their publication, the *Monthly Weather Review* for July, 1915, on " The Distribution of Thunderstorms in the United States," is a model of the manner in which such observations should be made and traced. With a view to providing the best possible "earths" to his line, Mr. Creighton sunk gas pipes vertically into the soil about 5 ft., and tested the resistance to current sent through the earth from pipe to pipe. He found the untreated pipes gave a resistance of 50 ohms, but by adding 4 lb. of salt and some gallons of water the resistance dropped to 15 ohms, and remained practically the same for one year seven months. The salt and water gradually percolated through the soil—which was sand and clay—until a good conducting substratum was reached, when, as the hygroscopic action of the salt maintained a good moist conducting medium, the conductivity remained stable. The operation of salting sandy and loose soil practically brings it to a condition similar, electrically, to the clays. For the clays are moist, smooth and dense. They mostly contain certain salts, and the great beds of Midland clay contain about 5 per cent. of iron. A loose soil such as gravel and sand contains air spaces, and air is a non-conductor. There is little doubt that a good conductor, or a good insulator for that matter, requires homogeneity of texture, in order to maintain a charge. In the laboratory ebonite requires to be smoothly polished to be efficient, and so I think does brass work. It is an interesting fact to note that the Midland clays have mostly been subjected to the compressing and polishing action of the glacial drift. It is very necessary in considering such a question as this to think geologically, that is, to consider the depths of these formations. The following figures are extracted from Lord Avebury's " Scenery of England."

Snowdon.—The igneous rocks themselves are rather over 3,000 ft. thick . . . below them come the lavas which are shown by the

survey to be about 1,500 ft. thick, while still lower are the ancient flows . . . so that the whole must amount to between 6,000 and 8,000 ft.

The Lake District.—Lower Silurian. Ward estimates them as not less than 12,000 to 15,000 ft. in thickness. These are examples of the resistant rocks which are piled up into mountains. In the plains the

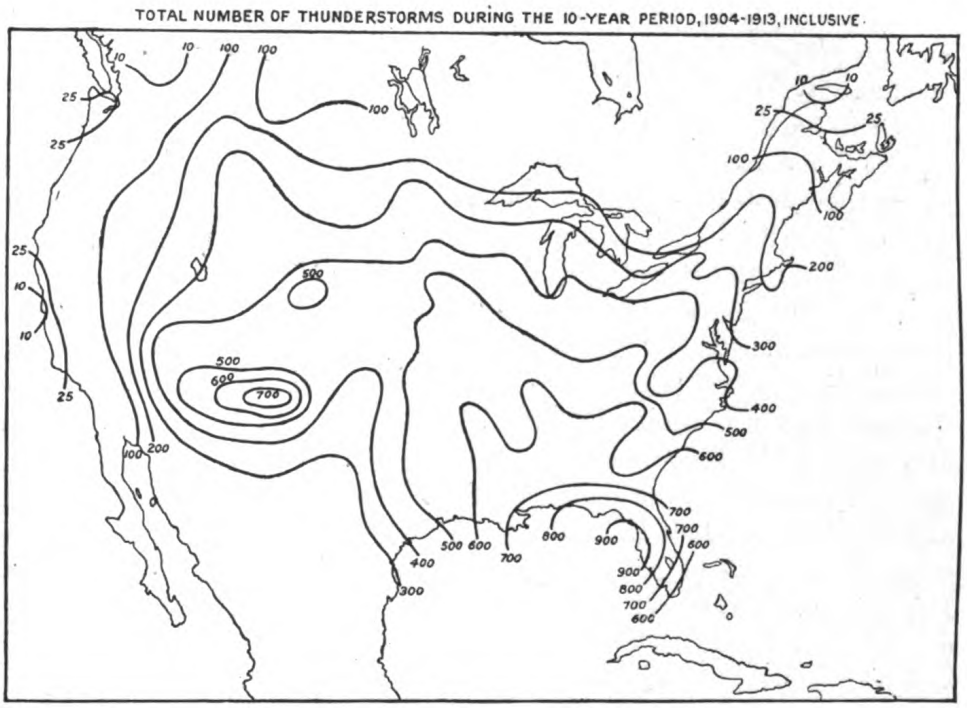


FIG. 6.

Thunderstorms in the United States.

softer rocks have also considerable thickness ; he estimates the Wealden rocks as under :—

Chalk	1,000 ft.	
Upper Greensand	80	,,
Gault	100-300	,,
Lower Greensand	600	,,
Weald Clay	750	,,
Hastings Beds	1,000	,,
Total	3,730 ft. thick	

The clays are not, however, generally as thick as this. Jukes-Brown gives the following measurements:—

Triassic Rocks in Devonshire	1,660 ft., of which Keuper Marl is	1,150 ft.
,, ,, Midlands	2,000 ,, ,, ,, ,,	1,000 ,,
,, ,, Cheshire and Lancashire	4,400 ,, ,, ,, ,,	2,000 ,,
Jurassic Lias in Midlands is	Lower Lias	460 ft.
	Middle Lias	100 ,,
	Upper Lias	150 ,,

In some places the clays are of less thickness than this, but it is enough probably to determine the surface at those parts as being of good conductivity.

I will hand round the paper I referred to just now on the distribution of thunderstorms in the United States. The last map of all (fig. 6) shows the number of storms (not deaths) occurring during ten years in the various localities. You will notice that there are two areas which are pre-eminent: the Florida Peninsula and New Mexico in the Santa Fé district. The extraordinary thing about these two districts is their great dissimilarity. "Tampa, the Florida station, is at sea-level. Santa Fé is 7,000 ft. up; the former is situated in what is perhaps the most humid portion of the United States, while the latter is in the arid regions."[1] I would suggest, with regard to Florida, an explanation which occurred to me in regard to the selection of Whitby, Scarborough and Patrington. It is this: the spray near a waterfall is negative: the spray from surf is positive. The soil in Florida is alluvium, at Patrington chalk, at Whitby shale and sand on East Cliff, boulder clay on West Cliff. The clouds that form above these conducting earths will be negative, the mists that come up out the sea will be positive. When they meet a discharge takes place.

Now comes the question, do these electric conditions affect vital functions, and if so, how? It is known that the positive electrification of the atmosphere increases with the height above the sea-level; and we may assume that the earth charge pulls down the potential over the clays and non-resistant rocks, but there are no continued observations that establish this assumption.

I have engaged your patient attention too long now to recapitulate all the observations and arguments that have led me to adopt certain conclusions on this matter, but I will briefly summarize them thus: *I believe a high positive potential stimulates mentation and other psychic*

[1] "Distribution of Thunderstorms in the U.S.," by W. H. Alexander.

operations; and that a lower positive or possibly a negative condition stimulates skeletal and muscular growth. I will adduce a few considerations—they are scarcely arguments—which appear to me to favour these views.

When primitive man is tired he stretches himself upon the negative earth. His brain ceases to act, and his frame recuperates. When sophisticated man is jaded he goes for a motor-ride in the country. The thick rubber wheels insulate him from the earth, he enjoys a positive bath, and is exhilarated. There are, no doubt, other factors which contribute to exhilaration, such as speed, change of scene, satisfaction at mechanical triumph, &c. I give the instance for what it is worth.

Consider the development and cultivation of the horse and cattle. We value the horse for psychical characteristics, courage, speed, endurance, energy; cattle chiefly for bulk. The horse flourishes on the plains of Hungary, the Argentine, Australia, and North America. These are mostly countries known for severe electric storms, though I admit that they also furnish space and other considerations. Cattle flourish in quiet valleys in Devon, the Midlands and elsewhere. I spoke to a veterinary surgeon once on this subject, and he said, "You cannot grow stock in this locality, you must go to the Midlands." It may be merely a question of feed, but, on the other hand, food can be transported, and if other things were equal farmers could easily add imported nourishment. They probably do.

Lastly, consider the effect of the migration of part of our race to America, and its subsequent development. The American is spare, but alert; he calls it "chipper," and he speaks of a "beefy" Englishman.

I will conclude with two quotations: In Lord Avebury's "Scenery of England," he says: "Clay is not generally regarded as a healthy soil, but Dr. Buckland is said to have remarked that he could always tell[1] when he was on boulder clay by the rosy cheeks of the lasses." Dr. Clippingdale's paper, read before the British Balneological and Climatological Society,[2] showed that the clay districts round London compared favourably with the more sought-after gravel sites so far as vital statistics were concerned. The other, and final, quotation is from a letter of Thackeray written from New York, in 1855:—

[1] *Proc. Geol. Assoc.*, ix, 1885.
[2] *Journ. Balneol. and Climatol.*, 1902, vi, pp. 14-24 (discussion, pp. 44-57.)

" Clarendon, New York,
November 13, 1855.

" In both visits to America I have found the effects of the air the same; I have a difficulty in forming the letters as I write them down on the page, in answering questions, in finding the most simple words to form the answers. A gentleman asked me how long I had been in New York; I hesitated and then said a week; I had arrived the day before. . . . I hardly know what is said, am thinking of something else, nothing definite, with an irrepressible longing to be in motion; I sleep three hours less than in England, making up, however, with a heavy long sleep every fourth night or so. Talking yesterday with a very clever man, T. Appleton, of Boston, he says the effect upon him on his return from Europe is the same. There is some electric influence in the air and sun here which we don't experience on our side of the globe; people can't sit still, people can't ruminate over their dinners, dawdle in their studies; they must keep moving. I want to dash into the street now. At home after breakfast I want to read my paper leisurely, and then get to my books and work. Yesterday as some rain began to fall I felt a leaden cap taken off my brain pan, and began to speak calmly and reasonably, and not to wish to quit my place."

LOCALITIES WHERE TWO OR MORE DEATHS FROM LIGHTNING TOOK PLACE, WITH STATEMENT AS TO UNDERLYING ROCK.

Locality	*Underlying Rock* overlain by *Superficial Deposits*	
*Atcham, Salop ...	New Red Sandstone ...	Alluvium.
*Bakewell, Derby ...	Carboniferous Limestone and Lower Limestone Shales.	
*Basford, Cheshire ...	Keuper Marl.	
*Barrow-on-Soar ...	Lower Lias.	
*Bingham, Notts. ...	Keuper Marl.	
Bourne, Lincs. ...	Oxford Clay	Alluvium and Gravel.
Caistor, Lincs. ...	Chalk, Tealby Sandstone and Kimmeridge Clay.	
*Congleton, Cheshire ...	Keuper Marl.	
Faversham, Kent ...	Chalk, some Lower London Tertiary.	
Gainsborough, Lincs.	Keuper Marl	Blown Sand and Alluvium.
Glanford Brigg, Lincs.	Oxford Clay	Glacial Sand.
Goole, Yorks. ...	New Red Sandstone ...	Alluvium.

* Character of superficial deposits not known.

Locality	*Underlying Rock* overlain by *Superficial Deposits.*	
Hackney	London Clay	Gravel.
Halifax	Millstone Grit and Coal Measures.	
Hexham	Carboniferous Limestone Series	Valley Gravel and Glacial Gravel.
Horncastle ...	Kimmeridge Clay	Boulder Clay.
*Leighton Buzzard ...	Lower Green-sand ...	Some Gravel.
Mansfield	Magnesian Limestone and Keuper Marl.	
*Newcastle-under-Lyme	Coal Measures.	
Newport Pagnell ...	Great Oolite and Cornbrash.	
Northampton ...	Inferior Oolite and Upper Lias	Alluvium.
Patrington ...	Chalk	Boulder Clay.
*Penkridge	Keuper Marl and Sandstone.	
Preston	New Red Sandstone ...	Boulder Clay, Sand and Gravel.
Spilsby	Lower Green-sand.	
St. Neots	Oxford Clay	Gravel.
Tynemouth ...	Coal Measures	Boulder Clay.
Whitby	(East Cliff) Shale and Sand...	(West Cliff) Boulder Clay.
Wigan	Coal Measures	Boulder Clay.
Wirrall	New Red Sandstone ...	Boulder Clay.
Wolverhampton ...	New Red Sandstone, Bunter and Permian.	
Yeovil	Upper Lias.	

* Character of superficial deposits not known.

DISCUSSION.

Dr. FORTESCUE FOX: Dr. Mahomed has opened up new ground in climatology, and the researches that he has commenced are not only of great scientific interest, but may have great practical bearing upon health and the selection of health resorts. It is a very remarkable fact that the nature of the soil should modify the state of atmospheric electricity. Dr. Mahomed's methods of investigating the electrical condition of the atmosphere might very well be set up at all health stations. They might produce most valuable results, and explain to some extent the undoubted effect of the air upon invalids in some places. A discharge of rain can, of course, be considered as a discharge of electricity. A long residence in the neighbourhood of mountains, where we are now told that the atmosphere is positively electrified, has convinced me that mountain air has a definite quality and influence upon health. It is

curious that many persons, otherwise of the keenest perceptions, are quite insensible to "change of air." Even many medical men are unaware of it in their own persons and very doubtful of its effect, although others are keenly sensitive to it.

Dr. CLIPPINGDALE: It seems to me that the frequency of deaths from lightning may have some connexion with the amount of rainfall. I notice in the maps which Dr. Mahomed has passed round, that there are no deaths from lightning in the Eastern counties where the rainfall is lowest, whereas most deaths occur in the Midlands, where the rainfall is considerable. It is true there are few deaths in mountainous places where the rainfall is greatest, but I think this may be because these places are sparsely populated. I think that, in any future investigation, it might be desirable to draw up tables showing the co-relation between deaths from lightning and the amount of rainfall, elevation, and density of population.

Section of Balneology and Climatology.

President—Dr. WILLIAM GORDON.

(*March* 8, 1917.)

Demonstration of the Mensuration Apparatus in use at the Red Cross Clinic for the Physical Treatment of Officers, Great Portland Street, London, W.

By R. FORTESCUE FOX, M.D.

WHEN I was in Paris investigating methods of physical treatment, I saw a number of these at the Grand Palais, and became very much interested in them. Not having seen them in England, I thought it might be useful to introduce some more accurate methods of mensuration into our country. These are the instruments which are in use at the Red Cross Clinic in Great Portland Street.

I think that the French are to be congratulated, because the main direction of the physical treatment of their discharged soldiers is in the hands of physiologists. Professor Camus is an able physiologist, and his department of mensuration at the Grand Palais Hospital is arranged on physiological lines. He has for example a dynamo-ergograph for recording graphically the movement and the power of weakened limbs. Professor Amar has created a school of mensuration in France in connexion with disablement. He is a very able worker in the physiology of work. Both those men approach the subject as physiologists from the scientific side, and their methods have been widely followed. In all the great centres of physical treatment in France, and in connexion with the re-education of disabled soldiers for occupations, one meets with the instruments of Professor Camus and Professor Amar.

This instrument (fig. 1) for measuring the angles of pronation and supination was presented to the clinic by an ingenious engineer at Nottingham. It is accurately graded, and if the forearm is well fixed and the upper arm kept in a vertical position, we think the angle shown is fairly reliable. The apparatus of Amar, here shown, has an attachment

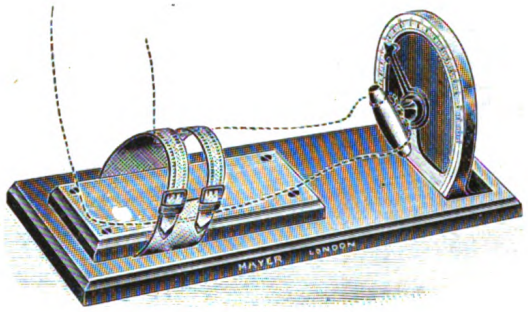


FIG. 1.

For measuring supination and pronation.

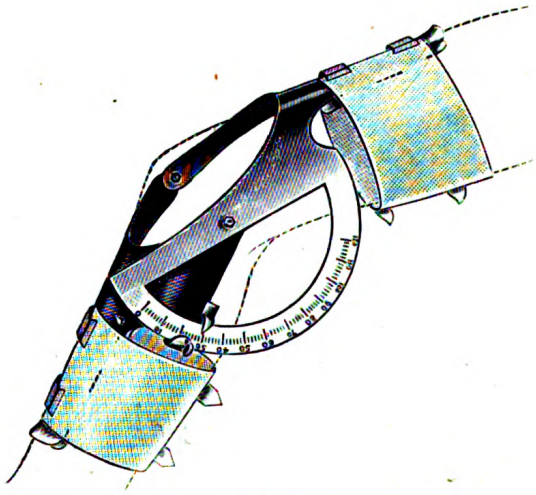


FIG. 2.

Goniometer: Red Cross Clinic.

intended to give a graphic record of the pronation and supination movements prolonged to the point of fatigue. Our own mechanical apparatus for exercising pronation and supination is graduated, and is helpful by showing the patient how much he can do.

The goniometers (fig. 2) were made from a sketch of my own. I do not profess that they are accurate to the degree of perfection, but they are the best we have come across. By one or other of these machines we measure up our knee cases every week. We do not find it necessary, as a rule, to strap the apparatus on to the thigh; but an assistant holds one end and the reading is taken. An interesting thing occurred to us this morning. A patient who has been with us some months, and whose maximum angle of flexion was 90°, was able, this morning, to reach 120°. Others may know, but I did not know before, that if the hip is well flexed in a case of muscular contraction, one gets much more movement in the knee. Probably that is a very elementary fact,

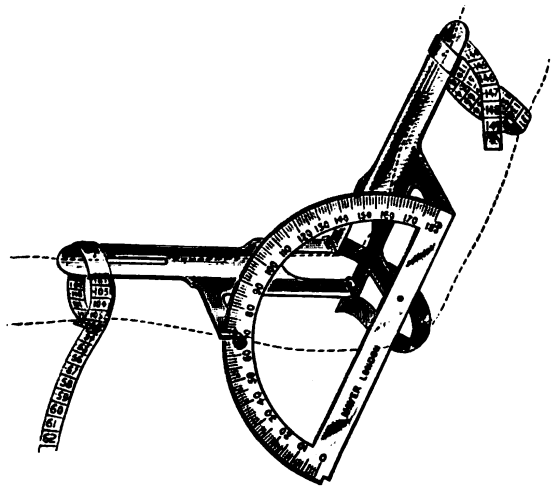


FIG. 3.

Fleximeter for elbow-joint; from the Grand Palais Hospital, Paris.

but it shows how important it is that the knee movements should be measured with the body in the same position each time.

Here is an instrument from the Grand Palais (fig. 3), designed and used by the ingenious Sergeant Dupont, who carefully measures every patient. If you lay it inside the angle of the elbow it accurately measures extension and flexion. That we use every day.

These simple protractors (fig. 4), also of the French type, are useful for measuring the angle of movement of the wrist, metacarpo-phalangeal and finger joints.

Here is another one (fig. 5), which I had made many years ago for

measuring rheumatic cases after treatment by baths. It answered very well for both wrists and ankles.

Here I show you one of Professor Amar's favourite instruments (fig. 6). It is for cases of weakness of the hand in which the ordinary dynamometer is of no use. The patient cannot close his fingers upon the

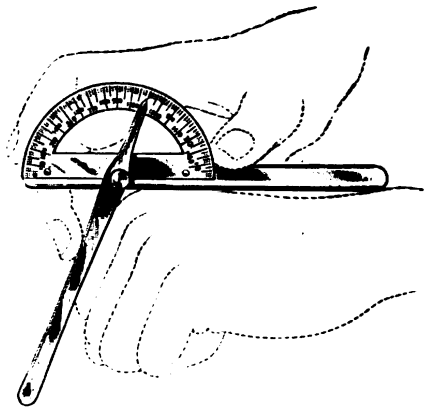


FIG. 4.

Fleximeter for fingers.

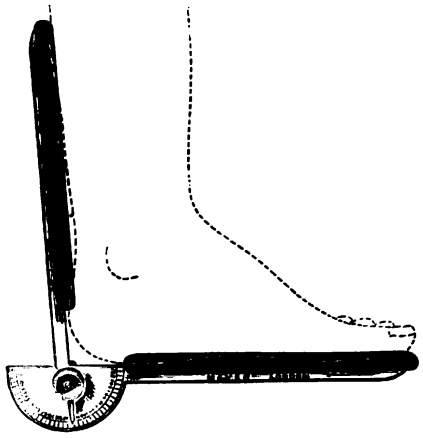


FIG. 5.

Fleximeter for ankle and wrist.

metal spring dynamometer to make pressure. Professor Amar contrived an india-rubber ball, which is connected with an air chamber; the air, operating upon water in a U-tube, presses up the float. It is a good

way of registering the very slightest movement of a paralysed hand day by day or week by week. The position of the float is read upon a scale, and a rod attached to the float can be connected with a revolving drum. Repeated pressures on the ball will then register on the drum, and the point at which fatigue comes in can be determined. The question of fatiguability is made a good deal of by the French schools of physical treatment; they are not content with measuring the angles reached and the force applied, but the power of continued movement also, both before and after treatment.

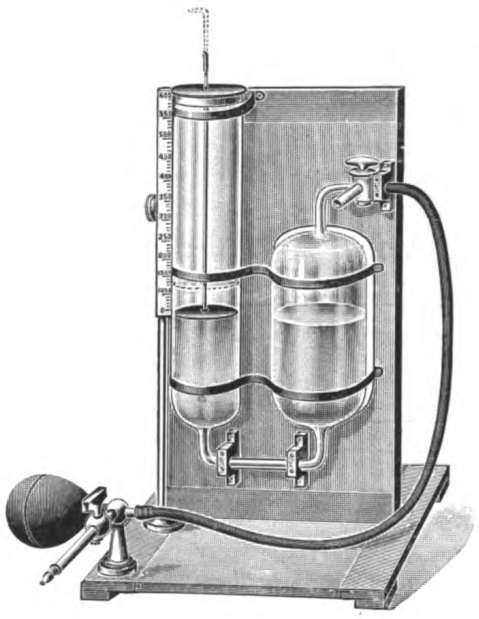


FIG. 6.

Pneumo-dynamometer or "Dynamographic Pear."

The *arthro-dynamometer* (fig. 7), which is here seen in England for the first time, is also one of Amar's favourites. It certainly shows great ingenuity. The two limbs are strapped upon the arm and forearm, the instrument being attached 4 cm. above and below the elbow-joint. When the joint moves, one of these dials indicates the angle of movement. There is nothing remarkable about that stage; we can do the same with other instruments. The great point about this arthro-dynamometer is that when the ratchet is engaged in the cogwheel which you see, the muscular effort of movement is registered on the second

dial in foot-pounds or the French equivalent. I asked a Belgian what he thought about Amar's instruments, and he said they are very good, but take a little learning. Amar's claim is, that if the readings of his instruments are taken week by week, and before and after treatment, you can check the effect of your treatment with more accuracy by this instrument than with other apparatus.

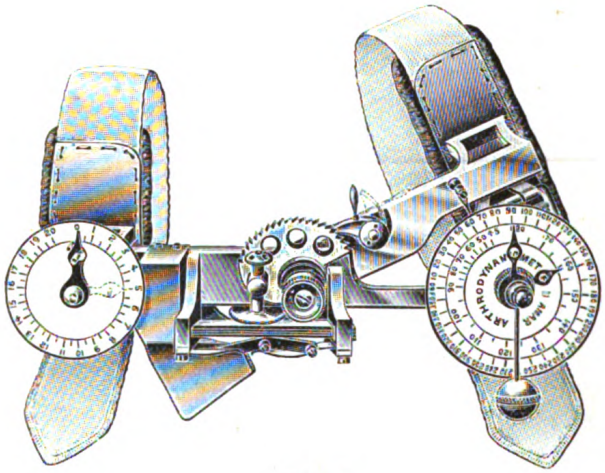


FIG. 7.

Arthro-dynamometer.

DISCUSSION.

The PRESIDENT: We are much indebted to Dr. Fortescue Fox for bringing these instruments before us. We hope they will be adopted by the War Office, and used much more extensively than at present. Precise means of measurement should be used wherever physical methods are applied, so that the results may be exactly stated.

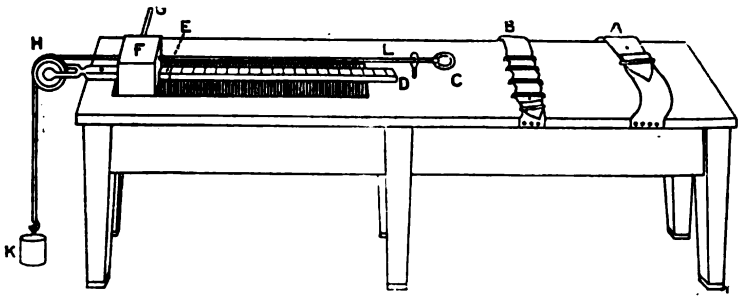
Dr. FORTESCUE FOX (in reply to Dr. Campbell): I should have said that the rule at our physical clinic is that all disablements should be measured and a record kept every week. That is one of the duties of the medical officer. It has been very encouraging to us to find numbers of cases that show improvement, especially in the angle of movements of joints, as measured by these instruments. I do not want it to be understood that we claim absolute accuracy of record by these means, but we are getting on towards more accuracy.

(*March* 8, 1917.)

Demonstration of Ergograph.

By C. F. SONNTAG.

THE forearm is laid upon *this* table, and this strap fixes the wrist in position. The second finger is fixed in the small strap, and the amount of weight on the pulley is graduated from time to time. Then, as in the ordinary ergograph, you flex and extend the finger, and the writing-point makes a record on the drum which is moving at a very slow rate. By measuring the distance the block travels along the rod, and multiplying that by the weight employed on the pulley and the time taken to do it, you get, as the result, the number of foot-pounds of work performed.



A simple ergograph. A, strap for fixing forearm; B, strap through staples for fixing fingers not in use; C, ring for finger to be tested; D, brass runner graduated in sixteenths of an inch; E, maximum recorder; F, pen carrier; G, writing pen; H, pulley; K, weight; L, cord. The part shaded in the diagram is cut out of the table.

Dr. FORTESCUE FOX: I would like to say that Dr. Sonntag is working on a further instrument to which other muscles, such as those of forearm and leg, can be geared up, so as to show graphically the results achieved with them. This particular installation is, of course, for the finger only.

(*March* 8, 1917.)

The Manipulation Bath.

By J. RODDIE.

(Communicated by Dr. J. CAMPBELL MCCLURE.)

THE manipulation bath is a method of massaging and giving different movements to the body or limb, kept constantly under water varying in temperature from 98° to 110° F. Different processes are employed—for instance, in a case of painful sciatica, which will not stand any dry massage, if the sciatic region is rubbed with a little lanoline and *effleurage* movements are then started, the effect is very soothing. Lanoline is employed as it is not very soluble in hot water, and thus the skin is kept smooth and greasy. In this way light massage movements are rendered possible, which is important, as one must avoid all hard massage under water.

In treating a limb, high temperatures can be used, and where the stiffness is due to adhesions you can employ the ordinary *pétrissage* (kneading), especially on the parts where the adhesions exist, without giving your patient any pain, as the hot water has an anæsthetic effect on the limb. When the limb has been in the hot water for about ten minutes, it will become relaxed, and you can easily explore and find out the different deformities which have to be corrected when manipulating the case. Having finished the *pétrissage* movements, you continue, while the limb is still in the bath, to give, in the form of passive movements, those movements which the patient is unable to perform himself. This process rarely lasts more than twenty minutes. The limb is then taken out of the bath and wrapped in a warm towel so as to retain the heat, and you try to stretch out the different extremities which are stiff. As the tissues become more elastic after the bath, they can easily be stretched without pain. It is always best if the operator has someone to help him in holding the patient's limb; the shoulder, for example, in the case of a stiff elbow due to a fracture of the upper extremities of the radius and ulna. In this way you can easily stretch, supinate, pronate or bend without having any contractions of the muscles. This is only done after the under-water movements are finished. The whole of this process is termed the manipulation bath.

The process is very simple and painless, and many patients who could not stand dry massage on account of the pain, say at once how soothing the manipulation bath is, and what a great change they notice after only a few days' treatment. In reality, one manipulation bath is equal to several treatments by dry massage, the reason being that the relaxation of the limb by the hot water makes manipulation possible without pain. The whole process is soothing to the patient. Also, it is the quickest way of filling and emptying the blood-vessels, consequently accelerating the circulation, and the quickest way of promoting absorption by the lymphatics. The relaxation of the limb, too, enables the operator to gain much more information regarding the situation and extent of the lesion; and in the case of nerve injuries, you can even trace the painful places while the muscles are gradually relaxed, and give relief; in other words, you are not working in the dark.

These points are not mentioned to depreciate in any way the value of dry massage, which is employed successfully in ordinary early cases, but only to show that we have in the manipulation bath a more efficient remedy, which has succeeded in many cases where dry massage has been a failure—for example, when there is much pain, or in chronic and stiff neglected cases.

As a rule, in cases of stiffness or ankylosis the limb is measured before and after the manipulation, and experience has shown that there is often an increase of a few degrees after the manipulation bath.

It is important to lower the temperature of the water gradually before the manipulation is finished, so as to bring the limb to the normal temperature, thus avoiding the contractions which are apt to be produced by sudden chill, such as may occur when the patient goes into the open air from the bath establishment, especially in winter, unless this precaution is taken.

If the bath is given with care and due regard to proper precautions, the condition of both muscles and joints steadily improves, and there is no relapse between the baths.

So far I have only mentioned local lesions, such as stiff knees, shoulders, elbows or fingers, which are the most frequent cases of war injury. There are also cases of spastic paraplegia and other severe spinal conditions due to injury accompanied by muscular spasm, where the patient has to be immersed in a large ordinary bath, at a temperature of 98° to 103° F. In such cases you will find that the muscles, including the abdominal muscles, gradually relax, and constipation and difficulties in micturition, which frequently accompany such cases, can be cured.

While the abdominal muscles are relaxed you can easily work both on the intestine and on the bladder by slight compression, light *effleurage*, and a few vibrations in the right and left iliac fossæ, and so stimulate proper contractions of the intestinal and vesical muscles. It is difficult, if not impossible, to obtain such results with dry massage. You will find that the same process will succeed in cases of sciatica, where you wish to elongate and stretch the nerve without giving pain.

The manipulation bath is used to replace the whirlpool bath in all cases of injury causing stiffness of the hip or shoulder, as no whirlpool apparatus has been invented for such cases.

Experience has shown that as a rule the temperature of the body rises as the temperature of the water is increased. The two following cases may be taken as examples of this :—

(1) Captain T. Elbow injury. Temperature before the bath : 98° F. Temperature of bath : 95°, 100°, 105°, 110° F. Temperature of patient : 98·2°, 98·3°, 98·5°, 99° F.

(2) Captain C. Knee injury. Temperature before the bath : 97·8° F. Temperature of bath : 95°, 100°, 105°, 110° F. Temperature of patient : 97·7°, 97·8°, 98°, 98·2° F.

These cases show an increase of more than a point for every 5° of hot water.

As the temperature of the hot water is increased a certain muscular contraction is induced, which is temporary and only due to the dilatation of the blood-vessels, and it is generally at this moment that the limb can stand much deeper *pétrissage* and pressure, as it is almost anæsthetized by the hot water.

The most favourable cases for the manipulation bath are stiff and neglected cases after injury, and cases where adhesions have to be reduced. I have actually felt adhesions give way. A most remarkable point is that you gradually break down adhesions in this way without causing any inflammation or injury to the neighbouring tissues, as often happens under an anæsthetic where one tries to break down several adhesions at one time.

Effects on Muscular Spasm.—When the limb is put into the hot water at a temperature of 100° to 105° F., there is gradually a certain relaxation of the muscles, which can easily be handled whilst manipulating. If you increase the temperature a certain muscular spasm is induced, which is only temporary, due to the sudden rush of blood to the extremities or to nerve stimulation. As I have remarked

above, it is very important to reduce the temperature before the manipulation is finished, as it often happens that a sudden change of temperature induces muscular contractions, which are to be avoided in this treatment.

Effect on Muscular Atrophies.—The alternate pressures and relaxations of the above manipulation empty the muscles (like squeezing a sponge) and let them fill again, and the manipulation is therefore equivalent to the contraction and relaxation (the emptying and filling) of the active muscle, and so constitutes a mechanical exercise. This manipulation helps the circulation, as the determination of blood to the muscles relieves congestion of internal organs. Thus you get a sort of exercise in the manipulation bath movements without a great expenditure of energy on the part of the patient, as must occur in the ordinary active exercises. The tonicity of the muscle is also improved by this manipulation, and flabby and exhausted muscles are found to become firmer. By increasing the activity of the circulation by the manipulation bath you also encourage the elimination of waste products. In this way the stretchings and twistings, while the limb is wrapped in a warm towel after the manipulation bath, alter the morbid conditions and bring them to a normal state.

Summary.

The foregoing manipulation has a tendency:—

(1) To promote the circulation of blood and lymph.

(2) To break down adhesions.

(3) To promote the absorption of inflammatory products and scar tissue.

(4) To stimulate the muscular fibres.

(5) To excite the action of the nerves.

(6) To bring the blood to its normal temperature.

(7) To cause excitation of the skin and stimulation of the lymphatics.

I have found this process very useful in many cases where, in conjunction with the stiffness and injuries, there was a certain degree of general debility. Captain L., from Mesopotamia, was such a case. After the first two manipulations his appetite improved, and by the end of his treatment he had gained about a stone in weight.

In conclusion, I wish to state that experience is showing that the manipulation bath is superior to radiant heat followed by dry massage

in the class of case which I have indicated. The reason for this appears to be that the action of hot water is more soothing and relaxing than that of the radiant heat, that the regulation of temperature is easy, and thus each patient can receive the right amount of manipulation at the right temperature to suit his particular case. Also, there is no risk of burns. By this process the injured limb can be transformed into a supple and pliable one in a surprisingly short time.

DISCUSSION.

Dr. CHARLES W. BUCKLEY: This manipulation bath is no new thing. I have not seen it working in London, but, from the description, I think it is no other than the bath which has hitherto been known as the Buxton Douche Massage bath. There is a relatively shallow pan of water, in which the patient lies, and he is alternately douched and massaged in the way prescribed. That being the case, I can speak with very considerable experience as to the value of the effects which this bath produces, and I can cordially emphasize all that the author says. One point that has not been mentioned, which I commend to the attention of the Red Cross Clinic, is the value of having the water of the bath at a lower temperature than the douche. Then you get a local heat douche massage without the general relaxing effect of the hot bath.

Captain BRISTOW: At the Hammersmith Military Orthopædic Hospital we have, at present, no baths in use, but that omission will be rectified in the course of the next month or two, for an up-to-date bath installation has been arranged for after taking the advice of Dr. Fortescue Fox, and will be in working order there. As regards the demonstration of instruments this evening, I can only say that, from our point of view, they are extremely good. The difficulty seems to lie in finding time to use them, in the exigencies of military surgery, when a large number of cases are passing through the various departments. We have been relying on grosser methods of measurement, but are using plaster casts and photographs. We shall certainly hope to make use of some of the instruments which have been demonstrated.

(*March* 8, 1917.)

Dr. CAMPBELL MCCLURE: I would like to place on the table the recent Statement and Recommendation of the War Disablement Committee of the Council of the Section, which has been communicated to the Army Medical Department, and also published in the *Lancet*.

Statement and Recommendations on Physical Treatment for Disabled Soldiers,

By the War Disablement Committee of the Section of Balneology and Climatology of the Royal Society of Medicine.

I.

THE serious and urgent problem of the physical treatment and training of disabled and discharged soldiers has been a long time under discussion, and it may be hoped is now approaching a solution. The Committee, having devoted more than two years to an investigation of the subject in England and France, feel bound to reassert their profound conviction, already twice urged in reports to the War Office, August 28, 1915, and February 18, 1916, that Physical Treatment, so often advocated by them, is now the thing most needed to prevent the formation of an army of cripples in this country. What has been already done here and there only points the way to the much larger aim of the Committee, and that is to provide an adequate and well-ordered system of physical treatment for every disabled soldier throughout the country who needs it, as far as possible before his discharge. Such physical treatment consists of hydrotherapy, electrotherapy (including radio-therapy), mechanical treatment, and massage.

II.

At the British spas large numbers of wounded have received treatment by waters and baths, although considerable difficulty and delay in obtaining this treatment is sometimes experienced.

The number of invalids requiring such treatment is likely to increase, and the Committee are of the opinion that the hospital accommodation for soldiers at the spas should be reserved for cases requiring hydrological treatment.

III.

The Committee are further of opinion that as the importance of systematic methods and records is becoming more and more apparent, the general

adoption of one simple system of recording cases is most desirable in order that the records supplied from all centres of physical treatment, whether at spas or attached to hospitals, may admit of exact classification.

IV.

A Clinic for the Physical Treatment of Disabled Officers was opened at 126, Great Portland Street, London, W., in July, 1916, as a result of the efforts of certain members of this Committee. The intention of the promoters of this Clinic was to provide an institution, thoroughly well equipped, which would afford to officers who were patients in the various hospitals in London the combination of the different forms of physical treatment which seemed necessary. Those responsible for it have endeavoured with some success not only to combine the best methods of treatment, but to secure the accurate keeping of measurements and records. It is not a copy of any existing institution, and embodies some new features, such as the "Whirlpool" and "Sedative Pool" Baths. The Clinic is now financed by the British Red Cross Society, and is called "The Red Cross Clinic for Physical Treatment of Disabled Officers." Officers of all the Allied nations are treated free of charge under careful and constant medical supervision.

It is a matter of satisfaction to the Committee that so much excellent work in physical treatment is now being done at certain of the Command Depots, Convalescent Camps, Military Hospitals, and Red Cross Hospitals. The experience already obtained clearly indicates the possibilities of such treatment when properly applied.

V.

The vocational re-education of disabled soldiers in the British Islands, so far as it exists at present, has been in many instances carried out without medical supervision, and not associated with any concurrent physical treatment, nor with any systematic measurement of the patient's disability and progress. The Committee cannot regard this as satisfactory. On the other hand, they know that excellent re-educational work under medical supervision has been already accomplished at the Military Orthopædic Hospital at Shepherd's Bush and at certain of the Command Depots.

The senior Honorary Secretary reports as the result of a visit just paid to certain centres for Physical Treatment and Training in France, under both the French and Belgian Governments, that the arrangements for industrial, intellectual, and agricultural re-education are being continually extended in that country, and are in every case under medical direction. Essential importance is attached by French experts to the combination of re-education with physical treatment.

The Committee notice with much interest that these facts have been set forth very clearly by Sir Henry Norman, in his recent Report to the War Office on the "Treatment and Training of Disabled and Discharged Soldiers in France."

They would only add that, in their opinion also, physical treatment should in the great majority of cases be provided as an integral part of re-education; and that the determination of a man's capacity for work ought not to depend on casual observations, but on the results of the periodical measurement of his progress by means of accurate instruments. The very important economic and financial aspects of this matter are outside the province of the Committee.

RECOMMENDATIONS.

(1) That a service of Physical Treatment consisting of Hydrotherapy, Electrotherapy (including Radiotherapy), Mechanical Treatment, Medical Gymnastics, and Massage, should be made available at the earliest possible date for all soldiers needing it, who are disabled by war.

(2) That Centres of Physical Treatment, comprising all the above methods, should be established throughout the country on an adequate scale, and wherever possible in association with general hospitals, so that other forms of special treatment and diagnosis may be readily available.

(3) That at such centres there should be a uniform system of measurements and records.

(4) That Centres of Re-education and Centres of Physical Treatment should be closely associated.

(5) That all Centres of Physical Treatment should be under medical direction, with periodical inspection, and that medical men who are experts in the various departments of Physical Treatment should be appointed to the Staff.

(6) That at the Centres first established instruction in methods of Physical Treatment should be provided for the use of medical practitioners, medical students, and assistants.

(Signed) WILLIAM GORDON (President of the Section).
SEPTIMUS SUNDERLAND (Chairman of the Committee).
R. FORTESCUE-FOX, J. CAMPBELL MCCLURE (Hon. Secretaries of the Committee).

February 24, 1917.

The Use of Remedial Baths in association with other Physical Methods in the Treatment of Disabled Soldiers.

Being an Interim Report of the War Disablement Committee of the Section of Balneology and Climatology of the Royal Society of Medicine, issued for the Committee in December, 1916, by

WILLIAM GORDON, M.D., F.R.C.P. (President of the Section).
SEPTIMUS SUNDERLAND, M.D., M.R.C.P. (Chairman of the Committee).
J. CAMPBELL MCCLURE, M.D., and R. FORTESCUE FOX, M.D., M.R.C.P. (Hon. Secretaries of the Committee).

SINCE the last report appeared in the *Lancet* (February 5, 1916) the Committee appointed nearly two years ago has gained much additional information and experience with reference to the use of physical remedies in military practice.

At a meeting of the Section of Surgery of the Royal Society of Medicine in July, the value of physical treatment in convalescence, especially in surgical cases, was emphasized, and the methods employed at the Command Depot at Heaton Park, Manchester, were described. The Committee note with satisfaction that the procedure there and at some other Commands has closely followed what they have advocated—viz., that all proper physical methods should be combined and employed together in the convalescence of disabled soldiers. The Section of Balneology and Climatology has consistently pressed for the utilization, not only of hydrological treatment, but of all associated physical methods—electrical, mechanical and other. It has been very far from the mind of the Committee to suggest that hydrological remedies were alone needed.

The Committee have by no means confined their recommendations, as it has sometimes been suggested, to an imitation of the French methods at the Grand Palais. While freely acknowledging the splendid work of our French and Belgian colleagues, they are well aware that quite as fine work in other respects has been accomplished in our own country. The sedative pool bath in particular has been advanced on the sole authority of British hydrologists, although the experience of alienists in Austro-Germany and more recently in Canada has no doubt pointed the way to the employment of long-continued subthermal baths in nervous and mental affections.

Some misconception has arisen from the fact that the Committee have advocated the use of local hyperthermal treatment in moving water, under the name of whirlpool baths. This is by no means the only, nor perhaps the most important, hydrological remedy which in the opinion of the Committee should be employed in military cases.

An adequate installation of remedial baths must include :—

(1) *Sedative treatment*, such as the pool bath just referred to.

(2) *Tonic treatment*, such as douche and shower and effervescing baths.

(3) The *local treatment* for disabled limbs, by whirlpool and other baths, with which the name of the Committee has been too particularly associated.

They believe that it is necessary to employ all three classes of remedies, if the best results are to be obtained, and this conclusion they have therefore pressed upon the Army Medical Authorities, and wish again to lay before the profession. They must also state their conviction that some sufficient training in the science and practice of hydrology is indispensable in those who are to direct treatment of this kind. It would seem very desirable, now that many excellent installations are in course of being set up under the War Office, or the British Red Cross Society, or privately, that there should be no failure in the good results that should follow from so much care and outlay, by reason of lack of expert supervision. They would therefore strongly urge that a certain number of medical men should be specially trained for this service.

Some special points have arisen from the two recent discussions on physical treatment (Sections of Surgery and Balneology) at the Royal Society of Medicine:—

(1) *Treatment of Medical Disorders.*—Several common medical disorders—mental, nervous and circulatory in particular, are amenable to hydrological remedies, in association with other physical treatments. The combination of the physical and psychical factor in the causation of these maladies, and also in their treatment, has been brought out with much clearness by those who have spoken for the Canadian work at Ramsgate, and by Sir John Collie. It is an undoubted fact that hydrological remedies have both a physical and a psychical effect, and that they ought to be administered by suitable and properly-trained persons.

(2) *The Combination of Treatment with Training.*—This very important matter is now engaging the attention of the Governments on both sides of the Channel. The information at the disposal of the Committee leads them to think that in the later stages of convalescence the association of treatment and training is essential both from the physical and psychical point of view. Here again our Canadian colleagues have given a good lead, but the Committee have also to acknowledge with much satisfaction that in the Command Depots at Heaton Park and Tipperary, and in the great Orthopædic Hospital at Shepherd's Bush and elsewhere, the same principle has been given effect to by association of physical treatment with curative workshops.

(3) *Mechanical Treatment.*—As regards the question of mechanical treatment by apparatus, the balance of recent evidence corroborates the real value claimed for it at a certain stage of convalescence, in association with baths, and as a stepping-stone to occupational re-education.

(4) *Mensuration and Records.*—It is submitted that the physical treatment of the disabled soldier should always be accompanied and guided by accurate and periodical mensuration of defect. The lack of measurements is a grave evil. In this matter something is owed to the example of our continental colleagues, who have devised many ingenious instruments for recording the amplitude and strength of movement. Some of these are employed in the Red Cross Clinic for the Physical Treatment of Disabled Soldiers in London. As regards case records, the Committee have prepared and issued at their own

expense 20,000 cards for recording the details and results of physical treatment in military cases, and desire very earnestly to impress upon those who have the care of military patients the advantage of making regular use of these cards, since a series of records of this kind cannot fail to be of much scientific value in the future.

(5) *Experience with the Sedative Pool Bath.*—The accounts received of the action of the two pools installed early in the present year at Heaton Park and Tipperary, have indicated that they are clearly valuable in recent shell shock, insomnia and disordered action of the heart. Many inquiries have been received, and plans have been drawn for similar pools of flowing water, with or without air, in several localities in England and Scotland. This form of treatment can be readily installed in any hospital or clinic. The essential matters are but two—namely, that the water should be gently flowing, and that the temperature should be constant, from 92° to 94° F.

(6) *Experience with local Whirlpool Baths.*—Since the Committee's report in February, 1916, these baths have been employed in many places. The Red Cross Clinic for the Physical Treatment of Disabled Soldiers was opened on July 3, and has given an opportunity for an extended series of observations on their effects. Dr. F. P. Nunneley has more recently published a record of their use at Brighton,[1] and a special and ingenious type of bath has been devised and employed by Major H. S. Souttar, R.A.M.C., at the Red Cross Hospital at Netley. The results have been remarkable. Many cases have been observed in which disablement induced by wounds has been lessened rapidly under treatment by these local baths—more rapidly than without them, and sometimes when radiant light and heat baths had failed.

It is the conviction of the Committee that the disability, both surgical and medical, of large numbers of soldiers is definitely amenable to physical remedies. Whilst some of these latter have been and are well and adequately practised in this country, the use of remedial baths has been unduly neglected. The Committee desire to submit that at a time like the present this neglect ought not to continue, but that sedative, stimulant and local bath treatments ought to be provided in every centre for physical treatment. The experience of the past year offers a choice of models and appliances, which can be readily adapted to local conditions.

From their own personal knowledge the Committee desire to emphasize the need among discharged soldiers, especially those suffering from the results of wounds, for an adequate and *continuous* physical treatment. And this should not cease until all that is possible by such means has been secured for them. Owing to the present inability of these men to obtain the necessary treatment after they have returned to their homes, the number of permanent cripples is unfortunately being daily increased.

There is reason to think that a satisfactory and adequate treatment of *discharged* men, as well as of convalescent soldiers, by physical remedies can be carried on in out-patient clinics or camps.

The Committee submit that when centres for treatment and training are organized, the use of physical remedies ought to be—so far as possible—co-ordinated throughout the country, in respect to methods, measurements and records.

[1] See *Brit. Med. Journ.*, November 25, 1916.

Section of Balneology and Climatology.

President—Dr. WILLIAM GORDON.

Conférence interalliée pour l'Étude de la Rééducation professionnelle et des Questions qui intéressent les Invalides de la Guerre, Grand-Palais, Paris, May 8-12, 1917.

Report by J. CAMPBELL MCCLURE, M.D.

THE Congress was opened by the President of the French Republic on the afternoon of Tuesday, May 8, at 3 p.m. During the morning arrangements for the Sections were made, and I found that it was wise to attend Sections I and II, Section I having to deal with the physical treatment and functional restitution, that is to say, treatment by work from the purely curative standpoint. The work of this Section was divided into three parts: (*a*) physiotherapy and medical gymnastics; (*b*) the use of orthopædic apparatus, artificial limbs, splints and the like; and (*c*) work of various kinds as an adjunct to physical treatment. Section II was devoted entirely to the subject of the professional re-education of the disabled man. In Section III was studied the distribution and employment of disabled men; in Section IV, the economic and social problems connected with the disabled man; Section V dealt with the re-education of the blind, the deaf, and those crippled by serious nervous lesions; Section VI was devoted to literature and propaganda. It was not possible to attend all the Sections, but I was able to attend Sections I and II, and also to learn something of the work of Section VI.

The work of Section I began on Wednesday, May 9, at 10 a.m., and Dr. de Marneffe, head of the Belgian Military Hospital at Bonsecours, read a long *résumé* of all the papers already sent into this Section. This *résumé* covered the whole question of the physical treatment of the disabled man by medical gymnastics, mechano-therapy, inflation of the collapsed lung after perforating wounds of the chest, electro-therapy, radio-therapy, hydro-therapy, and physical training of disabled limbs.

Certain conclusions were arrived at, which were agreed to after discussion as representing a consensus of opinion of those who took part in the work, but they were somewhat modified at the final meeting of the Congress on the afternoon of May 11. (I append a translation of the more important of these resolutions as passed at the final meeting.)

The conclusions arrived at, at the first meeting, were:—

(1) That surgeons should be urged to send their cases for physical treatment earlier than they do at present, before scars and injuries to joints become too fixed.

(2) That medical gymnastics should only be practised under the constant direction of properly trained medical men.

(3) That in order to ensure a proper training of medical men centres of instruction should be established throughout the allied countries for the training of medical men in medical gymnastics and other forms of physical treatment.

(4) That medical gymnastics should be begun as early as possible in the treatment of injured limbs.

(5) That where mechano-therapy is given, careful choice should be made of the apparatus to be used.

(6) That assistants, nurses, and orderlies should not be permitted to take part in mechano-therapy without suitable training in physio-therapy.

(7) That re-educative exercises for disabled limbs should always be directed by a competent medical man with knowledge of the subject.

(8) That care should be taken in an institute where physio-therapy is practised not to allow professional re-education to take the place of manual work of a purely curative kind. The physical treatment of the disabled man and curative manual labour should be entirely finished before his professional re-education is begun.

(9) That professional re-education in an institution for physio-therapy should only serve as an adjunct to physical treatment of other kinds, and should be entirely subordinate to them. Also that such manual work should only be employed in treatment after being directly prescribed by a doctor and under his personal supervision.

These conclusions were not arrived at without some discussion. It was interesting to find that in France and in Belgium, as in this country, those who were devoting themselves to physical treatment were still under the necessity of urging the surgeon to send his cases for such treatment earlier than has been his habit in order to obtain the best possible results in the way of cure. This point cannot be over-emphasized. Many cases are sent to special hospitals and clinics to be treated far too late in the course of their disablement, and there is no doubt that many valuable months are spent on the treatment of cases who have been kept in general hands too long.

There was a distinct desire on the part of the Belgian section of the Congress to impress the methods in use in Sweden on all those who practised

physical treatment. The British and the French delegates objected to this, especially on the point that all apparatus for mechano-therapy should be strictly according to Zander models. The British and the French delegates pointed out that in our various countries other apparatus had already been found to be of service that differed very greatly from Zander models, and it was especially emphasized that all apparatus for mechano-therapy should be so used that the movements were active and not passive.

The newer varieties of physical treatment described at this Section were the use of radium in the treatment of contracted scars and eczema, and the manipulation bath and pool bath in use at the Red Cross Physical Clinic for Officers, 126, Great Portland Street, London, W. The results of the use of radium in the Grand Palais Hospital were very striking, and it would appear that further work in this direction might be taken up with advantage. It was interesting to know that under Dr. Kerr, of Liverpool, radium has already been used in this country with considerable success.

In other respects the delegates were all agreed, very strongly so, on the necessity of having all physical training and treatment under strict medical supervision until such time as the patient is ready to be sent back to the Army in some capacity or another, or, if judged unfit for military service, is ready to begin re-education of a purely professional kind.

At the next sitting of Section I in the afternoon of May 9, the subject of the use of artificial limbs and various special splints was discussed at length, and some interesting demonstrations were made. Excellent little splints for radial and ulnar palsies were exhibited, as used in the Grand Palais Hospital, at Lyons, Bordeaux and Bonsecours.

Dr. Gourdon, of Bordeaux, gave a very full demonstration of the artificial arms which he has designed both for mechanical and agricultural work. They are extremely simple, effective, and moderate in price, consisting as they do mostly of leather, with a steel bar and attachments. With these artificial arms mechanics are able to work freely in a most striking way, and agricultural workers are able to use the scythe, the spade, the wheelbarrow, &c., as well as to carry weights up to 100 kilos. Dr. Gourdon was very emphatic on the point that there was little need to spend much time on the physical re-education of men who had lost a lower limb in whole or in part. Such men, as soon as their artificial limb was comfortably fitted were able to take up re-education of a purely professional kind. It is, however, otherwise with those who require to be fitted with an artificial arm. Much of the success of the new limb depends upon its being so fitted as to be absolutely suitable for the man's work, and it is only by careful testing of the limb in association with the work that proper results can be obtained. It is Dr. Gourdon's experience that shortly after the limb is adjusted properly a mechanic is able to take up various kinds of mechanical work with great ease, and thereafter his purely professional re-education is very rapid. He emphasizes, however, and apparently with justice, that without the careful preliminary re-education

under medical supervision the man is apt to be drafted to his technical school with an unsatisfactory substitute for the limb he has lost.

It was the general opinion of the British delegates that as far as ordinary artificial limbs went Great Britain was in no way behind her Continental Allies, but that some attention might be paid to the perfecting of the mechanical and agricultural arm on the lines recommended by Dr. Gourdon, of Bordeaux, and also on the lines of the arms used at the re-education school at Lyons.

On the morning of May 10 the third session of Section I was held, at which was discussed the value of work from a curative standpoint, and there was a general consensus of opinion that such work was of the greatest possible value, both in the case of neurasthenics and those who had sustained injury to some limb, whether it had involved amputation or not. It was held both by the French and British delegates that this work should be considered only as a part of the physical treatment, and should not be in any way re-educative in a professional sense: that is to say, that as soon as a man is found to be unfit for military service he should not continue his professional re-education in the hospital or command depot where curative work is being employed, but should be immediately drafted to another centre. The reason for this is obvious. When workshops are definitely connected with hospitals and a portion of these workshops is devoted to professional re-education, there is a great danger of two things. First, an enthusiastic medical officer in charge of the workshops is apt to become too keen on what is after all a side-line, and men develop in the direction of professional re-education instead of being stopped short either when their curative work has made them fit to return to the Army, or when they have shown themselves to be quite unfit for further service. Secondly, the mingling of these two classes is bound to cause dissatisfaction among those who return to the Army. This is natural, and is a problem which has to be faced very seriously.

At this session I described the work of the Canadian Special Hospital at Ramsgate, illustrating the value of curative workshops in connexion with physical treatment.

Section II was devoted entirely to the study of professional re-education. This Section was attended officially by Colonel Stanton, of the Statutory Committee, and Major Mitchell, of the Pensions Board, and their report will contain full information on the subjects discussed. One of the most important contributions to this Section was Major Mitchell's own, which was extremely good, and of great interest to all the delegates present.

There are one or two points that I should like to mention in a general way. There is no doubt that re-education in the widest sense of the word should be begun very early in the case of all those who are manifestly unfit for military service, particularly in those cases who have lost a limb. Opinion was unanimous that this work should be begun while the patient is in hospital. What can be done while the patient is still in hospital is to encourage him in

the belief that although he is maimed he is still capable of living a useful life. To this end he should be spoken to, encouraged to ask questions, and a careful explanation should be given to him of all the means at his disposal for becoming fit to earn a decent living. Particularly is it necessary, when his mind is in a receptive condition, to make him understand the meaning of the new warrant which makes it plain that after a man's pension is fixed it cannot be diminished by any increase of capacity on his part. This is a very important matter, and all those in charge of wounded men should be encouraged, if not ordered, to approach them from this point of view. If the medical officers in home hospitals in charge of disabled men were to take this as an important part of their duty, they would find that much of their day that is now devoted to pursuits having a purely personal interest would be filled by very useful work.

In addition, the systematic visitation of hospitals by competent people, not necessarily women, would be of the greatest value. Similarly, any hospitals for amputation cases, like Roehampton, and hospitals for neurasthenics, like that which will be shortly opened at Hampstead, ought to have in connexion with them a small re-education school with workshops. It is interesting in this connexion to note that among the men at Roehampton who have attended even a fortnight's course of training in the workshops, 80 per cent. present themselves for professional re-education. Further, among those who have not gone through this short preliminary course at the hospital, only some 20 or 30 per cent. present themselves afterwards for professional re-education.

There was considerable discussion in this Section as to whether re-education of a purely professional kind should be under the direction of a medical man or under the direction of the teacher of whatever kind of work had been deemed suitable for the patient. To the British delegates the solution appeared to be obvious. There are three people to be considered: the man, his medical attendant, and the instructor. The man ought first of all to have his choice of the type of work which he desires to develop. If such work is manifestly unsuited for his state of health the doctor and the instructor ought to confer, and arrange what type of work analogous to that which the man chooses for himself is suitable for his physical condition and mental capacity. There is a certain tendency abroad to leave the man out of account in these discussions, and this, in my opinion, is very unwise. The man will do much better work along the line of his choice than when he is dragooned into taking up work for which he has no natural inclination or aptitude.

In connexion with this I endeavoured to find out how far re-education was obligatory in France, Italy, and Belgium. Roughly speaking, the regulations in France and Italy are the same—namely, that as long as a man is in hospital he is compelled to accept re-education if thought necessary by those in charge, and further, he can be kept in a school of re-education for six months after his dismissal from hospital. In Belgium a law was passed in April, 1917, which

made it obligatory for every disabled soldier to remain under supervision in schools for re-education until he can be repatriated. In France compulsion is very peaceful, as it seems to be in Italy, and the compulsion on the part of the Belgian Government is only because there is now no free Belgium in which to settle their men, and they are devoting all their attention to the education of craftsmen as far as possible, to meet altered conditions after the War. Compulsory re-education is evidently impracticable for this country, and the French authorities do not appear greatly in favour of it. It is an open question whether some kind of pressure ought not to be brought to bear on those who, either from indifference or laziness, refuse to be re-educated. It would appear that a certain provision for this is made in the warrant for pensions.

There was a discussion between Dr. Gourdon, of Bordeaux, and a Belgian doctor as to whether or not those men who had sustained an amputation of some portion of the upper arm should be trained in entirely different schools from those who had received only a slighter injury or had undergone an amputation of part of the lower limb. It was pointed out that those who had lost a portion of one or both upper limbs tended to be discouraged if they began their re-education side by side with those whose mutilation was less severe, and it was urged by the Belgian doctor that special schools should be formed for these unfortunates. Dr. Gourdon, however, while agreeing entirely with the principle, that they demanded separate treatment, thought it was quite sufficient to conduct their re-education in separate workshops in the same institution, which of course would involve much less difficulty of administration and expense.

Section VI was in many respects the most important Section of the Congress, and dealt entirely with the literature and propaganda part of the scheme. At this Section Sir Alfred Keogh's report was presented, and created a very favourable impression on the allied delegates. They were particularly struck also by the way in which our new Minister for Pensions had faced the fact that a reduction of pension after re-education would absolutely sterilize any efforts made in the direction of the proper re-education of the injured soldier.

A suggestion was made by one of the French delegates that a central committee should be formed, composed of members appointed by all the allied countries, and that local committees in each country should be formed to be in close touch with the central body, so that all information could be rapidly transmitted and discussed by the central body consisting of representatives of all the allied nations. This suggestion was favourably received, but the British delegates were naturally unable to pledge our Minister to take action on this point.

An excellent suggestion was made by one of the British delegates that a liaison officer should be appointed both in France and England to keep in touch with all the work done both in physical treatment and re-education in both countries.

In addition to the work of the Sections the delegates were given the opportunity of visiting certain of the important re-educational schools, and I went in the afternoon of May 10 to La Maison Blanche, which is about forty minutes' run in a car out of Paris through the Bois de Vincennes, near the village of Neuilly-sur-Marne. There is a re-educational school entirely devoted to amputation cases either of the leg or of the arm, and special attention is paid to the re-education of those who have lost a portion of the upper arm. There are courses of instruction in writing, book-keeping, stenography and typewriting, for those who wish to take up clerical work, combined with instruction in foreign languages, while for those who are more suited for manual labour there are all sorts of workshops—wood-carving and turning, metal work of all kinds, including artistic designing, turning and small repairs for motors and bicycles. There are tailors' shops, shoemakers' shops, and cobblers' shops, carpenters' workshops, in which parts of artificial limbs are made and various articles of furniture; ornamental leather work, and making and repairing of harness are also taught. There is also a good school for agricultural re-education, in which those who are mutilated are taught to use the spade and other agricultural implements, and are at the same time instructed in intensive culture and the science of agriculture in general.

What struck me most in this school, which is maintained by subscriptions from the Union of Foreign Colonies in Paris, was: (*a*) that the control was vested in a lay committee associated with a medical director, who is in the French Army; (*b*) serious effort is made in cases of the loss of one hand or even of half the forearm to train the soldiers to write and work without the aid of any artificial limb, and it is remarkable to see how the careful training of the remaining hand, even in those who have lost their right hand, is productive of such a capacity for work that they reckon that a patient can regain after such training about 70 per cent. of his former efficiency; (*c*) a serious attempt is made in re-educating patients at La Maison Blanche to give them that sort of training which will enable them to take a useful place and enable them to gain a good living in the part of the world from which they come. For instance, if a man comes from a large town he is trained either in book-keeping or some such other office work, or as a hand in a shoe factory, or as a mechanic who will be able to take his place in a large urban industrial workshop, while the tailoring taught to such men is of the specialized character useful to a man who would obtain his work from a large factory in town. Those who intend to return to the country are trained in such agricultural pursuits as are most suitable to the district to which they wish to return, or, if mechanically inclined, are taught to repair rather than to make, that is to say, they are taught to do small repairs to motors and cycles, taught cobbling, not shoe-making, and also taught to repair and re-make harness, and such other employments as would make a man useful in his own village.

There is no doubt that the success of La Maison Blanche is due to the immense personal interest which is taken in the patients by the medical director

and also by certain of the lay committee, who visit the place constantly, and make themselves aware of the intimate circumstances of all the patients. I was interested to learn that in the case of men who had lost one hand or two hands, the first attempt at re-education was to teach them to write with as simple an appliance as possible. The medical director and the lay committee both told us that in their experience the first thing that gave a man confidence in his ultimate betterment was to find that after comparatively little trouble he could write, after having lost his right hand, either with his left or by the help of a simple appliance adjusted to the stump of his right arm. I was very much impressed by the effect of deep personal interest and sympathy in the working of this excellent institution.

On the morning of Friday, May 11, the delegates were taken to see the larger re-educational school at St. Maurice on the Seine. Here the workshops and schoolrooms were of a similar character to those at La Maison Blanche, only on a much larger and more extensive scale. The same principles exactly were carried out at this school as at La Maison Blanche. The two schools are in a way connected, as I was told that cases of severe mutilation and amputation of the upper arm were largely sent to La Maison Blanche for re-education there. I was interested to see the agricultural arm in use at St. Maurice, and it was very instructive to see how a man who had lost most of his arm could by the aid of a simple appliance use the scythe, spade, hoe, rake, &c. In addition to the ordinary accommodation, there is a hotel pension attached, where men are lodged who are apprenticed to ordinary employers. I attach a translation of the leaflet presented to all members of the Conference, which describes the object and scope of the Institution.

On Saturday, May 12, the whole day was devoted to a visit to the large Belgian re-education school at Port Villez. This school has been described on many occasions, and there is no need to give many details about it, except to say that it is most beautifully situated and equipped. It has in connexion with it facilities for instruction in almost every trade, in farming, chicken rearing, and gardening. The instruction is excellent, and indeed too much cannot be said for the organization and equipment of the whole school.

The concentration, however, of so many men in a large camp, while necessary for Belgium under her special conditions, is neither practicable nor necessary in the case of Great Britain, and one has to remember, in judging the apparent efficiency of this school, that it is not only a school for re-education, but also a productive factory which supplies important material to the Belgian Ministry of War. One has to remember, also, with regard to the difficulties under which Belgium labours, that it is permissible to her to use men for productive work whom we in France and Great Britain would insist on returning to the Army, at least for a time. The result is that many men are being trained and developed in craftsmanship whose lesions would in France and Great Britain not be sufficient to keep them out of the Army, at least in the auxiliary service. It would seem impossible for either France or Great

Britain to consider the formation of such an institution during wartime. It would form an admirable plan for a model settlement after the cessation of hostilities, or such an institution might be set up in England for purely re-educational purposes by the generosity of private subscribers. A summary, giving a description of the establishment, is attached.

It is gratifying to learn that the French work much on the same lines as we do. They have their local committees in the various departments, with the Préfet as Chairman, and they have their establishments distributed in many localities. There is in France a special committee set up by the National Office, for the care of disabled soldiers. This Committee has represented on it, the Minister of War, the Minister of Labour, and the Minister of the Interior.

The Blind Centres in France are at: Amiens, Bayonne, Bordeaux, Caen, Chartres, Clermont-Ferrand, Lyons (two centres), Marseilles (two centres), Montpellier, Nantes, St. Brieux, St. Etienne, Toulouse, Tours, and the Hospice de Quinze-Vingts, Paris. Two private committees make grants in necessitous cases. The Association at Valentin-Hauy have a blind library with sixty-seven branches, and a dictionary for the blind is being prepared by M. Anatole France.

The tuberculous centres in France are: A sanatorium in Paris with 1,600 beds; a sanatorium at Nièvre (Loire), 300 beds; a sanatorium at Brevannes, and one at Blevigny, near Versailles.

The Union of Foreign Colonies (especially the American Section), have afforded great financial assistance in such places as the Grand Palais, La Maison Blanche, and others.

There are certain points which have struck me during the Congress as being of special interest to this Committee, namely:—

(1) The importance of physical treatment being given as early as possible after the man's injury, and also the importance of having this treatment carried out patiently and skilfully for the proper length of time. I saw many cases at Port Villez who could have been made much more efficient if treatment had been continued longer.

(2) That the success of any department which I saw evidently depended not only upon the equipment of the place, but also upon the ability, concentration and sympathy of those in charge. It is of equal, if not of greater, importance to have well-trained and interested men in charge of physical treatment and curative re-education as to have a well-equipped institution.

The old points have to be emphasized in the work of all the allied countries. The cases who will require physical treatment must be drafted early to special institutions; proper equipment for these institutions in every branch of physical treatment and curative manual work is necessary; skilled men interested in this kind of treatment must be found and appointed to take charge of such institutions, and to meet this demand there is needed at the present time in all the allied countries the establishment of centres at which medical officers, students and orderlies can be properly trained in this work.

I do not think that Great Britain is now behind her Allies in the treatment and re-education of the disabled soldier, but neither France nor ourselves can permit ourselves to be complacent. It would appear that in this country the civil organization of the whole subject of re-education is well on its way to be extremely effective, but all organizations for professional re-education will fail if the preliminary medical part does not go on improving.

I have to acknowledge gratefully the help given in drawing up this report by Colonel Stewart, R.A.M.C., with whom I was associated as representing the British Red Cross Society at the Conference.

Translation of Resolutions regarding the Work of Section I, passed at the Final Meeting, May 11, 1917.

(1) That surgeons should be urged to send their cases for physical treatment earlier than they do at present, before scars and injuries to joints become too fixed.

(2) That a proper surgical staff should be attached to the institutes of physio-therapy, so that surgeons at the Front could send the men to these institutes very soon after being wounded.

(3) That competent medical men with a knowledge of physio-therapy should be made consultants to advanced medical units.

(4) That medical gymnastics should only be practised by a competent personnel (doctors, "medical gymnasts," medical students, &c.).

(5) That medical gymnastics should be begun as early as possible in the treatment of injured limbs, and that several "medical gymnasts" should be placed in the large surgical hospitals at the Front, where medical gymnastics will be more useful than mechano-therapy.

(6) That assistants, nurses, and orderlies should not be permitted to take part in mechano-therapy without suitable training in physio-therapy.

(7) That re-educative exercises for disabled limbs should be directed by trained instructors of gymnastics, and under the strict supervision of a medical man with a knowledge of physio-therapy.

(8) That in order to ensure a proper training of medical men centres of instruction should be established throughout the allied countries for the training of medical men in medical gymnastics and other forms of physical treatment.

(9) That the therapeutic re-education schools be under the sole direction of the medical service.

(10) That physical re-education (that is to say, massage, medical gymnastics, mechano-therapy, manual work) should be practised only by competent persons,

and ought not to be confused with professional re-education, which should be applied only to those who are unfit for military service.

(11) That work, prescribed as an adjunct to physio-therapeutic treatment, should be obligatory in the physio-therapeutic institutes.

(12) That treatment by agricultural labour, the most frequently used on account of the large number of wounded who were engaged on agricultural work or work of that nature, cannot be organized on the same lines in every district; in organizing such treatment the methods used in different districts must be taken seriously into account. The various methods of working regulate, in fact, the kind and the number of workers who can be used in a certain district. Any organization which does not take this point into account is certain to fail absolutely, both with regard to the cure of the wounded, and to the work done for the nation.

(13) That professional work may be considered as an adjunct to physio-therapeutic treatment, but only on the express condition that the work be in each case chosen by the doctor, and that its execution be supervised most strictly by him.

(14) That no invalid undergoing treatment in hospital be admitted to a school of professional re-education, except on the condition that he give a sufficient number of hours to the work to enable him to learn or re-learn a profession properly. It is, of course, understood that he must present a medical certificate authorizing him to attend the school

Saint-Maurice (Seine), près de Charenton.

On May 11 the members of the Conference visited the "Institut National Professionel des Invalides de la Guerre" at Saint-Maurice (Seine).

This is a large establishment under the Minister of the Interior, containing workshops for teaching the following trades and occupations: Tailoring, boot-making, tin working, management and repairing of tractors and agricultural machines. Instruction is also given here in commercial book-keeping, industrial drawing, applied to machines, building, architecture, surveying, &c.

The management lay stress on the importance of training men as rural mechanics, owing to the development in the use of motors for agriculture. An elementary course is held for the illiterate, and especially for those with injured arms.

Conditions for Admittance.—The Institution is open—according to the number of vacancies—to discharged soldiers and sailors of class No. 1, known to be incapable of following their old occupations, and therefore qualified to benefit. They may, by their own choice, be admitted as boarders, or they may attend daily.

Boarders.—Wounded men awaiting their discharge are admitted to the Military Hospital of St. Maurice, situated in the same park as the workshops. They are able, while undergoing treatment at the hospital, to learn—gratis—any trade taught in the Institution, and they receive a worker's payment of 50 c. a day as long as they do not undertake remunerative work. Those who are discharged or are going through a period of convalescence with an allowance, are admitted to the establishment of St. Maurice on condition that they relinquish 1 fr. 20 c. of their allowance; but as soon as they are in possession of their pension there is no longer any demand made upon them. Those who are discharged and provided with their pensions are admitted free. Boarders are lodged and fed, and get their washing done, free; light and heating are also free.

Daily Attendants.—Luncheon is provided for them at 11 a.m., and a wage of 50 c. a day in addition to their allowance or pension. The daily attendance is specially for those whose families live in or near Paris in the vicinity of the Institution.

Both boarders and day attendants are expected to provide their own personal linen, &c., but in cases of necessity provision is made.

The hours are as follows:—

Rise	6 a.m. (Summer), 6.30 a.m. (Winter).
Breakfast	7 a.m.
Work	7.30 to 11. a.m.
Luncheon	11 a.m.
Work	12.30 to 5 p.m.
Rest	5 to 6 p.m.
Dinner	6 p.m.
Outdoor recreation	6.30 to 9 p.m.
Bed	9 p.m.

Outings are arranged for on Sundays and fête days. Permission of absence for married men with their families in or near Paris is granted from Saturday evening to Monday morning. Special leave till 11 p.m. is granted in exceptional cases.

All men making things which can be sold receive a part of the result of the sale. Half of this money can be paid to them fortnightly, and the other half is put into a general fund, and goes to make a lump sum which is given to them when they leave the Institution. At this time they can also get a remuneration in tools, money, or in other ways if their report is satisfactory.

Apprentices are under no engagement, and can always, if they wish it, leave the Institution. They find there all the information and advice which help them in the choice of a new career, and they are at liberty to change from one workshop to another, if they think they are not suited to the one they at first choose.

The administration reserves for itself alone the right of dismissing an apprentice who does not put enough ardour into his work to enable him to learn his trade quickly, or who misbehaves himself in any way. The Professional Institute is a place of re-education, and is not meant in any way as a refuge to shelter the idle.

Habits of intemperance are not tolerated. Apprentices who are given to drinking are subject to disciplinary measures, and if they continue they are sent away.

Advice to Disabled Soldiers.

It is, in the first place, necessary to tell them that in virtue of the law their apprenticeship to a new trade can in no way diminish the amount of the pension of discharge to which they have a right, and which remains entirely theirs, even if their work brings them, in time, a salary higher than that which they were earning before the War.

They should above all be reminded that it is their greatest interest (1) to take up again their old profession or one which as nearly as possible resembles it, and (2) to learn afresh a manual trade, if they had any such trade before the War, and have had the good fortune to preserve the use of their hands.

A large number of crippled soldiers ask to learn book-keeping, in the hope that this study will give them access to the Administration of the State and big societies and companies. They are completely mistaken. Book-keeping combined with commercial knowledge does not lead to administrative work, and only produces clerks for routine work. Also, professional book-keeping is a calling which promises to be very over-crowded in the future, and posts of this kind will be very difficult to get, and should therefore be reserved for men who are crippled in the arms and hands, and cannot take up any work necessitating the use of these limbs, and to men who have already been in commercial employment, and whose experience prepares them for this occupation.

Let us remember that the number of posts under the State which were reserved by the law of April 17, 1917, can never be anything but extremely small in comparison with the large number of applications for them; many candidates would, therefore, have to wait for years to obtain one of these posts, and many of them would never obtain one.

It is again important that disabled soldiers should not let themselves be attracted by employments which appear to be advantageous for the moment, but which hold no guarantee for the future.

This guarantee can only be found in working seriously at a trade sufficiently remunerative to assure in a permanent way their being able to support themselves and their families.

They should not allow themselves to be frightened by the length of time required for their apprenticeship, which cannot, of course, be compared with the time taken by a young man.

The man who makes the greatest progress is the man with the strong will to learn. We have proof of it in the rapidity with which our apprentices find themselves able, at the end of several weeks, to earn an appreciable wage which increases in proportion to the progress they are able to make.

As soon as this wage, added to their pension, is sufficient to enable them to live outside, they can be placed with employers and continue their work without hindrance until they become perfect workmen; for example, a man taking up the profession of a shoemaker, a saddler, or a tailor, can generally—if he work with intelligence and diligence—attain this result in six months.

A Description of the Establishment at Port-Villez, par Vernon (Eure).

The building of a school for the re-education of the disabled soldiers of the Belgian Army was begun in July, 1915, and was the idea of the Baron of Broqueville, Minister of War. The establishment, composed of wooden huts, is built on ground which had to be cleared for the purpose. It took in fifty patients at the end of August, 1915, and has continued to develop from that time to the present day. It now has about 1,300 inmates. The work of this institution is for the complete re-education, physical, professional, intellectual, and moral of the badly wounded men.

Medical treatment has been arranged for such cases as are likely to improve, by means of mechano-therapy, electro-therapy, and gymnastics. Medical advice is also given as to the most suitable and advantageous trade for each man to take up. Artificial limbs are also provided. There is an infirmary, and the question of hygiene in general is medically supervised.

There is a technical staff who look after the studios where manual professions are taught. The intellectual and moral education is arranged for by skilled assistants, who look after the general instruction by means of special classes consisting of candidates for different kinds of employment, both private and public, and classes where the technique of the numerous trades practised at Port Villez is taught. All matters of discipline and supervision, clothing and domestic affairs, are attended to by a military staff.

The Establishment consists of three large sections:—

(1) The Commercial, Industrial and Administrative Training School.

(2) The School of Trades.

(3) The Agricultural Section.

The first group, consisting of a large building recently erected, has twenty-three classes which are reserved for those men who are unable to take up any

manual work. At these classes they are taught many subjects (foreign languages included) which prepare them for posts in the public administration, firms engaged in exportation, banks and manufactories.

The School of Trades group consists of studios where all the different trades are practised, such as wood-carving, metal work, leather work, clothing, hair-dressing, book-binding, decorative painting of many kinds, and other works of art.

The third section comprises a practical training in gardening, agriculture and horticulture. This training is carried on partly in the gardens surrounding the buildings, and partly in two farming schools near by.

Besides the practical training, the School of Trades has five huts set apart for the teaching of languages, arithmetic and technology.

The buildings on the left of the compound serve as dormitories for the men. A large recreation room near the foot of the hill is always open to them, and is used twice a week for theatrical and cinematograph representations, and other forms of entertainment. This hall is also used as a dining-room, and the kitchens are attached to it. A wide terrace which runs along it is used as a canteen for the men.

One hut is used as a chapel, and there is a priest attached to the establishment.

There is another Section, comprising a bakery with its own mill, a pork butcher's shop with pig-styes annexed, and a butcher's shop. All food stuffs provided by this Section are solely for the use of the inmates of the establishment.

The products of these various sections, such as the rearing of poultry and the cultivation of potatoes, various vegetables, fruits, &c., are used to make the diet of the men as varied as possible.

The washing and disinfecting of the linen, &c., of the men is done in a large wash-house. A building with bath rooms is erected in the vicinity, where there are also numerous shower baths.

There is also an Exhibition Hall where the various things the men have made are exhibited and sold.

LIST OF SCHOOLS FOR RE-EDUCATION OF DISABLED SOLDIERS IN THE PARIS AREA.

Name of school	Address	Subjects taught
Aide immédiate aux Invalides et Reformés de la Guerre	327, rue Saint-Martin	Book-keeping, general instruction
Ditto	292, rue Saint-Martin	Technical drawing
Ditto	48, rue du Chateau d'Eau	Watch- and clock-making
L'Art et la Femme... ...	2, rue Viète ...	Goldsmith's trade, carpet-making, tapestry, cabinet-making, and metal case making
L'Atelier: École d'Apprentissage pour les Mutilés de la Guerre	5, rue de la Duracne	Carpentering, ebony work, wheelwright's work, the upkeep and working of machines for woodwork
Atelier de Soufflage de Verre des Amputés de la Guerre	9, rue de l'Éperon ...	Glass-blowing, making of small pipes, tubes, &c., and apparatus used by chemists and in laboratories
Chambre syndicale de la Bijouterie, de la Joaillerie, et de l'Orfévrerie de Paris	2 bis, rue de la Jussienne	Jewellery making
École Professionnelle gratuite de la Chambre Syndicale de la Bijouterie-fantaisie en tous genres	25, rue Chapon ...	Fancy jewellery, and industries of the same nature (in non-precious metals)
École nationale d'Agriculture de Grignon	1,800 yards from Plaisir-Grignon Station (between Paris and Dreux)	Agriculture, rearing of birds, rearing of bees, dairy work
École Rachel	140, rue de Bagneux à Montrouge (Seine)	Electricity, mechanics, shoemaking
École Spécial des Mutilés ...	Place du Puits de l'Ermite	Book-keeping, office work, technical drawing, photography, fur trade, shoemaking, motor mechanics
Fédération nationale d'Assistance aux Mutilés des Armées de Terre et de Mer	140, Av. des Champs Elysées	Shoemaking, harness-making, technical drawing, commercial training
Ditto	26, quai de la Rapée	Shoemaking, tailoring, and sundry employments
Maison du Soldat du XIII Arrondissement	17, rue Jenner ...	Agricultural machinery
Société pour le Developpement de l'Apprentissage	51 bis, rue des Epinettes ...	Fitting, making of tin-ware, tailoring, and shoemaking
Union des Colonies etrangéres en France	Grand Palais, Champs Elysées, Paris	All kinds of mechanics, making of tin-ware, carpentering, ebony work, making of cardboard boxes, &c., soap-making, shoemaking, harness-making, tailoring, ladies' hairdressing and wig-making, commercial training, shorthand and typing, English, &c.
Ditto	Maison Blanche, Neuilly-sur-Marne	Ditto
Ditto	Juvisy	Agriculture

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SESSION 1916-17

SECTION FOR THE STUDY OF DISEASE IN CHILDREN

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Section for the Study of Disease in Children.

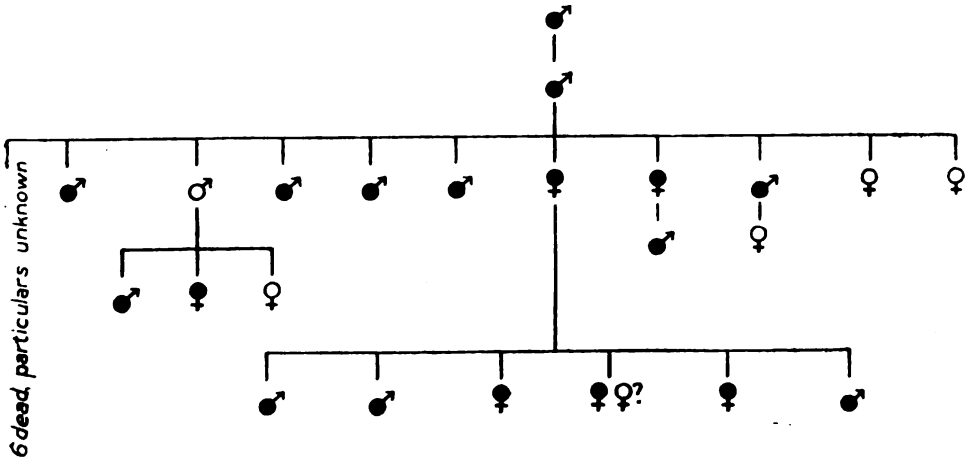
President—Mr. SYDNEY STEPHENSON, C.M.

(*October* 27, 1916.)

A Family showing Cleido-cranio-dysostosis.

By FREDERICK LANGMEAD, M.D.

IN the family of which some members are exhibited the condition appears to have been present during four generations. It is only in the present family group that personal observation has been made; the particulars relating to former generations have been gleaned, partly from a description by the late Dr. George Carpenter, who studied the mother's generation, and partly from the mother's account. It is possible that several of the members stated to be normal have minor defects which have been overlooked, since such are demonstrable in certain of her children whom she regarded as "normal." The present family numbers six alive and one dead.



Pedigree chart of family showing cleido-cranio-dysostosis.

Note.—The darker symbols indicate affected members.

(1) A. W., male, aged 7½ years: Each clavicle is in two parts, a sternal three-fourths and an acromial fourth. The outer extremity of the sternal portion is situated about ½ in. above and anterior to the inner extremity of the acromial portion. The fontanelle is closed and there are no open sutures. The frontal sinuses are normal. The palate is narrow and arched. The teeth are good and regular. The little fingers are short, reaching just beyond the proximal interphalangeal joint.

(2) B. W., male, aged 6 years: The acromial extremity of the left clavicle just fails to meet the acromion and is unduly mobile. There is nothing particular about the cranial vault, but the palate is narrow and very arched. The teeth are normal.

(3) M. W., female, aged 5 years: The left clavicle does not quite reach the acromion and is unduly mobile. About its mid-point there is a sharp bend forwards, the apex of which is somewhat thickened. The right clavicle shows the same malformation as that of A. W. The anterior fontanelle measures 2½ in. laterally and 3½ in. antero-posteriorly. The palate is very narrow and arched; there is no other cranial abnormality.

(4) V. W., female, aged 3 years 8 months: Right clavicle small and unduly movable; the left clavicle tapers off to the outer end, and has a sharp lower edge with forward projection near the centre. The forehead is large and bossed, and over it the veins are dilated, particularly in the bregmatic region. There is obvious nasal obstruction. The anterior fontanelle is large, measuring about 3 in. in each direction; in front it communicates with a patent metopic suture; behind it is continued as a definite groove which terminates in a posterior fontanelle admitting a finger tip. The palate is highly arched. There are some signs of rickets in the beading and shape of the thorax, the enlargement of the lower end of the radii, and the prominent abdomen. The liver edge reaches for about 1½ in. below the costal margin.

Twin (with V. W.): Died as an infant from progressive hydrocephalus. No other particulars are forthcoming.

(5) G. W., female, aged 2 years: Right clavicle normal. Left clavicle: Curves very exaggerated and acute bend in its middle; fontanelles closed. Palate very arched and narrow. Dentition: Twelve teeth erupted which are well formed. No obvious cranial bossing.

(6) W. W., male, aged 8 months: As in the eldest boy, each clavicle is represented by two portions, a sternal three-fourths and an acromial

fourth. The outer ends of the sternal parts over-ride the inner ends of the acromial. The anterior fontanelle is about 4 in. in breadth, and is continued forwards as a broad groove in the site of the metopic suture. Posteriorly it nearly merges into the posterior fontanelle, which measures 1½ in. in each direction. The palate is very arched and narrow.

MOTHER'S GENERATION.

(7) Mrs. W. (mother of patients 1 to 6): Left clavicle normal; right clavicle, sternal three-fourths only present. Palate very arched. Cranial vault large and somewhat overhanging. The fontanelles are said to have been very large and not to have closed until she was aged about 20 years. The transverse process of the last right cervical vertebra is protuberant. (This case was also described by Dr. Carpenter,[1] and is that of the sister, aged 12 years, mentioned in his paper.)

Of Mrs. W.'s brothers and sisters six are dead, about whom no particulars of any kind are available. The living brothers and sisters are here dealt with in their order of seniority.

(8) Brother: Left clavicle normal; right clavicle, inner three-fourths only present.

Brother: Normal, married, and has three children, two of whom are affected (Nos. 14 and 15, *see* below).

(9) Brother (described when aged 19 years by Dr. Carpenter): Kink in both clavicles. A sternal depression at its lower end sufficiently large to admit half an average sized orange. The xiphoid projected forwards and the end of the gladiolus backwards, and the depression or hole was made by a heaping up of the ribs on each side.

(10) Brother (described when aged 16 years by Dr. Carpenter): Normal clavicles, but prominent transverse processes of the last cervical vertebræ.

(11) Brother (described when aged 14 years by Dr. Carpenter): Left clavicle, prominent arching; right clavicle in two fragments, the outer being over-ridden by the inner. Transverse processes of the last cervical vertebræ prominent.

(12) Sister (described as a girl of 8 years by Dr. Carpenter): Each clavicle was represented by a small inner portion attached to the sternum. These were thin, tapering, and cartilaginous, the left measuring 1¼ in., and the right ¾ in. The coraco-acromial ligament was well developed

[1] *Lancet*, 1899, i, p. 13.

on each side. The heads of the proximal phalanges were enlarged on their palmar aspects, and the corresponding joints were easily over-extended. Married, and has one boy (No. 16, *see* below).

(13) Brother (described when aged 7 years by Dr. Carpenter): Right clavicle divided, but with no gap between the two portions, an indentation only being apparent. The two parts permitted separate movement. The left clavicle presented a depression in the same position but there was no separation. Transverse processes of the last cervical vertebræ prominent. He is married, and has one daughter who is normal.

Sister (described when aged 5 years by Dr. Carpenter), and another younger sister, normal (both unmarried).

Mrs. W.'s nieces and nephews, from her description of them: Of these information is forthcoming in only five instances; two nieces are normal, of the remaining three—two nieces and one nephew—there are the following notes:—

(14) Nephew: "Abnormality in both clavicles."

(15) Niece: "Three-quarters of a clavicle on the right side, like herself."

(16) Nephew: "Half a clavicle on each side."

(17) Mrs. W.'s father (described by Dr. Carpenter): Each clavicle in two parts, the sternal portions over-riding the acromial.

(18) Mrs. W.'s paternal grandfather, according to her statement, was similarly affected.

The family therefore provides eighteen examples of cleido-cranio-dysostosis, a condition which has been noted to be present in four of its generations.

DISCUSSION.

The PRESIDENT: I am sure I am only expressing the feelings of the Section if I say how very much obliged we are to Dr. Langmead for taking the trouble to bring these children before you; I only regret he could not bring all mentioned in his communication. I may incidentally say it is rather touching to hear the mention of Dr. Carpenter's name to those of us who remember how much he did for this Section, and for the Society for the Study of Disease in Children before this Section was founded. I hope we shall have some discussion on these cases.

Dr. EDMUND CAUTLEY: I think that one of the most interesting features of this family group is that the disease is much more characteristic in the clavicles than it is in the head. Another remarkable point is that it seems to be affecting every child, and in this respect does not accord with the Mendelian theory of heredity.

(*October* 27, 1916.)

Papulo-Necrotic Tuberculide.

By J. L. BUNCH, M.D.

THE patient, a youth, aged 17 years, has been under my care for ten years. He first developed a skin eruption at the age of 4 years. This began as a simple red patch near the umbilicus, on which small, red nodules showed themselves later. The nodules were slightly raised, papular in character, and distinctly infiltrated, but small and apparently quite superficial. They were always succeeded by a shallow scar about $\frac{1}{8}$ in. to $\frac{1}{3}$ in. in diameter. In 1906 there were about thirty of such scars round the umbilicus, and the skin of this area was dry, scaly, and red, and covered with a fine desquamation. On the inner sides of the thighs, and for some distance round each axilla, there was a circumscribed, irregular, superficial, pinkish dermatitis, with a similar fine scale on the surface.

During succeeding years the areas which formerly only showed a superficial dermatitis have become covered with a number of small, shallow, atrophic scars, similar to those round the umbilicus, which have persisted. Still more atrophic scars have made their appearance over the skin of the abdomen, so that, at the present moment, there are a very large number of such scars—so many that they have not been counted. The disease is progressive, for fresh lesions continue to appear. It seems certain that, before any fresh area shows any signs of papules or scars, it is, for some long period previously, invaded by a characteristic, scaly dermatitis. Such a scaly dermatitis is now well marked on the neck and on the forearms and hands, and to a less extent on the scalp; in this latter position it has been followed by a well-marked diffuse alopecia. This, combined with the affection of the neck and hands, is very disfiguring, and prevents the boy earning his living.

Inoculation experiments on guinea-pigs and microscopic examination of the lesions prove conclusively that the lesions are tuberculous.

Tuberculin treatment, especially Rosenbach's tuberculin treatment, improved the patient's condition for a time, but relapses occur and the disease certainly cannot be said to have been arrested. The scaly dermatitis, which now presents some of the clinical appearances of a pityriasis rubra, specially causes inconvenience and discomfort to the patient.

Many methods of treatment have been tried, but, although they alleviate, none seems capable of curing the disease. The patient's general health is otherwise good, and no signs of other tuberculous disease can be detected.

(*October* 27, 1916.)

Pityriasis Rosea with Unusual Distribution.

By J. L. BUNCH, M.D.

THE patient, a girl, aged 8 years, developed a typical eruption of pityriasis rosea a week ago, so far as the trunk was concerned. But, six or seven days before this eruption appeared, a "herald" patch made its appearance in the right frontal region, and is still quite noticeable —in fact, well marked. It is because of the unusual position of this primary lesion that I am showing her.

DISCUSSION.

Dr. ERIC PRITCHARD: With regard to the first of Dr. Bunch's cases, although perhaps the wish may be father to the belief, there seems to me to be a very marked change in his condition in the five months which have elapsed since I saw him, in regard to the tuberculous papules. When I last saw him these were certainly in a very active condition. At the present time I cannot satisfy myself that any of them show any activity, although the general dermatitis does not seem to have improved, so far as I can judge. But I think the dermatitis may be accounted for by the irritation in the skin set up by the creosote treatment. I do not think Dr. Bunch has pushed the treatment quite far enough to get what I have found to be the best results. I have found that best results follow when as much as a dram is given three times a day—i.e., three times as much as Dr. Bunch is now giving. I do not think the creosote has a fair chance until one can smell it as the patient enters the room; given in full doses it is exhaled from the lungs as well as from the skin.

Dr. E. A. COCKAYNE: With regard to Dr. Bunch's second case, I had the misfortune to contract the disease two or three years ago; several of us had it at the same time, and Dr. MacCormac took some of my blood and injected the serum into one of his own veins. But I think that experiment was not likely to have been very successful, because new spots had ceased to appear the day before he injected the blood-serum. Even if it be an infectious disease, I think the procedure was left a little too late to ensure a very successful result. So I do not think the negative result is of any importance.

(*October* 27, 1916.)

Case of Supposed Intrathoracic Neoplasm.

By C. E. LAKIN, M.D.

A. C., A GIRL, aged 16 years. A mentally backward child, rather obese with highly-arched palate, who for three and half years has been attending Golden Square Throat Hospital, under the care of the late Dr. FitzGerald Powell, through whose courtesy I am able to show the case.

I show this case as one of my failures in diagnosis. When the child first came to me (in May, 1914) she had big veins over her chest, much the same as they are now, and I found she had dullness over the upper part of the sternum, and extending slightly to the right of it. I could not make out any other physical signs, except that she was mentally deficient. Her face was very full, but it was not known how much of that was due to pressure on the superior vena cava, or whether it was attributable to any defective glandular secretion. I had her viewed with the X-ray screen, and a dark shadow was discovered to the right of the heart, in the position of the superior vena cava. I thought what was seen must be of the nature of a neoplasm, and was inclined to regard it as malignant disease. When I saw her about six months afterwards, I did not think she was any worse physically, except that now she had tubular breathing over the right lung, almost as intense as is met with in pneumonia, but there was no fever. Again I thought she must be a case of malignant disease, and that the lung was becoming infiltrated by growth. Six months later she was, if anything, better. There was intense tubular breathing over the position in which I thought the original growth was situated, but the breathing in the lung had become bronchial, and was not so intense in character. Mr. Kellock saw the patient, and he suggested that she might have an innocent growth, such as a hygroma. I saw her six months after that: she had lost no flesh, and on this last occasion one could not very well maintain the view that it was malignant disease. She had gone on improving, as a whole. She has never spat blood, and there has been nothing like blood-stained sputum, though her mother tells me that at times there has been a little expectoration.

I now have a skiagram of the case, which was taken last week. It shows much opacity in the lung itself, especially towards the root, and raising of the right side of the diaphragm, which is reported as "fixed." I think that now there is no doubt that the case is one of enlarged tuberculous glands; that these have since shrunk and caused increased pressure upon the veins. Still, I have never seen such marked venous obstruction due to tuberculous glands, and though one is exhibiting one's mistakes, I thought it might be interesting to bring the case before the notice of the Section.

DISCUSSION.

The PRESIDENT: I suppose the records of our mistakes are more valuable than those of our successes.

Dr. ERIC PRITCHARD: I think Dr. Lakin has been premature in admitting a mistake in this case, for I see no evidence in the case which definitely excludes it from being malignant. I have under my own care, at Queen's Hospital, a child with an undoubtedly malignant growth, who has been in the hospital for two years—and certainly the growth had existed for some considerable time before admission. There is no doubt as to its malignant nature, because the brain has been secondarily invaded. There are, I think, other cases on record in which sarcomatous intrathoracic growths in children have lasted even longer than this. But on the whole, I think, the evidence in the present case is in favour of its being tubercle, if for no other reason than because the early history of the child almost necessitates the tuberculous process being considered. The mother tells me that within five weeks the child had, first, measles, then chicken-pox, then whooping-cough, and then broncho-pneumonia. In my experience, when these diseases occur in such rapid sequence, a child is invariably found to be tuberculous. Under such conditions the power to resist tubercle is completely lost. I should say that after this sequence of illnesses the child is certain to have become infected with tubercle, that the glands of the mediastinum have become tuberculous, and that these have undergone cicatrization, with occasional exacerbations of an active character. Dr. Parkinson and I shared a case some years ago of a somewhat similar condition, in which tuberculous glands in the thorax caused enlargement of the abdominal veins and ascites, both conditions undergoing alternating periods of exacerbation and improvement. As soon as that child got a cold, or an attack of bronchitis, the glands swelled up, and the abdominal symptoms increased, with intensified distention of the veins. The child, while it remained under my care, steadily improved, and was alive three years ago—that is to say, five years from the time the symptoms were first noticed. I am, therefore, inclined to regard the present case as tuberculous, though I do not think one can definitely exclude the malignant hypothesis.

Dr. EDMUND CAUTLEY: I think that this child had an attack of mediastinitis, probably, but not necessarily, tuberculous in origin; and in consequence of the subsidence of the inflammatory condition, the shadow disappeared, or at all events, decreased. I cannot imagine it likely that a malignant neoplasm could be present in a child for two years without causing more definite symptoms, and increasing symptoms, and without there being some evidence of displacement of the heart. Apparently the heart in this patient is in its normal position. Though one knows that neoplasms in the chest remain stationary, or only increase very slowly, I have never yet come across one which decreased in size: a decrease is very improbable unless there has been inflammatory mischief which has subsequently subsided. The growth is very unlikely to be a benign neoplasm. A dermoid, for instance, is improbable, because when once it begins to increase in size, it generally continues to do so.

Dr. LAKIN (in reply): I am pleased to hear Dr. Pritchard's dictum, that any child which has a series of infections close upon one another is very prone to tubercle: to me it is a very valuable piece of clinical information. I cannot find any enlarged glands in this girl's neck or axillæ. That, I consider, is further evidence against the case being one of new growth, and, personally, I am now inclined to regard the case as being tuberculous in nature. But I am very glad to have heard the opinions which have been expressed.

(*October* 27, 1916.)

Case of Juvenile General Paralysis, with Hypopituitarism.

By E. A. COCKAYNE, M.D.

H. McS., BOY, aged 9 years, appeared healthy, bright, and intelligent at school until two years ago. He then became languid, and complained of severe headaches. Later muscular weakness was noticed. Gait began to alter eight or nine months ago, and speech became slurring and indistinct. Sometimes he complained that he could not read owing to lines appearing blurred. He has had no fits, and there is no polyuria. He began to get fat six months ago. His father, a soldier in India eighteen years ago, has been treated recently for locomotor ataxy. His mother has had seventeen pregnancies. There have been seven to nine miscarriages (second to sixth months), and four or five children have been premature, two still-born. Patient was born at full term. Two children are alive and well.

On admission to hospital on July 5, 1916, the boy was dull and

apathetic, with continual tremor of arms and legs. He talked intelligently for a time, and then lapsed into baby talk, with slurring and indistinct articulation. Gait unsteady and with wide base. Knee-jerks exaggerated. Ankle clonus present on both sides. Plantar response flexor. Triceps-jerks exaggerated. Pupils: Right reacted to light and accommodation; left reacted slightly and very sluggishly. Mr. Atlee reports that both disks are chalky white, with very small arteries (optic atrophy). Vision: Right, $\bar{c} + 1{\cdot}5 = \frac{6}{36}$; left, $\bar{c} + 1{\cdot}5 = \frac{6}{60}$. Bulging forehead. Teeth slightly peg-shaped. Very marked deposit of fat all over body, but especially in mammary region, round pelvis, pubic region, hips and thighs. Penis very small. Testicles small. Genu valgum. Wassermann's reaction positive on July 10.

Three intramuscular injections of galyl were given: 0·1 grm. on July 21, 0·15 grm. on July 27 and August 2. He has become slightly worse, and for the first time some loss of control of bladder and anal sphincters has been noticed. On August 11 Wassermann reaction in blood strongly positive.

The boy was under Dr. Carr's care, and as that gentleman could not come himself he was kind enough to allow me to show the case. Between us we have not quite completed the investigations we might have carried out. The case was regarded as one of general paralysis of the insane, but no examination of the cerebrospinal fluid was made. The Wassermann reaction in the blood is strongly positive, so that there is no doubt about the congenital syphilis. We have had the skull skiagraphed, and the pituitary fossa appears to be normal for a child of that age. We gave him 100 grm. of dextrose, but there was no glycosuria. We have noted that the sweating is very deficient. Everything seems to point to a condition of hypopituitarism. I think there is probably some basal meningitis, which has involved the stalk of the pituitary body, cutting off its blood supply. Dr. Scripture has taken some speech-records from the case, which I will ask him to demonstrate on the epidiascope.

Demonstration of Speech Inscriptions from a Case of Juvenile General Paralysis, with Hypopituitarism, by E. W. Scripture, M.D.

The patient's speech was recorded on a revolving blackened cylinder. These inscriptions are the only ones ever made of such a case. Comparison with inscriptions of speech disturbances in other diseases

show that they coincide in some respects with those of early adult general paralysis, and in others with those of progressive bulbar paralysis.

The straight line (fig. 1) at the beginning registers the time during which the lips are shut for the "p" (occlusion). The line rises, and the higher line registers the "explosion" of the "p" as the lips are opened. The faint waves that follow register the vibrations of the vowel "o." The "t" is registered as a straight line (occlusion), followed by a sharp rise. The faint waves that follow register the vowel "a." The following "t" is registered by an occlusion with an explosion. The faint vowel waves

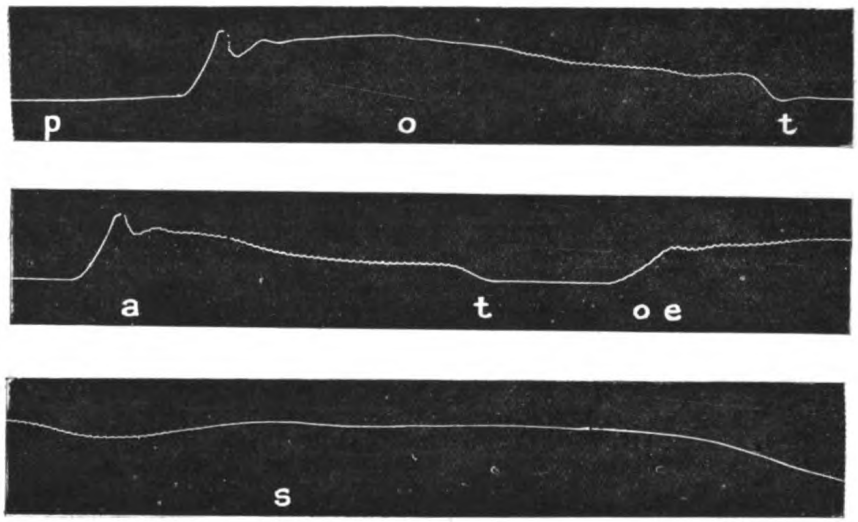


FIG. 1.

Record of "potatoes" by the patient.

of "oe" are followed by a rising line that registers the "s." It is to be noted that the occlusions of the "p," "t," "t," have all about the same length. There are, however, differences in the explosions. That for "p" is long and blowy; the vowel does not begin for some time after the lips have been opened. That for the first "t" is short; the vowel waves begin immediately. With the second "t" the vowel waves begin immediately after the occlusion, and are present during the explosion also. In normal speech the records of the three sounds "p," "t," "t," are practically alike. Here there are variations from the

type; this variation around a type, asaphia, is the result of a cortical lesion. Asaphia is one of the earliest symptoms in adult general paralysis; it is found in the records long before it can be detected by the ear.

This record (fig. 2) was taken a few minutes later than the preceding one. Instead of a straight line with a sharp upward jerk for the "p" there is an irregular rise, that indicates that the lips were not properly closed for the sound. The "s" at the end is an irregular wavy curve instead of a smooth one, indicating improper control of the tongue. These are symptoms of ataxia and weakness, due to bulbar degeneration. In adult general paralysis the bulb symptoms are later than the cortical.

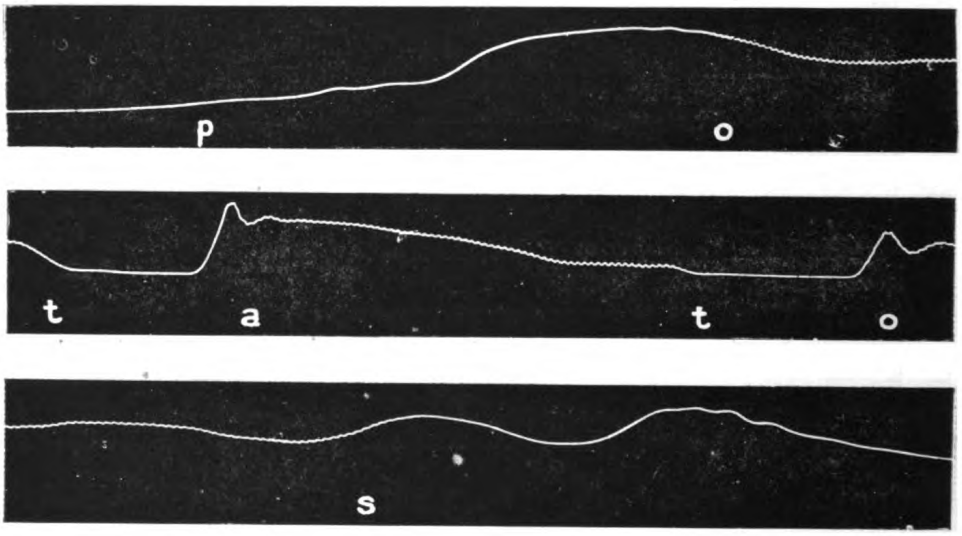


FIG. 2.

Record of "potatoes" by the patient.

An "s" is inserted after "Peter" (fig. 3); this is an illustration of the higher cortical symptom "apraxia." The second "p" of "Piper's" and the double "p" of "peppers" are incorrectly made; the rising line registers a current of breath, and shows that the lips were not closed at all, as they must be for the pronunciation of a real "p." This is an illustration of bulbar ataxia and weakness. During some examples of "p" the fine vibrations show that the larynx continued to vibrate

instead of stopping. This is a common bulbar error. The record thus shows not only asaphia and bulbar ataxia, but also the intellectual degeneration that transposes, inserts, and omits sounds, and produces the symptoms known as apraxia. In adult cases apraxia is an early symptom.

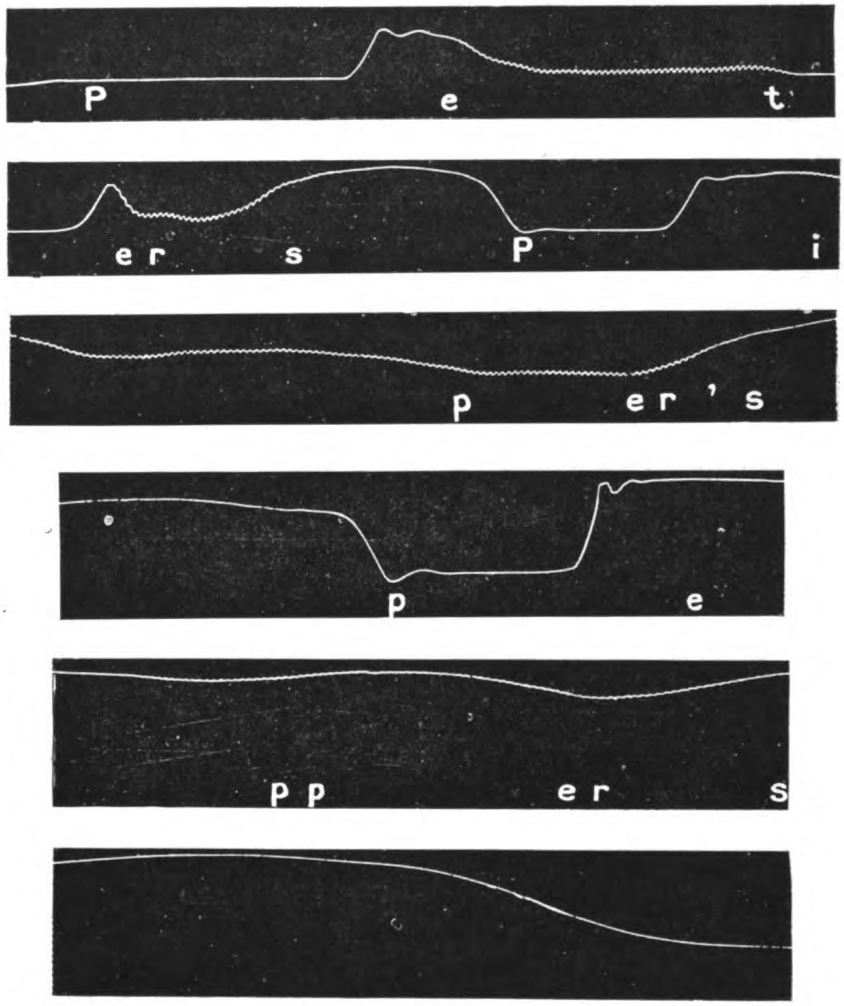


FIG. 3.

Record of an attempt to say "Peter Piper's peppers."

DISCUSSION.

Dr. LANGMEAD: I have recently had under observation a very similar case. It is that of a boy, aged 9 years, whose mental capacity has gradually deteriorated for about fifteen months, his powers of memory especially having undergone a notable decline. During approximately the same time, he has gradually become more obese, and in appearance and development resembles a case of hypopituitarism. Besides the obesity, genital aplasia, gynæcomastia, and the female type of pelvis and thighs are present. There is neither polydipsia nor polyuria. His general appearance and gait closely resemble those of the boy shown by Dr. Cockayne. Other points of close similarity are the speech, tremor, and spasticity. The case is regarded as one of infantile general paralysis and the cerebrospinal fluid gives a positive Wassermann reaction. Two such similar cases seem to show that the combination of infantile general paralysis and hypopituitarism is more than a coincidence.

Dr. F. PARKES WEBER: In an adult man, aged 44 years, who died a little while ago, and in whom there was a certain amount of syphilitic basal meningitis, it is interesting that microscopic examination of the pituitary body showed the presence of syphilitic lymphocytic infiltration in the region of the "pars intermedia." During life, however, the man had not had any pituitary symptoms, unless it were temporary polyuria, and the history of that was somewhat doubtful. I would like to ask whether, in any children's cases similar to the one shown to-day by Dr. Cockayne, there have been microscopical investigations as to the presence of basal meningitis in the neighbourhood of the pituitary fossa; also whether the pituitary body itself has been found infiltrated. In the adult patient, to whose case I have referred, there had been several epileptiform attacks, the first one about seven months before his death.[1]

Dr. COCKAYNE (in reply): I am afraid I cannot answer Dr. Parkes Weber's question, but it is very interesting to hear that there can be infiltration of the pituitary body. I had thought of that, but had not pictured it as occurring. I thought, and still think, that a meningeal condition is more likely to have produced hypopituitarism. I am very interested in the account which Dr. Langmead has given us of his case. If we both pursue our investigations a little further, we shall be enabled to have the diagnosis established with greater certainty than it is at present.

[1] Cf. F. Parkes Weber, "Syphilitic Thrombosis of the Basilar Artery of the Brain, with Remarks on Syphilitic Basal Leptomeningitis, and on a Syphilitic Case in which the Pituitary Gland was Affected," *Clin. Journ.*, Lond., 1916, xlv, p. 405.

(*October* 27, 1916.)

Werdnig-Hoffmann Type of Spinal Muscular Atrophy.

By E. A. COCKAYNE, M.D.

P. R., MALE, aged 3 months. First child. No history of similar condition in family. Apparently healthy at birth. Up to the age of 14 days used to kick and suck his thumbs. Then he began to lose power gradually, and to cry less often. He now lies with arms everted and pronated. The fingers are partially flexed, and the thumbs extended. He can move his arms a little, but the lower limbs are paralysed except the feet and toes. The upper and lower limbs, neck and back muscles are in a condition of flaccid paralysis. There is some paralysis of the intercostal and abdominal muscles, but the diaphragm moves normally. Abdominal reflex, knee-jerks, and tendo Achillis-jerks are absent. Sensation appears to be unaltered. Reaction of degeneration is present in the leg and arm muscles. Some wasting can be detected, but the child is gaining weight, and takes notice and smiles. Bronchitis has been present for some weeks.

A point which I think I have not seen mentioned before is the profuse sweating which this child exhibits. This year I saw a case which died of bronchitis, and the same profuse sweating was also present.

(*October* 27, 1916.)

Case of Œsophageal Stricture.

By ERIC PRITCHARD, M.D., and A. S. BLUNDELL BANKART, M.C.

R. C., A BOY, aged 4 years, was admitted to the Queen's Hospital for Children on August 21, 1916, for "wasting."

Family history: Patient is the youngest of three children. Two others quite healthy. Father healthy. Mother died one year ago of consumption.

Past history: Child healthy till December, 1915. No history of swallowing corrosive or very hot fluid, or foreign body.

Present illness: In December, 1915, patient gradually lost his

appetite, but was not sick after food. In April, 1916, he began vomiting, a little every time after taking solid food, but he never brought up the whole meal. The vomiting occurred at varying intervals after meals. He could keep down fluids and semi-solids. The attacks of vomiting became more frequent, sometimes twice after a meal, and the amount vomited larger. He also began vomiting after taking semi-solid and thickened foods about June, 1916. The interval between taking food and the vomiting became shorter, and finally the vomiting always occurred either while taking food or immediately after taking it. Also the whole meal was vomited. Patient has generally been able to keep down small quantities of fluid.

Condition on admission: Child complained of pain in head and neck. No head retraction. Reflexes and cranial nerves normal. Heart and lungs healthy. Abdominal examination reveals nothing abnormal. Weight, 1 st. 11 lb. 4 oz. Cerebrospinal fluid normal. Fundus oculi normal in both eyes.

X-ray report: There is an œsophageal stricture at the level of the fifth dorsal vertebra. It is very tight, only allowing fluids to pass slowly, and stopping bread and milk until regurgitation occurs. The gullet above is dilated to the level of the third thoracic vertebra by the retained food: above this point any added food is regurgitated. The channel of the stricture seems annular and smooth. No alteration in its size or intensity took place during ten minutes' observation.

Progress: Patient always vomited after thickened foods, such as custard or Benger's food, but has not vomited after taking milk since admission to hospital. The weight has fluctuated, but he has made a net gain of 1 lb.

Examination with œsophagoscope by Mr. Bankart, October 13, 1916: A full-sized bougie was passed down the œsophagus as far as the stricture. After much difficulty a No. 8 gum-elastic catheter was passed through the stricture. This was gripped so tightly that it was very difficult to withdraw it. It was therefore decided to leave it in, but it suddenly got loose and slipped out.

Since October 13 patient has taken thickened foods and thin bread and butter; and has only vomited once.

DISCUSSION.

Dr. ERIC PRITCHARD: Spasm in the œsophagus is rare in a child of this age, and more especially so when the spasm occurs in the middle part of the œsophagus. I think there is no doubt, from Mr. Bankart's surgical observa-

tions, and from the X-ray screen examination, that the stricture is actually about 2 in. above the cardiac end. It does not appear to be a congenital condition, but to have come on when the child was about the age of 3 years, the onset having been more or less gradual. This case, taken in conjunction with one which Mr. Douglas Drew and I showed before this Section in 1914, is interesting from the fact that the latter, though thought to be an organic stricture, ultimately proved to be functional, and this case may also prove to be the same.

Mr. BLUNDELL BANKART: I am not yet sure what sort of stricture this is. I do not think it is entirely spasmodic, although no doubt there is spasm present. Through the œsophagoscope there was seen to be a very minute opening with smooth walls. I think there must be some cicatricial tissue round the stricture as well as spasm in the muscular wall. I hope that when the child has recovered from the scarlet fever we shall be able to get through the stricture again. Since the last attempt the boy has been able to take semi-solid food, a thing which he could not do before.

(*October* 27, 1916.)

Cerebral Diplegia with Abnormal Flexibility ("Atony") of Ankle Joints.

By F. PARKES WEBER, M.D.

THE patient, a boy, C. H., aged 5½ years, was admitted to hospital on August 18, 1916, and was kept under observation till October 16. During that time the child's condition changed very little, but he gained slightly in body weight. Though he is doubtless mentally backward, he is certainly not an idiot, and can understand what one tells him to do, but he can speak very little, and that only in a slow, jerky way. His body is fairly well nourished, but his legs are thin and apparently weak, and there is abnormal laxity of the ankle-joints, permitting *extreme* dorsal flexion (*hyperflexion*, or better, *superflexion*, as illustrated in fig. 3 of the paper by F. E. Batten and W. H. von Wyss, referred to under "Bibliography" at the end). He is very awkward with his upper extremities, and his hands often assume an athetosis-like position. He can, with some difficulty, grasp a piece of cake or anything he wishes to eat, but he can do very little else with his hands except catch hold of things in an extremely awkward (partly ataxic?) way. In spite of the poor-looking development of his feet and legs and

the great super-flexibility of his ankle-joints, there is usually no real muscular atony. The muscles of the legs contract well, and he can move his legs freely when lying on his back in bed. He can sit up and hold his head up. When held up by the arms he will endeavour to walk. The knee-jerks are always present, and are sometimes greatly exaggerated. The plantar reflexes are sometimes (but not always) definitely of the extensor type (Babinski's sign). A most striking feature is the "overflow" of the superficial abdominal reflexes; the response is not limited to contraction in the muscles of the abdominal wall, but it involves considerable movements of the thighs and trunk.

There can be no doubt that the condition dates from birth. The birth was a difficult one (breech presentation), and I suppose that some widespread symmetrical damage to the cerebrum (and ? cerebellum) resulted. Possibly there was diffuse bilateral meningeal hæmorrhage injuring the cerebral cortex. The mother has two other children, who are normal, excepting that one of them has nocturnal enuresis.

In the hospital there was frequently slight evening pyrexia (to 100° F.), and the child has perhaps some tuberculosis of lymphatic glands in the thorax. Dr. James Metcalfe, after examination of a skiagram of the thorax, reported that there were many small enlarged hilus glands. There are no signs of rickets whatever. The fundi of the eyes (Dr. R. Gruber) are normal.

I hesitate to classify the case as one of the "Atonic (Hypotonic) Type of Cerebral Diplegia," because there is, I think, no real condition of muscular atony or hypotonia present—at all events, not always present; but certainly in some respects it resembles cases that have been described under that heading, notably in regard to the feeble-looking legs, the super-flexibility of the ankle-joints, and the "overflow" of the superficial abdominal reflexes.

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Section for the Study of Disease in Children.

President—Mr. SYDNEY STEPHENSON, C.M.

(Chairman—Dr. LEONARD GUTHRIE.)

(*November* 24, 1916.)

Case of Family Splenomegalic Acholuric Jaundice.

By LEONARD GUTHRIE, M.D.

A. R., AGED 10 years, was brought to hospital on September 7, 1916, on account of her yellow skin and occasional "bilious attacks." At the age of 9 years she had icterus for a short time, and has always been slightly yellow since. The "bilious attacks" at first occurred monthly, but she has only had three during the present year. They usually happen in bad weather. She does not vomit, but complains of headache, nausea and of feeling seedy. The yellowness becomes darker, the urine becomes "like tea," and the stools remain brown during these attacks, which last two to three days. In the intervals she is perfectly healthy, runs about and plays, and is a "tomboy."

Past history: She was subject to bronchitis until the tonsils and adenoids were removed at the age of 2½ years.

Family history: No history of tuberculosis. Mother healthy. Father had icterus at the age of 9 years for a short time and has been yellow ever since. At the age of 30 years he was in St. Thomas's Hospital for broken legs, and was treated for jaundice by calomel (13 gr.). Three years ago he was told that he had a large and "interesting" spleen. Until three years ago he was liable to attacks of gastritis, but since wearing a belt, and dieting himself, he has been better, though he always feels unwell in bad weather. He works hard, and considers his health generally good. There are three children, all girls, in the family, and one died (the first-born) of meningitis at the age of 10 months. The second daughter has suffered from ascites (*see* case

following). The youngest, aged 3 years, has quite recently become sallow like her sister; the spleen can be easily felt below the ribs, and the conjunctivæ are slightly icteric.

Present condition: A well-grown fairly healthy looking girl. Makes no complaint of any kind. Lips and mucous membranes distinctly pale. Skin generally is of a pale brownish-yellow hue. Conjunctivæ are primrose yellow, which varies in depth from day to day. Heart and lungs healthy. Faint systolic (hæmic) bruit heard at cardiac base. Pulse regular, rate 96, fair tension and volume. Abdomen not distended. Spleen can be felt 7 cm. below costal margin in nipple line. It is smooth and rather hard. Both anterior and posterior borders can be palpated, and the organ can be nearly encircled by hand. The enlargement is downwards rather than towards the umbilicus. Liver can be felt 2 cm. beneath the costal margin. Its edge is smooth. Submaxillary glands are enlarged, but not shotty. Urine: Acid, clear, dark in colour; it contains no bilirubin, but gives the chemical reaction for urobilin; spectroscopic test not available; albumin, sugar, acetone, bile are absent. Stools very deeply pigmented brown; apparently free bile present. Blood: Wassermann reaction negative; red blood corpuscles, 3,320,000 per cubic millimetre; white blood corpuscles, 5,000 per cubic millimetre; hæmoglobin, 65 per cent.; colour index, 1; poikilocytes, present; polychromatophilia, slight; nucleated red cells, none. Differential count: Polymorphonuclears, 67·6 per cent.; small lymphocytes, 27·2 per cent.; large mononuclears, 3·2 per cent.; eosinophilia, 1·2 per cent.; mast-cells, 0·8 per cent. Fragility of red blood corpuscles (Mr. Herbert Perkins's report): "This blood is completely laked by salt of 0·4 per cent., whilst hæmolysis is completely inhibited by salt of 0·5 per cent. Two control bloods examined at the same time under identical conditions were completely laked by salt of 0·3 per cent., whilst hæmolysis was completely inhibited by salt solution 0·4 per cent."

(*November* 24, 1916.)

Case of Ascites of Obscure Origin.

By LEONARD GUTHRIE, M.D.

G. R., AGED 7 years 7 months, sister of preceding patient, was admitted to hospital on May 10, 1916. Complaint, swelling of abdomen, noticed two days.

Family history: *See* preceding case.

Past history: Measles, whooping-cough. A very nervous child, subject to "habit chorea" for about three months. Otherwise perfectly well until three weeks ago, when frequency of urination commenced. No large amount of urine was passed. There was slight pain in the lower abdomen and at the pit of the stomach before micturition. Bowels always regular, no diarrhœa, no vomiting, no cough nor night sweats. She had attended school until the week of admission.

Condition on admission: A fairly well-nourished and well-developed child. Skin a little sallow, but lips and mucous membranes of good colour. Thorax: Well shaped; lungs clear on auscultation and percussion; heart not enlarged, sounds clear and strong, a systolic hæmic murmur heard at base and along sternal margin. Abdomen: Much distended, flanks bulging, dullness practically everywhere up to umbilicus, and fluctuation easily elicited. No pain nor tenderness on palpation, liver and spleen could not be felt owing to abdominal tension. No glands nor other masses were palpable. The swelling had only been noticed for two days, and had rapidly increased. Lymph glands nowhere enlarged. Urine: Acid, clear; trace of albumin; occasional finely granular casts seen under microscope.

May 14, 1916: Von Pirquet's reaction positive but late in appearance. Temperature, 97° to 100° F. Abdominal circumference, 63 cm. Child makes no complaint of pain. There is no frequency of micturition now.

May 21: Abdomen much more distended. Child no longer able to sit up. Heart displaced upwards, maximum impulse in second intercostal space.

May 29: Operation became necessary owing to displacement of heart and embarrassment of respiration. Mr. FitzWilliams opened the abdomen and evacuated about a gallon of fluid. Patient bore the operation well, and in the evening said she could breathe much better. The heart's apex had descended to the third left interspace.

June 1: Patient much more comfortable since operation. Heart's apex now in fourth interspace. Abdomen still considerably distended, but by flatulence. Temperature subnormal or normal.

June 11: Patient sitting up and quite happy. Abdomen fairly natural-looking. A little fullness still present. In appendix region is a small indefinite mass, and to the left of umbilicus are numerous small deep irregularities. No definite large mass or band of adhesions to be felt. Liver and spleen not palpable.

June 26: Sent to convalescent home for a fortnight. Patient was perfectly well and had no symptoms of any kind. She has been under observation until present time. There has been no return of fluid, the liver and spleen are not enlarged, and no masses of any kind have been detected in the abdomen.

Remarks.—Nothing was known of the family history of splenomegalic acholuric jaundice until after the patient's discharge from hospital. The ascites was regarded as tuberculous. The positive von Pirquet's reaction, the slight pyrexia, and the discovery, after evacuation of the fluid, of small indefinite masses which may have been glands are points in favour of tuberculosis. No tubercles were seen at the time of operation, but no special search was made for them. On the other hand, if tuberculous, the course of the ascites was unusual. The amount of fluid in such cases is seldom excessive, it does not increase rapidly, and it subsides as a rule under rest in bed and graduated pressure. In this case, under similar treatment the fluid rapidly increased and caused such pressure and displacement of the heart and lungs that operation was inevitable. The question of possible relationship between the ascites and the family complaint therefore arises. The patient up to the present has not been jaundiced, nor is the spleen enlarged, nor is she anæmic like her father and sisters. But it may be that she will develop these symptoms later, and that the ascites was an early and unusual manifestation of the family complaint. It will be remembered that in Banti's disease splenomegalic anæmia is followed by cirrhosis of the liver and ascites. The cause of the cirrhosis in such cases is unknown, and there is therefore no reason for denying that it may precede instead of following the other symptoms.

DISCUSSION.

Dr. HUGH THURSFIELD: I should like to urge Dr. Guthrie to have splenectomy done for this child. The reason is, that although it is perfectly true that, in a large number of cases, there is no material disadvantage in the condition, yet in a certain number of cases—and I think this is one of them—the anæmia which is apt to come on, and the attacks of pain, to a certain extent disable the patient from earning her living as she grows up. Also, in some cases, during the exacerbations of the disease, the colour is a disadvantage where looks are taken into account. The result of splenectomy, when done in children, is so brilliantly successful, because not only does it relieve he condition but apparently cures the disease: therefore I urge it should be done in this case at once. With regard to the pathology of the disease, I think the

results of splenectomy go very far to establish it as a primary splenic disease. A good many of the cases are isolated ones, not family cases nor apparently inherited, but I am not aware that they differ in any degree from the family or inherited cases. With regard to the fragility of the corpuscles, which is such a striking phenomenon in these cases of acholuric jaundice, I do not think that has any causal connexion with this disease at all. Some people have held that this fragility is a primary factor, leading to the destruction of the corpuscles, but it does not seem to me that that can be maintained. If in a normal person, for any reason, you remove the spleen, you profoundly alter the fragility of the corpuscles: the resistance of the corpuscles to hæmolysis is considerably increased: and the same obtains in many other conditions. But the normal spleen apparently exercises a certain hæmolytic effect on the normal red blood corpuscle, and when the spleen is removed, that effect is also removed, and the resistance is increased. I suppose that in acholuric jaundice the function of the spleen is disturbed, and I think that is the primary factor in the disease. I now know of four cases in which fragility has been tested after splenectomy, and in all the fragility has returned towards the normal: in two it went back to the normal. I do not know of a case in which it has gone beyond the normal, as one would expect in an ordinary person. One case was recorded in which there was practically no alteration in the fragility for more than a year afterwards, but whether that has continued I do not know. After removal of the spleen, the fragility of the corpuscles gets less and less, until it arrives at about the normal, and the normal is extraordinarily steadfast. I think Dr. Guthrie's figures do not correspond with the general experience, which is that hæmolysis begins or ends with a salt solution of a strength of 0·47 per cent.

Dr. PORTER PARKINSON: May I say a word on the other side? I think this girl is rather lucky. During the whole of the present year she has had only three bilious attacks, which, I understand, were only slight ones—slight nausea, without vomiting. That, it seems to me, is a very slight justification for the performance of splenectomy. Of course, if she develops more serious symptoms later, then operation may be thought of with more reason. With a disease which is not fatal, and which often does not even lead to grave results, especially as this child has at present only had slight symptoms, I should be inclined to wait. During the time of waiting there would be no objection to seeing what the application of X-rays over the spleen region might do: possibly it might clear up the condition. I should like to know what is the percentage of fatalities after splenectomy. I know the figure has been reduced, but it is still a decidedly serious operation, too much so, I consider, to carry it out in the present case.

Dr. F. PARKES WEBER: In this family group of splenomegalic acholuric jaundice I understand that the father and three daughters are affected. In the family group which I described some years ago, the father, two

daughters and one son were affected.[1] With regard to the pathology of the disease, and indirectly with regard to treatment, we certainly have two definite data. One is that there is an abnormality in the blood and blood-forming organs, and the other is that the spleen is enlarged. It is obvious that if the spleen is enlarged (hypertrophied) because it is functionally too active in destroying the red blood corpuscles, the blood-forming bone-marrow must supply an increased quantity of red blood corpuscles to make up for the excessive hæmolysis in the spleen. This would explain the presence of polychromatophilia and the occasional presence of nucleated red blood cells in some cases. On the other hand, if the primary fault were in the erythro-poietic tissues (bone-marrow), and if they were producing imperfect red cells, one would suppose that the spleen would be secondarily overworked, and would consequently become enlarged (hypertrophied), owing to its function of destroying imperfect red blood cells. Unfortunately, the results, so far, of splenectomy do not seem completely to have settled the question as to whether the disease is primary in the spleen or in the bone-marrow. I do not think that the disease is entirely got rid of by splenectomy, though in some cases the operation has certainly done good. In children who appear so well as do those shown to-day, I should hesitate to advise immediate splenectomy.

Dr. GUTHRIE (in reply): I am much obliged to those who have taken part in the discussion. Until recently, I was of the opinion that it was the fragility of the red blood corpuscles which was at fault, and a tendency to fragility which was inherited, and therefore accounting for the family disease. But, according to Dr. Thursfield, the fragility is a secondary affair: it is the spleen which is at fault. With regard to operation, what he has said is extraordinarily interesting, and seems to prove his point that splenectomy has a considerable effect on these red blood corpuscles, and does, in time, reduce their fragility. But both Dr. Parkinson and Dr. Weber argue, as I was inclined to do myself, that these cases do remarkably well. The father, now aged 42 years, although he has been jaundiced since the age of 9 years, has always been able to do his work. One does not like to persuade parents to un the risk of losing their children by allowing splenectomy to be carried out unless it is quite necessary. This child has anæmia, as the red blood corpuscles are down to 3¼ millions, and if this gets worse one might alter one's opinion and give her the chance which operation seems to afford. At present I propose to "go slow," and follow Dr. Porter Parkinson's advice and try X-rays.

[1] F. Parkes Weber and G. Dorner, "Four Cases of Congenital Acholuric Jaundice in one Family," *Lancet*, Lond., 1910, i, pp. 227-232.

(*November* 24, 1916.)

Case of Dystrophia Adiposa Genitalis, with Congenital Lues.

By FREDERICK LANGMEAD, M.D.

A. B., AGED 15 years and 10 months. The boy has always been backward. For the first three years of his life he was under constant medical care for "general weakness, wasting, and skin rashes." He did not walk until the age of 3 years, and could not speak distinctly until aged 4 years. At school he did not learn, take part in games, or make friends with other boys. When he was aged 13 years it was noticed during routine examination that he could not see with the left eye. After leaving school he started work (upholstering), but seven weeks later caught his fingers in a machine, and two of them had to be amputated. Soon afterwards he developed a facial tic, which persists. He is stunted and obese, and feminine in build. Mentally he is childish, equal perhaps to a child aged about 7 years. His scrotum and penis are very small, and the testicles rudimentary. There is slight fullness of the breasts. Hair is absent from face, axillæ, and pubes. He has some want of control over the bladder, but there is neither polydipsia nor polyuria, the amounts passed in twenty-four hours varying from 13 oz. to 50 oz., and averaging about 30 oz. Well-marked stigmata of congenital lues are seen in the scars at the angles of the mouth, the Hutchinsonian teeth, and the eyes. Ophthalmoscopic examination of the eyes (Mr. Leslie Paton) shows advanced disseminated choroiditis with waxy atrophy of the disks much more marked in the left eye than in the right. The visual defect is therefore local in origin. A skiagram shows perhaps a little smallness of the pituitary fossa and prominence of the posterior clinoid processes. About 130 grm. only of dextrose could be retained, and were followed by no glycosuria. The sugar content in the blood is about normal. His father died when aged 45 years from general paralysis, and his mother has tabes dorsalis. An elder sister aged 21 years, and a younger brother aged 8 years, are in good health.

At the last meeting of the Section Dr. Cockayne showed a boy affected by general paralysis combined with hypopituitarism, and, in the discussion which followed I was able to record a similar case. The

present case is shown because it is a third example of the association of inherited syphilis with defective pituitary activity. This combination cannot be merely fortuitous. How it has arisen is, at present, undecided; possibly there is a syphilitic infiltration of the gland.

DISCUSSION.

Dr. F. PARKES WEBER: In a case of acquired syphilis, with moderate syphilitic basal leptomeningitis, the necropsy showed that the pituitary body was infiltrated with lymphocytes. In some such cases the syphilitic lymphocytic infiltration might not prove fatal, but might lead to pituitary syndromes, such as "dystrophia adiposa genitalis," or diabetes insipidus.[1]

Dr. COCKAYNE: It would be interesting to know whether the cerebrospinal fluid would give a positive Wassermann reaction in this last case. It is unlikely that the pituitary condition has no connexion with the syphilis.

Dr. LANGMEAD: The cerebrospinal fluid has not been tested, but I will bear it in mind.

(*November* 24, 1916.)

Case of Diabetes and Infantilism.

By J. PORTER PARKINSON, M.D.

Q. A., AGED 10 years, was healthy and fat till four years ago, but since then she has become much thinner, been very thirsty, and has had an excessive appetite; for about three months the parents have noticed that she passed excessive amounts of urine. The family history is very good; there are three other children quite healthy, and patient has had no previous illnesses. She has hardly grown at all during the last four years.

On admission to the hospital in April, 1916, she was seen to be much undersized and very thin, her height was 41 in. and weight 35 lb., in other words the height of a child aged 5 years, and her weight under the average for that age. The breath was foul owing to numerous bad teeth. The thoracic and abdominal organs appeared healthy, but she passed from 30 to 60 oz. of urine a day, containing usually from 400

[1] Cf. F. P. Weber, "Syphilitic Thrombosis of the Basilar Artery of the Brain, with Remarks on Syphilitic Leptomeningitis, and on a Syphilitic Case in which the Pituitary Gland was Affected," *Clin. Journ.*, Lond., 1916, xlv, p. 405.

to 800 gr. of sugar, but occasionally amounting to about 2,000 gr. a day due to increased output of urine, the amount of sugar being 15 to 20 gr. to the ounce of urine. The specific gravity of the urine was about 1040; there was usually a well marked acetone reaction, but no albumin, casts, pus or crystals. There was a slight deposit of bladder epithelium. During her stay in hospital she had a streptococcal sore throat, with an abscess in a gland at the angle of the jaws.

She was given a fairly strict diabetic diet without any result in lessening the output of sugar, and 3 gr. of opium daily also produced no result. From time to time the patient was starved for twenty-four hours, taking nothing but black coffee and well boiled cabbage, and after each of these fasting days the amount of sugar was very appreciably lessened, being often about a quarter of the usual average, though it had no effect on the output of water. After five months the patient left the hospital in much the same condition as on admission, having only gained 2 lb. in weight.

X-ray photographs have been made by Mr. Ulysses Williams, who reports that the sella turcica is normal in size and shape in proportion to the small size of the skull. It measures antero-posteriorly 8 mm., and in depth 7 mm. The radial epiphyses are clearly abnormal in size and shape. All the centres of ossification of the carpal bones have appeared, but the size and shape of the bones themselves suggest those of a child of six.

Growth seems almost to have ceased for the past five years, during which time the symptoms of diabetes have been present; there is no evidence of affection of any gland except the glycosuria. The infantilism is of the Lorain type.

It is a typical case of diabetes, for the patient has all the appearances of a patient suffering from that disease, and she has passed large amounts of sugar.

DISCUSSION.

Dr. F. PARKES WEBER: I should like to ask Dr. Parkinson what he thinks as to the prognosis in such a case. I suppose it is extremely bad, and that the child is likely to die within a few years of diabetic coma. I think the rather florid appearance of health is an unfavourable rather than a favourable sign in diabetes in early life.

Dr. ERIC PRITCHARD: In view of this being of the pancreatic type, have any tests been performed to gauge the efficiency of the pancreas? Has Dr. Parkinson given pancreatic extract? He says the amount of water passed

has not materially lessened during the period of starvation, and I should like to know whether the amount of water given to the child during that period was altered in any way.

Dr. PORTER PARKINSON: In answer to Dr. Weber, I agree with him that the prognosis in such a case as this is very bad, and that the false appearance of health, including the malar flush, shows its seriousness. I think the end may come at any time in coma. There is no sign of disease of the lung, nor anything of that sort. We know that acetonæmic coma is the commonest form of death in these cases. In answer to Dr. Pritchard's question, she is taking polyglandine, which contains pancreatic with other extracts. I gave her that not only to influence the diabetes, but also hoping to do something for the infantilism. She has not yet been taking it long enough for me to see whether it is having any effect. When she was kept hungry I did not limit the intake of water at all. She strongly objected to the hunger, and if I had restricted the water too there would have been trouble. In spite of anything of that sort, the quantity of sugar washed out was very much smaller. I was surprised at that, because it takes several days of starvation to empty the liver of glycogen and other substances.

(*November* 24, 1916.)

Case of Dermato-myositis.

By E. BRONSON, M.D. (U.S.A.).

(For Dr. G. A. SUTHERLAND.)

HISTORY: Female, aged 5 years, was admitted to the Paddington Green Children's Hospital on August 29, 1916, with the complaint of rheumatism. One month before admission patient had had pains in her hands and a week later in her legs as well. Gradually all the joints in her body became sore, spine, fingers, and toes, as well as arms and legs. She was about the house until one week before entering hospital, when she was put to bed on the advice of the family physician. She had had no sore throat. Nothing abnormal had been noticed about the digestive and urinary system.

Past history: Generally a healthy child. Only illnesses, measles and chicken-pox.

Family history negative.

Examination (special condition): Skin was moist, smooth, and showed no eruption; over the hands and wrists, one could not pick up skin from subcutaneous tissues, nor subcutaneous tissues from muscles.

This condition extended up the forearms, ending gradually below the elbows. There was distinct swelling, slight flushing, local temperature, and tenderness on palpation. Movement at the wrist was painful. The fingers were flexed in a claw position, and could not be completely extended. In the popliteal space there was a condition similar to that of the forearms, and tenderness was especially noticeable here. The toes were similar to the fingers, but in a less degree. Patient was not able to flex the spine normally, and complained of pain when the head was brought forward.

Further examination showed no pathological conditions, except hypertrophied and unhealthy tonsils, and a slightly enlarged spleen. Urine examination negative. Wassermann and von Pirquet reactions negative.

Blood examination showed: Hæmoglobin, 92 per cent.; red blood cells, 5,180,000; white blood cells, 23,000. Differential count: Polymorphonuclears, 50 per cent.; small lymphocytes, 36 per cent.; large lymphocytes, 4·8 per cent.; eosinophiles, 3·6 per cent.; basophiles, 1·6 per cent.

Progress: During a three weeks' stay in the hospital there was no noticeable improvement, except a diminution of pain. Tonsillectomy was performed with no complications following. She was under observation as an out-patient for six weeks. During that time the induration increased in extent, and the mother stated that the child was unable to run or go up stairs rapidly. There was still complaint of pain, but less than when she was admitted to the hospital.

Patient was readmitted on November 11, 1916, with generalized hardening of subcutaneous tissues and muscles. The skin over the forearms and legs was slightly flushed, and the face was much flushed. There was a marked *tache cérébrale*. Again, nowhere over the body—face, back, thorax, abdomen, and extremities—could one pick up the skin from the subcutaneous tissues, nor the subcutaneous tissues from the muscles. On the upper half of the anterior surface of the thighs, over the gastrocnemic and deltoid muscles, there were slightly raised indurated pads of tissue. No marked tenderness was elicited anywhere. The joints moved freely within a range limited by induration of overlying tissues. The tongue was protruded freely, and speech was unimpaired.

Patient has had radiant heat baths, in which she perspires freely, and massage for the past two weeks. During this time there has been noticeable softening of the subcutaneous tissues, especially over the flexor surfaces of arms and legs, also on the face, back and abdomen.

DISCUSSION.

The CHAIRMAN (Dr. Guthrie): Was there any rise of temperature in this case?

Dr. F. PARKES WEBER: I think sclerodermia may, roughly, be divided into two classes. In the first class the disease consists of one or more localized patches. In the second class the disease is generalized, and in the extremities it is symmetrical (so-called "sclerodactylia"), and at the commencement is usually associated with more or less swelling. When the disease runs an unfavourable course the turgid swollen condition of the hands or feet, or both the hands and feet, gives place to an atrophic "hide-bound" state, from which recovery can no longer be expected. The patches in the first type sometimes have a zoniform distribution. The second type usually begins, in both adults and children, with a brawny swelling, more or less symmetrical, especially involving the hands or feet, or both the hands and the feet; the face is also frequently affected, more or less symmetrically. The prognosis in these generalized cases is, that as long as there is a swollen appearance like "hard œdema" there is always hope of improvement; it is when there are atrophy and contractures that one cannot expect much return towards the normal. The more œdema and turgidity there are, the greater is the chance of improvement, and this has been illustrated to some extent by cases shown before various sections of the Royal Society of Medicine. Another point is, that in the generalized type the muscles are sometimes involved as well as the skin. Though, however, there may be a muscular or "myositis" element present, it is convenient to adhere to the terms "sclerodermia" and "sclerodactylia," and to reserve such terms as "dermato-myositis" for other diseases. Certain cases have been described under the headings "dermato-myositis," "poly-myositis," &c., which are probably of altogether different nature, the patients having appeared extremely ill, and some of them having died of heart complications. I believe that the case shown to-day may well be included under the category of the generalized type of sclerodermia: in some parts recovery has already taken place, but the symmetrical affection of the hands is still characteristic of sclerodactylia, and is not likely to be completely recovered from.

Dr. LANGMEAD: In a similar case which I brought before the Section, the condition of the hands and of the skin was identical. The muscles in my case were, however, more definitely affected, such muscles as could be palpated readily, notably the pectorales majores, feeling like leather bands. The tendons, too, were shortened, this causing marked deformity of the knees and elbows, by fixing them in the flexed position. In the present case fibrosis of the muscles is more difficult to demonstrate and open to question. The pectorals can be moved freely, and when gripped do not appear to be unduly hard. Other muscles are less easy to palpate through the dense skin and

subcutaneous tissue, and their hardening or otherwise is difficult to determine. With Dr. Weber I agree that such a condition does not comply with the published American descriptions of dermato-myositis, but is more accurately described as sclerodermia of the diffuse form, with sclerodactyly and fibrosis of muscles. In the case which I recorded the affection was congenital. Ultimately the skin became normal, but the sclerodactyly and fibrosis of muscles, with the consequent deformity, has persisted. The general health of the patient has remained good, and a series of exanthemata and an attack of pneumonia have been countered without seriously affecting it. In diffuse sclerodermia it would appear that generally the condition is limited to the skin; sometimes the muscles are also affected, sometimes the serous membranes as well. The relationship between it and the dermato-myositis described by American writers requires further elucidation.

The CHAIRMAN (Dr. Guthrie): The case is an extremely interesting one. I agree with Dr. Langmead that cases which have been described as dermato-myositis have not much resemblance to this case. And my mind is not clear that in this case there is any real affection of muscles. Miss Bronson and Dr. Weber said that in a certain number of cases of sclerodermia there is undoubtedly an affection of muscles. That is one reason for calling it sclerodermia; at the same time, I do not feel that there is sufficient evidence of hardening of muscles to speak of the condition as one of myositis. For some time I was inclined to doubt my own powers of observation, because when at first one handled the muscles, especially the pectorals, they were hard, but by the exercise of a little patience relaxation gave one the impression of quite normal muscle.

Miss BRONSON (in reply): When the patient entered the hospital there were irregular elevations of temperature to 100° F. Now the temperature has settled down to normal, with occasional rises to 99° F. There is a marked history of pain in this case, which is not usually reported with cases of sclerodermia without muscle involvement. The leucocytosis of 23,000, points to some infection. In regard to a combination of myositis with both types of sclerodermia in the same individual, Petges and Clėjat[1] described a case with induration of the subcutaneous tissues and muscles of the extremities of the generalized type of sclerodermia, but with plaques of the ordinary type over the abdomen. After one and a half years this case came to necropsy, showing interstitial sclerosis and degeneration of fibres in the muscles of the extremities and the usual skin and subcutaneous changes.

Postscript.—The discussion of this case revolved round the question as to whether the condition was sclerodermia or myositis. The possibility of a combination of these two conditions I did not hear mentioned. In going over a considerable number of cases in the literature, I

[1] *Ann. de Derm. et de Syph.*, Par., 1906, 4me sér., vii, p. 550.

have found cases reported as sclerodermia in which the microscopic examination showed degeneration of muscle fibres, infiltration with mononuclears and fibrotic changes—lesions similar to those described in myositis. I have also come across cases described as myositis with the typical characteristics of generalized sclerodermia. Oppenheim[1] published a case as myositis. He described the swelling as massive, involving skin, subcutaneous tissues, and muscles. He mentioned the hardness of the muscles and the apparent binding together of muscle groups by an interstitial myositis. Four years later he regarded this case as sclerodermia with involvement of the connective tissues of the muscle bundles, secondary to involvement of subcutaneous tissues. The differential diagnosis is obscured by the confusion in the literature as to what is generalized sclerodermia and what is dermato-myositis. Is the muscle degeneration found pathologically due to an infection of the muscle itself, or is it due to anæmia, the result of pressure from the swollen subcutaneous and interstitial tissues, as in Volkmann's ischæmic paralysis? If the muscle involvement is secondary to the subcutaneous involvement, the term "sclerodermia" might be used to describe cases like the one shown before the meeting.

(*November* 24, 1916.)

Hereditary and Familial von Recklinghausen's Disease.

By J. D. Rolleston, M.D.

Two sisters, aged 19 and 11 years respectively. They were shown with their father at the Clinical Section on January 13, 1911,[2] under the title of "Familial Pigmentary Dermofibromatosis." The father has a generalized eruption of molluscous tumours, punctiform pigment spots and *café-au-lait* patches. The mother is not affected. The eldest daughter, since 1911, has developed a large spherical tumour on the inner side of her right upper arm. It is freely movable and quite painless. The molluscous tumours, *café-au-lait* patches, and punctate pigment spots have not shown any decided increase since 1911. In the younger girl the *café-au-lait* patches and punctate pigment spots have increased in number and size, but no molluscum has developed.

[1] *Berl. klin. Wochenschr.*, 1903, xli, p. 381.

[2] *Proc. Roy. Soc. Med.*, 1911, iv (Clin. Sect.), pp. 71, 114.

Cases of hereditary and familial von Recklinghausen's disease are not very common. In 1900 Alexis Thomson[1] collected ten such cases, in 1912 another twenty-two were collected by myself and Dr. MacNaughtan,[2] and since then I have found nine in the literature[3]—a total of forty-one cases.

(*November* 24, 1916.)

Case of Hereditary Neuro-fibromatosis (von Recklinghausen's Disease).

By E. A. Cockayne, M.D.

The mother of the children, an Englishwoman aged 35, is of dark complexion. She has numerous freckles and there are many *café-au-lait* patches on the trunk and limbs. On the dorsum of the left wrist and right hand there are sessile molluscous tumours, bluish in colour. Above the left breast is a patch of thickened skin which is irregular in shape and is probably neuro-fibromatous in nature. She states that there are some flat molluscous tumours above the sacrum. She has only two children. The elder, H. D., a boy aged 5 years 7 months, has a number of *café-au-lait* patches on the trunk, situated both in front and behind. Most of them are oval. He has in addition an irregular raised area of skin of a bluish-red colour above the left nipple. All these were present at birth. He is nervous and restless, but not mentally defective. The younger child, D. D., a girl aged 10 months, has several oval *café-au-lait* patches on the trunk, especially on the left side of the trunk. These have been present since birth. She appears to be of normal intelligence. The mother knows of no other cases in the family.

[1] "On Neuroma and Neurofibromatosis," Edinburgh, 1900.

[2] *Rev. of Neur. and Psych.*, 1912, x, p. 8.

[3] Pierret and Sergeant, *Echo méd. du Nord*, 1911, xv, p. 592; Scott, *Indian Med. Gaz.*, 1911, xxvi, p. 428; Leriche, *Deutsch. Zeitschr. f. Chir.*, 1911, cxi, p. 314; Kolepke, *Zeitschr. f. orthop. Chir.*, 1911, xxix, p. 367; Wolfsohn u. Marcuse, *Berl. klin. Wochenschr.*, 1912, xlix, p. 1088; De Haan, *Nederland. Tijdschr. v. Geneesk.*, 1912, i, p. 1492; Steen, *Indian Med. Gaz.*, 1912, xlvii, p. 400; Mathies, *Zeitschr. f. klin. Med.*, 1913, lxxvii, p. 50; Herxheimer and Roth, *Beitr. z. path. Anat. u. z. allg. Path.*, 1914, lviii, p. 319. (Abstracts of these cases will be found in the *Rev. of Neurol. and Psych.*, 1912-14.)

DISCUSSION.

Dr. F. PARKES WEBER: I once described a case (without familial history) in which there were practically no molluscous tumours, though there were the typical patches of pigmentation of the skin, and I regarded it as one of *incomplete* Recklinghausen's disease.[1] I do not think the patches and spots of cutaneous pigmentation in cases like those shown by Dr. Cockayne to-night differ at all in appearance from ordinary pigmentary nævi, one or two of which occur in about 50 per cent. of normal persons, apparently from quite early life. Were some of these pigmented patches present at birth, or in the first years of life, in the family cases shown to-day by Dr. Cockayne and Dr. Rolleston?

Dr. COCKAYNE (in reply): I know of no way of distinguishing the patches in this patient from those of ordinary nævus. With regard to the question whether they were present at birth, the mother states they were present in both children at birth, and the baby now is aged only 10 months, so that the statement is probably correct.

Dr. J. D. ROLLESTON (in reply): I cannot say, definitely, when they appeared, but I understand from the mother that they were seen shortly after birth.

(*November* 24, 1916.)

A Case of Chest for Diagnosis.

By ERIC PRITCHARD, M.D.

J. C., A BOY, aged 9 years, was admitted to the Queen's Hospital for Children, on October 24, 1916.

History of present illness: On July 15, 1916, patient was knocked down by a motor-car; he was cut and bruised about the head and neck; but his chest was not hurt. On July 16, he started coughing and complained of pain in his chest. The cough was most troublesome the first thing in the morning. There has never been any sputum. The appetite is poor and the patient has been losing weight.

There is no history of tubercle in the family.

Condition on admission: The left side of the chest measures $\frac{3}{4}$ in. less than the right side. Percussion note dull all over upper one-third

[1] *See* F. P. Weber, "Cutaneous Pigmentation as an Incomplete Form of Recklinghausen's Disease, with Remarks on the Classification of Incomplete and Anomalous Forms of Recklinghausen's Disease," *Brit. Journ. Derm.*, 1909, xxi, p. 49.

of the left side of the chest, tympanitic in the axilla below level of nipple.

Breath sounds were very weak over the left lung: no adventitious sounds. Vocal fremitus decreased on left side. Heart displaced to the left side. Abdomen: Nothing abnormal detected.

Progress of case: There was slight fever on admission, but after a day or two the temperature was normal. On November 5, temperature was 102° F., patient's breath was offensive and the cough was very troublesome; but there was no sputum. The temperature remained up for four days, but has not been up since. Patient has gained weight. Lungs: The percussion note is tympanitic in the lower half of the left axilla: there is a small area to the left of the vertebral column over which the percussion note is resonant, but over the rest of the left side of the chest it is dull.

The breath sounds are very weak over the left side of the chest. The heart sounds are heard very well all over the left side of the chest in front.

DISCUSSION.

Dr. T. R. WHIPHAM: I examined this case, and I thought it was one in which the history might be partly disregarded. The physical signs point to interstitial pneumonia. I think the boy had pneumonia at some time, and now has some resultant fibrosis of the lung. Possibly the variations in the physical signs which have been found may be accounted for by his accident: he may have had a temporary pneumothorax from slight rupture of the lung.

Dr. F. PARKES WEBER: I think this case must be the result of "contusional" traumatism of the thorax. There have been an enormous number of experiments made on animals, in order to explain the subject of "contusional pneumonia."[1] Fibrinous deposit remaining from traumatic hæmothorax may partially explain the signs in the present case.

[1] Cf. F. P. Weber, "Traumatic Pneumonia and Traumatic Tuberculosis," Adlard, 1916. (Part I on "Traumatic or Contusional Pneumonia," references given to experiments on animals.)

(*November* 24, 1916.)

Inscriptions of Speech in Cerebral Diplegia, with Indications of a New Method of Treatment.

By E. W. Scripture, M.D.

The object of this paper is to give an illustration of a new line of work that has been recently developed. Speech is the most delicate and accurate expression of all mental and many bodily conditions. The slightest disturbance of mental equilibrium shows itself at once in speech long before it can be detected in any other way. Many nervous diseases such as general paralysis and disseminated sclerosis, can be detected by speech analysis before they can be recognized by any other means.

A method of speech analysis has now been developed that involves a recording apparatus which can be taken to the bedside, also methods of measurement and computation which require only a reasonable time. The most important characteristic is the fact that when the speech has been recorded the diagnosis follows automatically from the inscription with no reliance on judgment by the ear. Quite a large number of diseased conditions have already been studied. The work is entirely original and every one of the records published is the first of the kind that has ever been made.

The speech was recorded by the phonautograph method. The patient spoke into a tube leading to a flexible membrane, whose movements were registered on a revolving blackened cylinder (fig. 1).

A normal record of the word "hippopotamus" is given in fig. 2. The slight rise of the line at the start records the air current for the initial "h." The following waves are those of the first vowel. The waves are cut short by a sudden descent of the line caused by the lips closing to make the "p." The time during which the lips were closed—the "occlusion"—is indicated by the straight line. As they are opened a sharp gust of air rushes out—the "explosion"—and the line rises sharply. Of course there is only one "p" and not two as the spelling would indicate. Then follow the waves for the second vowel. These are followed by a fall, a straight line and an explosion

like that for the first "p." The third vowel "o" is followed by a record of "t"; this is similar to that of "p" except in being shorter with a weaker explosion. The short vowel after "t" is followed by a low line with faint vibrations—the record of "m." The last vowel "u" is followed by a rising line that records the rush of air for "s."

The first patient whose speech was analysed was a boy, F., aged 10 years. He had shown the typical signs of Little's disease since his birth, which was difficult. There was great spasticity of head, arms,

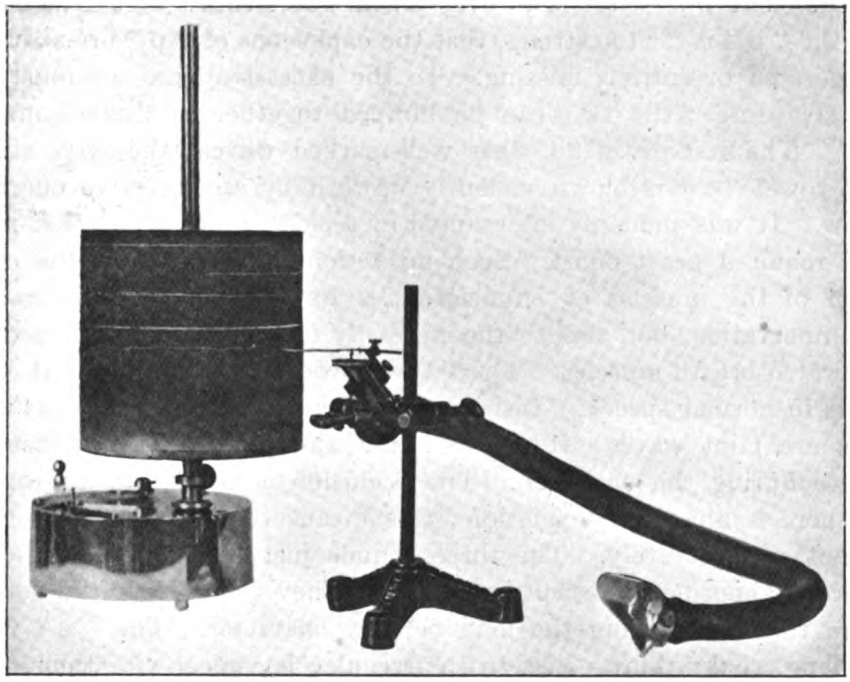

FIG. 1.

The Recording Apparatus. The apparatus consists of a revolving drum, covered with paper blackened by means of smoke. A speech inscription is obtained by speaking into the mouthpiece of a wide rubber tube which leads to the recorder. This recorder consists of a metal cylinder ending in an oiled-silk membrane. The vibrations of the voice pass down the tube to the membrane. The movements of the membrane are enlarged and registered on the blackened surface. For preservation, the paper can be removed from the drum and passed through a clear hard varnish.

trunk, and particularly the legs. The knee-jerks were highly exaggerated. The walk was very spastic. The movements of the arms were not so much affected. At rest the face was almost normal, but

any effort produced a mask-like expression with widely opened eyes and corrugated brow. The speech was very laboured. The lip movements were highly exaggerated and accompanied by grimacing. The voice was deep, rough and bellowing. Every effort at speech was accompanied by staring of the eyes and wrinkling of the forehead. Each syllable was brought forth with a distinct effort.

The inscription of "hippopotamus" by this case of cerebral diplegia is given in fig. 3. We notice first that the entire word is greatly prolonged. The individual sounds are in most cases similarly prolonged. The final "s" lasts over an immense time. We next notice that the "h" is far too strong, that the explosions of "p" are absurdly exaggerated or entirely missing. To the excessive time we must add excessive force; the two can be lumped together as "over-enunciation." The first vowel "i" has well-marked waves; the curve of the next vowel "o" is blown violently upward by an excessive effort or bellow. It was suddenly interrupted by a closure of the lips that must have required great effort. Such an action illustrates how the overaction of the muscles of enunciation is due not only to their own over-innervation, but also to the necessity for counteracting the over-innervated breath muscles. The "t" shows an abnormality that often occurs in normal speech. Instead of a straight line for the occlusion there are faint waves; this shows that the glottis did not cease to vibrate during the occlusion. The occlusion is short and incomplete and there is almost no explosion; this means that the spastic tongue did not act accurately. The three sounds just before "s" show no apparent abnormality except in length. They differ from the sounds before them in lacking the loud bellowy character. The "s" itself is a long, shaky, blowy hiss, with irregular laryngeal vibrations.

In normal speech the expiratory muscles furnish the propulsive power; the inspiratory muscles act only as a method of regulating the rate of expiration. In diplegic speech two abnormal conditions can be distinguished—namely, the "repressed form" where the muscles of inspiration and expiration are both cramped tightly as indicated by the record of "amu" in fig. 3, and the "propulsive form" where the muscles of inspiration are released and those of expiration are overactive as in the rest of the record.

Another patient, E., presented considerable difficulty in diagnosis. This patient was a boy, aged 12 years, showing signs of spasticity but with loss of knee-jerks and other conflicting signs. An inscription of "hippopotamus" by E. is reproduced in fig. 4. It begins with a

depression of the line that indicates an effort at taking breath, as occurred in nearly all the records of E. This is followed by a straight line that represents the "h." It is quite probable that the glottis was closed spasmodically during the "h" instead of being opened. The vowel "i" is registered as a series of fine waves. Although these waves are all of approximately the same length horizontally, the general line rises and falls in a more or less irregular manner. This indicates irregularity of the breath pressure. Such an irregularity results from the loss of control over the muscles that regulate the breath pressure. If this condition is to be termed "ataxia," it is different from the ataxia in tabes and disseminated sclerosis, where the taxic centres have undergone degeneration. Here the irregularity results from a conflict between the over-active spastic breath muscles of the chest and abdomen and the efforts of the patient to counteract the over-action. The line of waves for the vowel is cut short as the line descends for the closure of the lips to form the "pp." The "pp" ends with an upward jerk of the line as the lips open. Then follow the fine waves for the vowel "o." Here also the general line waves up and down as the result of the defective breath control. The record for "p" is similar to that for the preceding "pp." The fine waves of the vowel "a" are almost on the base line, showing that the emission of air was very small. The record for "t" resembles that for "p" with a faint explosion. The record for "m" is similar, with very faint waves. The records for all the vowels show the same wavy breath line already mentioned. The "s" is a prolonged slowly descending line. This record is seen at once to resemble the normal much more closely than that of F. (fig. 3), although it differs in being longer and in the minor ways already mentioned.

The durations of the sounds when carefully measured often furnish important conclusions. The duration is obtained by measuring the length of the line in the record and reducing the result to time from a knowledge of the speed of the recording drum. The durations of the single sounds in thousandths of a second are as follows (S is from a normal record) :—

	h	i	pp	o	p	o	t	a	m	u	s	
S.	15	95	113	82	115	120	72	65	35	175	280	= 1,167
F.	210	182	105	273	280	259	56	189	119	161	1,218	= 3,052
E.	50	305	155	245	145	275	130	100	120	255	265	= 2,045

In the case of F. the sounds are nearly all excessively long; they do not retain the same relations of length as in ordinary speech. For

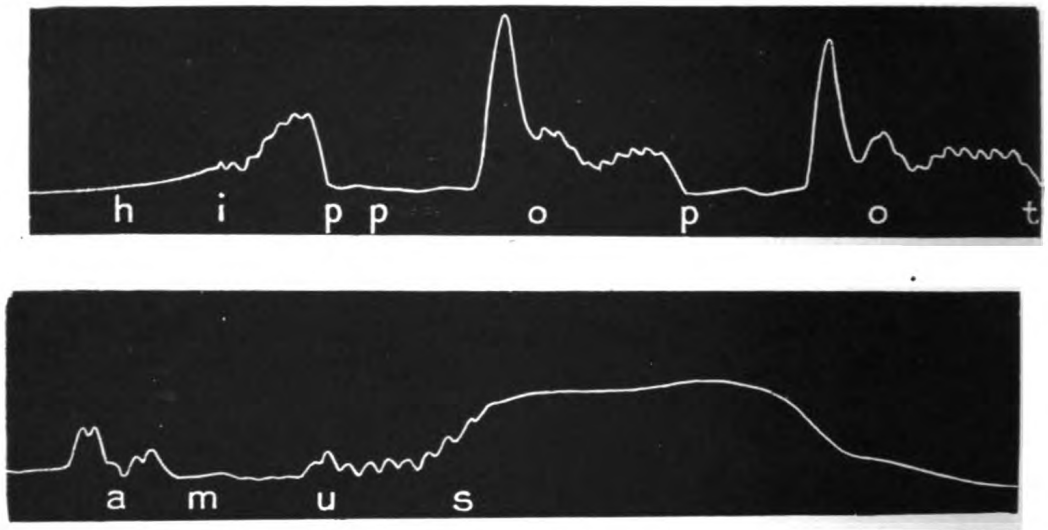

FIG. 2.

Record of "hippopotamus" by a normal voice. The letter is beneath the beginning of each sound. The "h" is weak and brief. The "pp" and "p" show occlusions (straight lines) followed by strong explosions (upward jerks). The "t" shows a short occlusion with a weak explosion. The "m" shows an occlusion with vibrations. The "s" shows a well-marked breath of air (raised line). The vowels show well-marked regular vibrations.

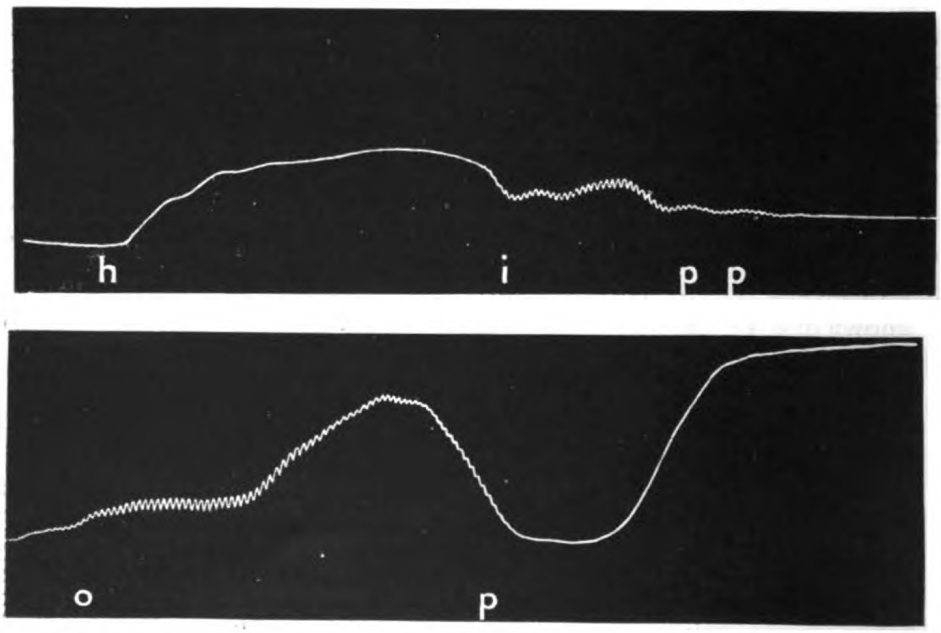

FIG. 3 *(continued on next page)*.

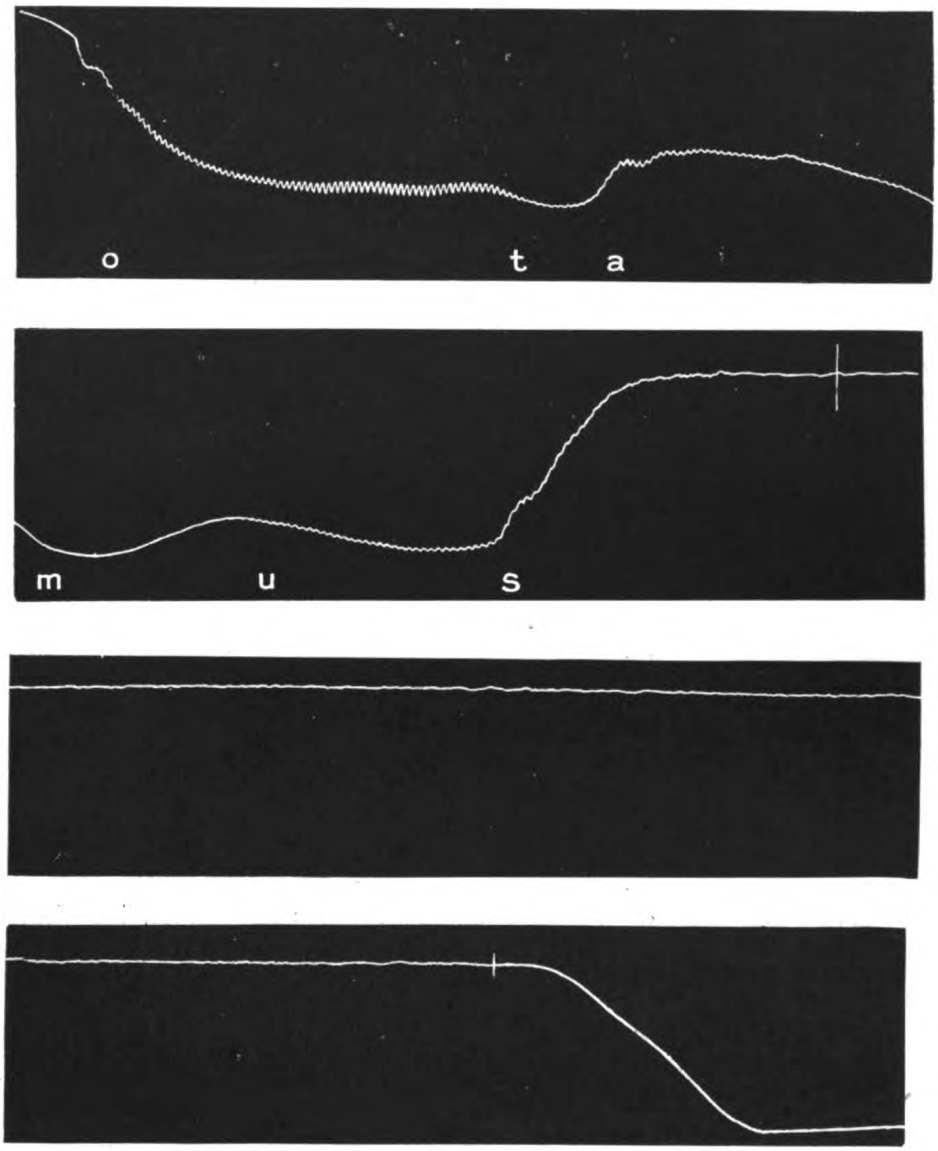

FIG. 3.

Record of "hippopotamus" by a case of cerebral diplegia, F. The letter is beneath the beginning of each sound. The "h" is very strong and long. The "pp" has no explosion; the "p" has an enormous one. The "s" is very strong and enormously prolonged; it shows irregular vibrations that come from abnormal action of the larynx. The vowels show well-marked vibrations; all of them are far too long; the first "o" is enormously strong (bellowy).

example, the "h" in fig. 3 is longer than the "i," whereas in fig. 2 it is shorter. Certain sounds are even shorter than the normal ones, while the final "s" is immensely prolonged. In the case of E. the relations among the sounds differ from those in the normal record, but not so much so as in the case of F.

The relative lengths of the emphatic and the unemphatic syllables must be considered. The word as spoken can be divided into syllables as follows: "hipp-o-pot-a-mus." The dictionary division into "hip-po-po-ta-mus" is based on typography and etymology, and is quite unrelated to the spoken word. For example, there are not two "p" sounds for "pp" of the spelling. An attempt to speak the word according to the dictionary division produces a quite different record from the normal one.

When the sounds are added together to form the syllables, their lengths are as follows:—

	hipp	o	pot	a	mus
S. (normal)	223	82	307	65	490
F. (diplegic)	497	273	595	189	1,498
E. (diplegic)	510	245	550	100	640

The difference between long and short syllables is lessened, as appears from the following approximate ratios:—

	hipp : o	pot : a
S. (normal)	3 : 1	5 : 1
F. (diplegic)	2 : 1	4 : 1
E. (diplegic)	2 : 1	5 : 1

When the pairs of long and short syllables are added together we get the lengths of the feet; the last syllable counts as a foot by itself:—

	hippo	pota	mus
S. (normal)	305	372	490
F. (diplegic)	770	874	1,498
E. (diplegic)	755	650	640

The feet are practically equal in normal speech as would be expected. In the diplegic cases irregularity is evident. The rhythm of speech as dependent on duration is therefore defective.

Diplegic speech is often said to be "scanning speech." When we scan verse, we exaggerate the difference between long and short syllables and we make the feet as equal as possible, regardless of variations needed for the expression of the idea. In diplegic speech exactly the

opposite occurs. The difference between long and short tends to disappear and the successive feet become less equal. The speech is just the reverse of scanning speech. All this is only in accord with what we observe in the movements of arms and legs; the easy rhythm is replaced by irregular movements that fail to take account of finer differences.

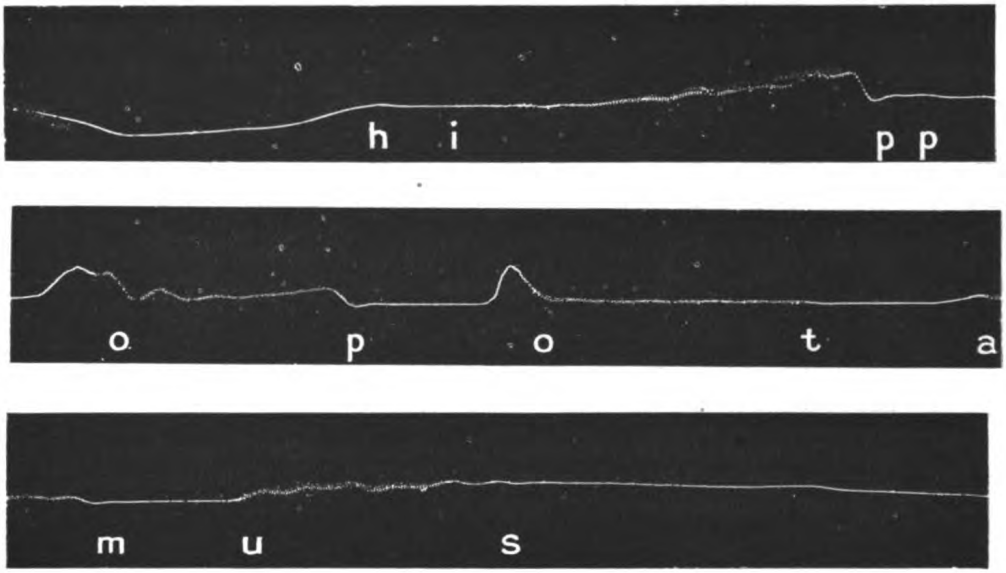

FIG. 4.

Record of "hippopotamus" by a case of cerebral diplegia, E. The letter is beneath the beginning of each sound. The inscription begins with a depression of the line that indicates an effort at taking breath. Then follows a straight line that represents "h." The vowel "i" is registered as a series of fine waves. Although these waves are all of approximately the same length horizontally, yet the line rises and falls in an irregular manner indicating irregularity of the breath pressure. The vowel waves are cut short as the lips close to make the "pp." As the lips open for the "o" the line jerks upward. The "t" resembles the "p"; it has a faint explosion. The fine waves for the vowel "a" are on the base line indicating that here the emission of air was very small. The "m" has very faint waves. The "s" is registered as a prolonged slowly-descending line.

It is of fundamental importance to get the "melody of speech" in every case. When the speed of the recording drum is known, the length of each wave can be turned into time. Every wave in these records was thus measured. When the results are plotted on cross-section paper, a line drawn through the dots will give the "melody plot" or the rise and fall of the voice during a word.

In the melody plot for the normal voice, fig. 5, we notice that the sounds "h," "pp," and "s," do not have any melody; that is simply an expression of the fact that the larynx does not vibrate during these sounds. The "i" starts at about 180 vibrations a second and falls quickly. The first vibration of the first "o" could not be measured accurately; for the rest of the "o" the voice rose and fell. A similar remark applies for the second "o." Regarding the plot as a whole we notice that the melody starts high in the first vowel and falls steadily to the end of the word. We also notice continual fluctuation of the tone.

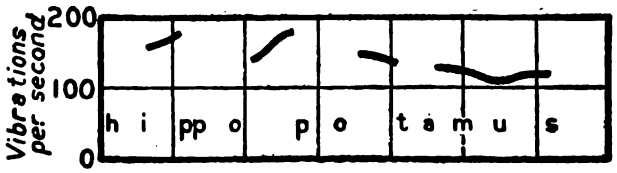

FIG. 5.

Melody plot for fig. 2. The voice starts high and falls throughout the word. At no point is the pitch constant for a moment, it is always rising and falling. The consonants "h," "pp," "p," "s," have no tone in the usual enunciation; the "t" between two vowels sometimes has a faint tone as in this case, but the vibrations were too faint to be measured. The vibrations at the beginning of each "o" could not be measured accurately.

In the melody plot for the diplegic boy, F., fig. 6, we observe a monotony so complete that we may almost call it "inflexible." This is one of the marked characteristics of severe cases of this disease.

Records of various words, phrases and sentences by these patients showed without exception the same characteristics of laboured bellowy over-enunciation with absolute monotony. The co-ordination of the speech muscles was usually perfect in regard to simultaneity; the various groups used for enunciation, phonation and breathing were properly employed as far as their relations of time to one another were concerned. The limits between sounds were usually as clearly marked as in ordinary speech.

The speech condition corresponds to the fundamental motor symptom of the disease—namely, the overaction of the muscles for every voluntary effort. The excessive breath pressure produces the bellow. The excessive laryngeal contractions produce the pinched sounds. With a violent contraction of the laryngeal muscles a husky tone with inflexible monotony cannot be kept in constant change as required by normal speech and so the separate sounds are shot out.

Several other cases were studied by this method. The results differed only in degree. In still severer cases the speech appeared as a hoarse, violent bellow with absolutely inflexible monotony. In milder cases some or all the characteristics were fainter. The case of F. was of the more severe type. From the records and observations made on E. the conclusion had to be drawn that the speech was one of the spastic type, with the one difference that the spasticity could readily be dropped and normal modulation could be assumed whenever the patient was shown how to effect this. The diagnosis had to be made that the patient had the remains of a form of spastic speech kept up as a habit.

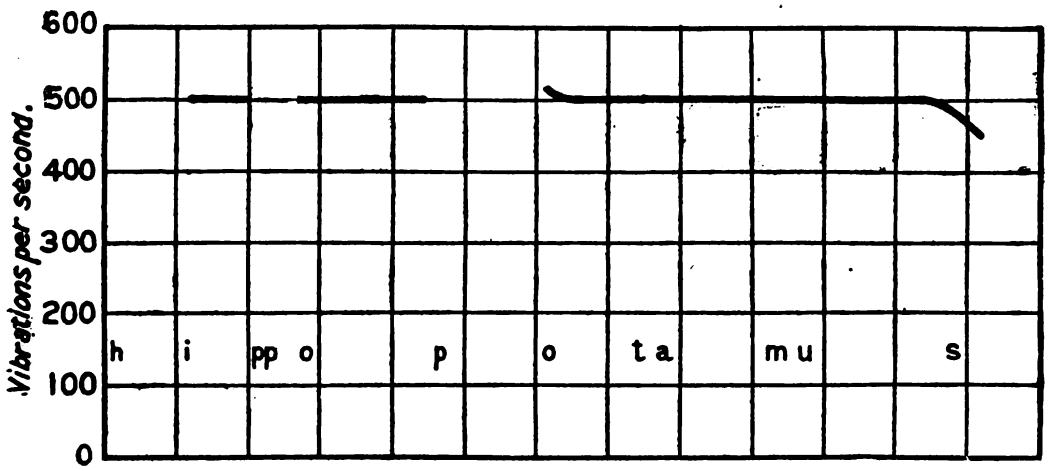

FIG. 6.

Melody plot for fig. 3. This shows the inflexible monotony characteristic of severe cases of cerebral diplegia.

The following table (*see* pp. 46 and 47) sums up the characteristics of diplegic speech. The last two items are learned by efforts at correction; all the others are deduced from the records. To show why various items are noted some other conditions are added for comparison.

The table also includes the analyses of the characteristics of speech in stuttering, in the jerky speech of the neurotic condition following chorea and in disseminated sclerosis. It is plain that, when such a table is finally established for all the forms of speech defects, the diagnosis of a disease that interferes with speech will be automatically deducible from an inscription.

TABLE OF SPEECH ANALYSIS.

	Cerebral diplegia	Stuttering	Post-choreic neurosis	Disseminated sclerosis
(I) Speed	Slow	Normal or accelerated	Normal or accelerated	Slow
(II) Loudness ...	Increased	Normal	Normal	Normal
(III) Fatigue ...	0	0	0	0 or +
(IV) Rhythm :—				
(*a*) Duration ...	Lessened	Normal except for stutter words	Normal except for jerks	Lessened
(*b*) Stress ...	Lessened	Normal except for stutter words	Normal except for jerks	Lessened
(*c*) Pitch ...	Lessened	Lessened	Normal	Lessened
(V) Breathing ...	Blowy	Normal or irregular	Normal or irregular	Irregular
(VI) Laryngeal tone :				
(*a*) Acoustic character	Loud, forced, husky, or pinched	Hard, husky	Clear	Clear
(*b*) Pitch control ...	Good	Good	Good	Irregular
(*c*) Sentence melody	Monotonous	Monotonous, with fall of minor third	Normal or exaggerated	Monotonous
(*d*) Vowel melody...	Lost in sentence monotony	Lost in sentence monotony	Normal	Lost in sentence monotony
(VII) Enunciation :—				
(*a*) Formation of sounds	Excessive	Normal, irregular, excessive or lisping	Normal or irregularly excessive	Coarsely irregular
(*b*) Co-ordination in duration	Good	Normal or irregular	Normal or irregular	Coarsely irregular
(*c*) Co-ordination in force	Bad	Normal or irregular	Normal or irregular	Coarsely irregular
(VIII) Combination of sounds :—				
(*a*) Repetition ...	0	+ of varying sounds	+ of varying sounds	0
(*b*) Transposition...	0	Sometimes	0	0
(*c*) Elision ...	0	0	0	0
(*d*) Insertion ...	0	Often of "starter"	0	0
(IX) Ability to change:				
(*a*) Temporarily ...	+	+	+	0 or +
(*b*) Permanently...	+	+	+	0

Note.

(I) Speed is given by the length of a word or phrase as compared with the normal length.

(II) Loudness shows itself in larger curves in the record.

(III) Fatigue may show itself in a single word by decrease in loudness, or in a succession of records by cessation of speech, by tremulousness, &c.

(IV) Rhythm depends on relative duration of the syllables (long and short), relative stress (loud and weak), and relative pitch (high and low).

(V) Breathing affects the intensity and regularity of the sounds.

(VI) The laryngeal tone, or tone of the voice, has an acoustic character that is usually clear; pitch control is shown by the ability to sing tones of different

pitch. The sentence melody is the rise and fall of the voice in speaking a phrase or a sentence; the vowel melody indicates the rise and fall of tone within individual vowels.

(VII) Enunciation. The formation of sounds requires certain very definite movements of lips, tongue, velum, &c., for each one. For a normal sound the muscular movements must have proper co-ordination in duration and proper co-ordination in force.

(VIII) Combination of sounds into words and phrases may be disturbed in the four ways indicated.

(IX) Ability to change. An abnormal mode of speech may be altered temporarily or permanently.

Stuttering is sometimes found combined with diplegia. The spasms of the enunciation muscles and the consequent hitches and repetitions that are characteristic of stuttering are present. The laryngeal tone, however, is not hard and husky as in stuttering, but hard and tense as in diplegia; this is due, of course, to the fact that the overtense laryngeal innervation of stuttering and the spastic condition of diplegia are simply added together. In severe cases the diplegic condition is the ruling one; the sentence melody is inflexible and the monotonous voice does not fall by a minor third at the end of a phrase as in stuttering.

All the speech symptoms in cerebral diplegia can be explained as results of one cause. A volition, or an impulse of will, is followed by abnormally strong action of spastic muscles. The impulse to make the occlusion for " p " is followed by excessive contraction of the lips; the impulse to produce a tone in the larynx is followed by excessive contraction of the intrinsic and extrinsic laryngeal muscles and of the breath muscles. The peculiarity of the resulting speech results from the spasticity of the muscles (hypertonia) and from efforts to correct the excessive action (anatonia). The speech pathology of this disease can be expressed as " hypertonia + anatonia."

The general treatment of cerebral diplegia may include the usual warm baths with massage and active and passive movements in the bath. Transplantation of tendons and other surgical procedures may be used to relieve special difficulties. But it is quite inadmissable for the treatment to stop with a procedure that does nothing for the speech or for the fundamental difficulty in the disease. The ability to speak correctly is more important than that of walking. The entire mental development of the patient depends on it; it is not seldom that the child is believed to be mentally deficient where he is merely backward because his difficulty of speech has hindered his education. No surgery or massage will help the speech, and special treatment is necessary.

The speech treatment must be based on the pathology. Since a will-impulse of a certain intensity is followed by an excessively strong muscular act, we must seek to modify the will-impulses themselves. The fundamental principle of the special treatment, therefore, lies in training the patient to inhibit his will-impulses in so far as they involve action. "Try not to try" is not a paradox but the motto of the treatment.

The treatment may begin profitably by teaching the patient to sing in a relaxed voice. By example, correction and imitation he learns to produce a tone that is not pinched nor pushed. Before a mirror he learns to enunciate all his words without any contortions. The proper lengths, the proper emphasis, and the proper melody are taught by example. Speech is entirely relearned on the new principle. Of course, the re-education requires much time and patience, but the result is an ample reward; moreover, it is the only way out of the difficulty. Speech inscriptions should be made from time to time to furnish an index of progress. The fundamental principle of the treatment—accurate control of relaxed muscles—must never be lost sight of.

The same principle should be applied to the movements of the hands and arms and to walking. The methods of treatment that attempt to get correct movements in walking, speaking, &c., by careful exercises aiming at precision under increased effort of will are directly contra-indicated; the innervation is already excessive and each extra effort of will increases it.

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The CHAIRMAN (Dr. Guthrie): We have listened with the greatest pleasure to Dr. Scripture's very interesting account of his work on this subject, and I am sure you will agree with my proposal of a hearty vote of thanks to him. No doubt Dr. Scripture will elaborate his work, but what one feels, in a general way, is that a case of cerebral diplegia has a considerable number of infirmities besides that of speech. It is interesting to hear from him that the difficulty of speech can be overcome, and it suggests that something might be done on educational lines for the spastic disabilities also. At the present time we are more apt to hand over such a case to our surgical *confrères*.

Section for the Study of Disease in Children.

President—Mr. SYDNEY STEPHENSON, C.M.

(*December* 15, 1916.)

(Chairman—Dr. J. PORTER PARKINSON.)

Congenital Atresia of the Œsophagus.

By EDMUND CAUTLEY, M.D.

BELGIAN boy, aged 5 days; second child. The œsophagus presents the most common type of malformation, due to maldevelopment of the tracheo-œsophageal septum. The upper part is constricted at the level of the larynx and opens into a blind pouch. The lower part opens into the trachea just above the bifurcation. The child weighed 4¼lb. 13 oz. when admitted on the day of birth, and 4 lb. 3 oz. at the age of 5 days, in spite of fever and bronchitis.

(*December* 15, 1916.)

A Case of Cyclic Vomiting with Acetonæmia (Acidosis): Remarks on Non-diabetic Acetonuria and Diaceturia.

By F. PARKES WEBER, M.D.

THE patient, P. H., is a girl, aged 7 years, physically well developed, and of fairly good "general nutrition," but considered to be somewhat mentally backward and dull. She was born in Manchester, of Hebrew

parents from Hungary. She is said to have vomited at birth, and from birth onwards to have had recurring attacks of vomiting, with intervals averaging five weeks between the attacks, each attack generally lasting about three or four days. She has three sisters and four brothers, but in none of them has any similar affection been observed.

An attack, apparently at first of the ordinary kind, commenced on June 11, but did not pass off as soon as usual. From June 12 vomiting recurred at short intervals (more or less incessantly, I was told) till the patient was admitted to hospital, on July 3; she was said to be losing weight and had complained of a feeling of giddiness.

On admission the child was abnormally inclined to sleep. The temperature was 98° F.; the pulse was 92, and the respiration 24 per minute. Nothing abnormal was found on examination of the thorax, abdomen, throat and ears. The urine (July 3) was of specific gravity 1030; acid in reaction; free from albumin; very slightly reducing Fehling's solution (though this was probably not due to the presence of sugar); giving a positive Gerhardt's (perchloride of iron) reaction for diacetic acid and a positive Legal's (nitroprusside) reaction for acetone. The knee-jerks were rather exaggerated; there was no ankle clonus; the plantar reflexes were of the (normal) flexor type; the abdominal reflexes were present, the pupils reacted well to light. Nothing abnormal was discovered by ophthalmoscopic examination (Dr. R. Gruber). There was no cervical rigidity and there was no evidence of meningism.

Under treatment by sodium bicarbonate the urine soon became alkaline and turbid with phosphates, but the reaction for diacetic acid was not found to be negative till July 7, nor that for acetone till July 8. The reaction with Fehling's solution had never again been found to be at all positive. There was no vomiting after July 4; on July 6 the child was sitting up in bed, looking quite happy and well again, and on July 13 she was taken to her own home.

She was, however, readmitted to hospital on August 6, in a somewhat drowsy state, as on the last occasion; temperature 97° F., pulse 96, respiration 24 per minute. The attack was stated to have commenced on August 4 with lassitude and sleepiness, vomiting having first occurred at 5 a.m. on August 6 (about five hours before admission). At 11 a.m. (that is to say, about six hours after the commencement of the vomiting) the urine was found to give a negative Gerhardt's reaction for diacetic acid; Legal's reaction for acetone was likewise negative, but Rothera's reaction for acetone was faintly positive. In the afternoon

treatment by sodium bicarbonate was commenced. In the evening the urine (weakly acid, of specific gravity 1026, and free from albumin and sugar) gave positive Gerhardt's and Legal's reactions.

On August 7 the urine was slightly alkaline and turbid with phosphates, but gave positive reactions for acetone (Legal's) and diacetic acid (Gerhardt's). There was no vomiting after August 6, and on the afternoon of August 7 the child seemed happy and quite well again. But in spite of the urine being neutral or slightly alkaline (and turbid with phosphates) Gerhardt's and Legal's reactions were both positive on August 8. On the morning of the following day, however, Gerhardt's reaction was negative, Legal's reaction being still positive. In the evening (August 9) both reactions were negative, and so they remained on August 10 and afterwards. On August 12 the child was discharged to her own home. It may be mentioned that a few small purpuric spots (petechiæ) were observed, scattered over the trunk and limbs, on readmission (August 6), but these had practically disappeared by August 9, and no fresh ones had appeared. I was not quite satisfied that they were not due to insects. On August 12, just before the child left the hospital, a blood count gave: Red cells 5,000,000, and white cells 7,925 (55 per cent. of which were polymorphonuclear neutrophiles), to the cubic millimetre of blood; hæmoglobin, 90 per cent.

The attack in August was obviously much less severe than that in June. On November 22 I heard that the patient since leaving the hospital had had two of her ordinary attacks, each lasting about three days, one in September and the other in October. The specimens of urine passed on November 22 and November 25 (out-patient department) were of specific gravity 1016 to 1017, acid, free from albumin and sugar, and giving negative reactions for acetone and diacetic acid.

For help in the examination of this case I am much indebted to Dr. H. Schmidt, the Resident Medical Officer.

Remarks.

It should be noted that in this child in both attacks the vomiting was preceded by a day or two of prodromal symptoms (lassitude and somnolence). The ordinary reactions for acetone and diacetic acid became positive in the urine after the commencement of the vomiting, and persisted, in spite of the urine being rendered neutral or slightly alkaline by the administration of sodium bicarbonate, till a day or two

after the child seemed well again; the reaction for acetone made its appearance slightly before diacetic acid could be detected, and it remained weakly positive for a day or so after the reaction for diacetic acid had been found negative.

Quite apart from the acidosis which has been said to sometimes result from the prolonged therapeutic use of large doses of sodium salicylate,[1] acetonuria and diaceturia are not very rarely present in diseases (e.g., acute follicular tonsillitis, with suspicion of rheumatic fever) for which salicylates may be given. In this connexion, therefore, I should like to draw attention to the frequent statement that the colour reaction produced by adding perchloride of iron solution to a urine containing salicylate can be at once distinguished from that due to the presence only of diacetic acid (Gerhardt's reaction), that the colour produced in the former case is a bluish-purple, reminding one of the colour of certain grapes and plums and of some kinds of claret, whilst the true colour in the latter case (Gerhardt's reaction for diacetic acid) is the golden-red or brownish-red of slightly tawny port wine and (amongst gem stones) of some garnets. These statements are, however, only partly true, for though, I believe, the bluish-purple colour reaction, characteristic of salicyluric specimens of urine, is never caused by the presence merely of diacetic acid, nevertheless the typical tawny port wine colour reaction, sometimes stated to be a certain sign of the presence of diacetic acid, can *always* be obtained with the urine of persons under salicylate treatment. In fact, with a salicyluric specimen of urine it depends on the relative quantities of the reagent (perchloride of iron) and of the salicylic contents of the urine whether the tawny port wine colour or the more usual bluish-purple colour is produced.[2] A positive Legal's or Rothera's reaction for acetone is of course very valuable when Gerhardt's (perchloride of iron) reaction for diacetic acid is interfered with by some salicylic compound having been employed in the treatment of the case.

Cyclic or periodic vomiting in children, of which the present case (P. H.) is an example, was described by Samuel Gee in the first important paper on the subject, in 1882, under the heading "Fitful or Recurrent Vomiting."[3] Many years later various interesting studies

[1] Cf. F. Langmead's remarks, *Lancet*, 1913, ii, p. 1755, on the danger of acid-intoxication during treatment by large doses of sodium salicylate.

[2] Cf. F. Parkes Weber, *Lancet*, 1916, i, p. 1234.

[3] S. Gee, *St. Bart.'s Hosp. Repts.*, Lond., 1882, xviii, p. 1.

of the condition were published in America and France by J. P. Crozer Griffith,[1] Edsall,[2] Marfan,[3] and others. Excellent papers on the subject were published in England in 1905, by H. Batty Shaw and R. H. Tribe,[4] and by F. Langmead.[5] For a concise summary of the subject Langmead's article[6] on "Cyclical Vomiting," in 1912, may be consulted. These articles give references to other literature connected with the subject.

The affection occurs chiefly after the first year of life, between the ages of 2 years and 11 or 12 years (especially between 5 and 8 years), and more often in girls than in boys. I hesitate somewhat to accept the history given in the present case (P. H.) of its having commenced immediately after birth, though that is of course possible; Rachford alluded to a case which began at the age of 2 months. Cyclic vomiting with acetonuria may occur in more than one child of the same parents. Burrage saw a brother and sister who were both affected.[7] Very interesting is the occurrence of migraine, or so-called "recurrent biliousness," or recurrent "sick headache," in members of the same family; but in the present case (P. H.) there is no family history of migraine, though I at first understood that there was. In the patient herself it would not be surprising if the mental symptoms (drowsiness, &c.) became transformed after puberty (as they have been apparently in some other cases) into recurrent attacks of migraine.

In regard to the nervous manifestations and the family history, obtained in some cases, of neurotic diseases, the condition of cyclic vomiting might be compared not only to recurrent migraine in adults, but to minor forms of cyclic or periodic insanity with mental depression. From the metabolic point of view one is reminded of recurrent so-called "bilious" or "digestive" disorders and likewise of the diseases which A. E. Garrod[8] has termed "inborn errors of metabolism," conditions

[1] Griffith, *Amer. Journ. Med. Sci.*, Philad., 1900, cxx, p. 553.

[2] Edsall, *ibid.*, 1903, **cxxv**, p. 629.

[3] Marfan, *Arch. de Méd. des Enfants*, Paris, 1901, iv, p. 641. For a recent paper by Marfan on this subject see *Presse Médicale*, Paris, 1916, xxiv, p. 397.

[4] Shaw and Tribe, *Brit. Med. Journ.*, 1905, i, p. 347.

[5] Langmead, *Brit. Med. Journ.*, 1905, i, p. 350.

[6] Langmead, *Practitioner*, Lond., 1912, lxxxix, p. 24.

[7] T. J. Burrage, *Journ. Amer. Med. Assoc.*, 1909, liii, p. 2099.

[8] Croonian Lectures before the Royal College of Physicians, London, 1908.

which may have a striking familial distribution. In certain cases of cyclic vomiting in children enlargement of the liver (sometimes jaundice) has been noted in connexion with the attacks.

In the present patient (P. H.) pyrexia has not been associated with the attacks whilst she was under observation, but most of her attacks do not last long and she has probably seldom come under medical observation; it was only the exceptional length of the attack in June, 1916, which brought her to the hospital. Pyrexia has been associated with the attacks of cyclic vomiting in various published cases, but the temperature rarely exceeds 100° F.

E. I. Spriggs[1] writes: "In determining whether the condition of acidosis (in recurrent vomiting of children) is a primary or secondary one it is important to know whether acetone bodies have been absent from the urine before the symptoms definitely commenced; their presence in the prodromal stage in individual cases might be due to abstinence from food, and will not have the same significance as their absence. J. P. Crozer Griffith recorded absence of acetonuria in the prodromal stage, and Langmead also came to the conclusion that the acetone bodies are secondary in their appearance to the vomiting." In the present case (P. H.), as I have already stated, the reactions for acetone and diacetic acid became positive in the urine after the commencement of the vomiting, and persisted, in spite of the urine being rendered neutral or slightly alkaline by the administration of sodium bicarbonate, till a day or two after the child seemed well again.

The cyclic vomiting and the excess of acetone bodies (in the blood and urine) might be, not dependent the one on the other, but due to some (unknown) toxic or metabolic cause common to both of them. One can imagine the gradual accumulation in the body of some abnormal and toxic metabolic product (the result of an "inborn error of metabolism") giving rise to recurrent or periodic (cyclic) "explosive" attempts, of a *conservative nature* (from the modern Darwinian teleological point of view), on the part of the organism to rid itself of the accumulation—a kind of vital "geyser-like" reaction of the body, serving the purpose of a safety-valve escape. Such an intermittent mode of vital reaction (by "periodic explosions") might be regarded as an abnormal inborn peculiarity of certain children, which, at or before the period of puberty, usually gives place to a continuous (adult) method of reaction, though traces may remain during adult life, in the form of

[1] Spriggs, "Acidosis," *Quart. Journ. Med.*, Oxford, 1909, ii, p. 341.

recurrent attacks of migraine, recurrent "sick headache," recurrent "bilious vomiting," recurrent periods of mental irritability accompanied by anorexia and various gastro-intestinal troubles, or yet other recurrent symptoms.[1]

It is significant that, though starvation in healthy persons gives rise to a condition of acidosis, some authorities[2] strongly advise restriction of carbohydrate foods in the diet during the intervals between the attacks of cyclic vomiting in children. Moreover, though alkaline treatment (bicarbonates) is useful during attacks of cyclic vomiting with acidosis, it does not follow that the acidosis is the cause of the cyclic vomiting (and its prodromal somnolence and nervous symptoms).

In this connexion one must of course remember that non-diabetic acetonuria or diaceturia, or both, may be observed in association with many various conditions, especially in childhood. I have recently seen the following cases in which acetone bodies were present in the urine:—

(1) Fatal tuberculous meningitis in a boy (H. D.), aged 6 years. The presence of acetonuria and diaceturia in this case tended to obscure the true nature of the vomiting, which had been the prominent symptom for fourteen days before admission to hospital. The diacetic acid, but not the acetone, disappeared from the urine before the child's death.

(2) A female child (M. B.), aged 1 year, in whom acetonuria and diaceturia were temporarily present after vomiting and diarrhœa, due to gastro-enteritis in June, 1916.

(3) A female child (B. K.), aged 3 years, after vomiting of uncertain causation, possibly an example of "cyclic vomiting," for the mother said that the child had had occasional attacks of vomiting since the age of 3 months. The symptoms soon passed off.

(4) A female child (A. J.), aged 1½ years, with a superficial burn on the face and moderate pyrexia. Satisfactory recovery took place.

(5) A girl (M. P.), aged 12 years, with slight Sydenham's chorea, and acute follicular tonsillitis, from which she soon recovered.

(6) A boy (R. P.), aged 5 years, with pneumonia and temporary acetonuria. He recovered.

[1] The various forms of recurrent troubles in adults allied to migraine and the paroxysmal neuroses do not seem as yet to have been sufficiently differentiated.

[2] Cf. Francis Hare, *St. Bart.'s Hosp. Journ.*, Lond., 1908, xv, p. 175. In support of his views he likewise quotes Emmett Holt ("Diseases of Infancy and Childhood," 1903, pp. 326 *et seq.*), who has seen many cases of cyclic vomiting.

(7) A boy (H. D.), aged $5\frac{3}{4}$ years, after operation for an appendicular abscess. The acetonuria and diaceturia soon disappeared.

(8) A very bad case of appendicular abscess in a girl (E. R.), aged 5 years, who died three days after operation, probably as the result, partly of septic intoxication, and partly of so-called "late chloroform poisoning." At the necropsy the liver was found to be very fatty, and microscopically it showed much "centro-acinous" parenchymatous degeneration. There was jaundice. I did not see the patient during life, but was kindly enabled to examine the urine passed shortly before death; it contained acetone, bilirubin and albumin.

(9) I will mention another case, though in an adult. It was that of a woman (B. L.), aged 28 years, in her fourth pregnancy, with hyperemesis gravidarum. The acetonuria and diaceturia and the hyperemesis persisted in spite of treatment until the uterus was artificially emptied. After that operation the acetonuria and diaceturia disappeared within about five days.

(10) In a case of hyperemesis gravidarum, in which no operative interference was necessary, the patient was a primipara (F. B.), aged 27 years; and the acetonuria and diaceturia soon disappeared after the cessation of the vomiting.

In regard to non-diabetic acetonuria and non-diabetic acidosis some recent remarks of Howland and Marriott[1] may well be quoted here: "We may in many instances liken the mere presence of acetonuria to fever, for it occurs in most of the infectious diseases of children with much the regularity that fever does." Moderate acidosis, they say, is no more unusual or dangerous than moderate pyrexia. But just as pyrexia may be dangerous in itself, so an excessive production of the acetone bodies in itself may determine a fatal outcome. In regard to the "air-hunger" ("Lufthunger") of acidosis, they quote L. J. Henderson[2] as calling the carbonates of the blood "the first line of defence," and go on to explain that the dyspnœa (of acidosis), better termed "hyperpnœa," or "increased pulmonary ventilation," is an agent of the greatest value in ridding the body of carbon dioxide and thus keeping the reaction within normal limits. Hyperpnœa, they remark, is the best of all the evidences of acidosis to be obtained by physical examination alone; hyperpnœa may almost be said to be acidosis.

[1] Howland and Marriott, "A Discussion on Acidosis, with Special Reference to that occurring in Diseases of Children," *Johns Hopkins Hosp. Bull.*, Balt., 1916, xxvii, pp. 63-69.

[2] L. J. Henderson, *Amer. Journ. Physiol.*, 1908, xxi, p. 427.

P. R. Cooper[1] has recently described "a case of acute pneumonia in an adult complicated at the outset by marked acidosis"; and it would be interesting to know if some of the "hyperpnœa" in certain cases of pneumonia, in which only a small proportion of lung tissue is apparently affected, is mainly due to an associated condition of acidosis.

In regard to post-mortem examinations on children suffering from cyclic vomiting (Langmead,[2] J. Comby,[3] A. E. Russell,[4] &c.). I think it must be admitted that the occasional presence of such conditions as appendicitis, hypertrophic stenosis of the pylorus, and degenerative changes in the glands of the stomach, do not throw much light on the true nature and ætiology of cyclic vomiting.

[1] P. R. Cooper, *Clin. Journ.*, Lond., 1916, xlv, p. 403. I do not, however, find it stated that the patient had not taken a salicylic drug, nor is it mentioned that the urine was tested for acetone as well as for diacetic acid.

[2] Langmead, *Brit. Med. Journ.*, loc. cit.

[3] J. Comby, *Arch. de Méd. des Enfants*, Paris, 1909, xii, p. 721.

[4] A. E. Russell, "A Case of Cyclic or Recurrent Vomiting associated with Hypertrophic Stenosis of the Pylorus," *Brit. Journ. Child. Dis.*, Lond., 1910, vii, p. 49.

DISCUSSION.

Dr. PORTER PARKINSON: The best test for diacetic acid is to pour some urine into two test tubes, then to heat one to boiling point for a couple of minutes to drive off the volatile diacetic acid, then to add a drop of ferric chloride to both tubes. If a claret colour develops in the unboiled urine and not in that which is boiled then diacetic acid is present, but if the colour appears in both urines it is due to some other abnormal substance. Dr. Parkes Weber has not mentioned the acetone smell of the breath, which is often so marked that it can be noticed on entering the room in which the child is. The condition is most usual between the ages of 5 and 12 years: I have rarely had a case before the age of 5 years. Over 50 per cent. of the children admitted into the Queen's Hospital for Children show acetone in the urine from one cause or another, but in the large majority of them it does not seem to produce any ill effects. Dr. Parkes Weber states that fever when present is only slight, but I have seen a case in which on more than one occasion the temperature mounted to 103° F. while the smell of acetone almost pervaded the whole house. An important point lies in the prevention of further attack. I am in the habit of dieting fairly strictly, cutting off most fats but not limiting carbohydrates; and I have noticed that the child often has an instinctive dislike to any fatty food, even to butter. I am in the habit of prescribing a dose of calomel once or twice monthly, and of giving a mixture of rhubarb and soda, mainly for the sake of the latter ingredient, for a fortnight during each month, and by continuing this treatment for many months I think attacks have been prevented.

Dr. LANGMEAD: Too much importance must not be attached to the finding of acetone or even of diacetic acid in the urine of children. I have grown accustomed to think of the children in whose urine the acetone series of bodies may be found as falling into three groups: (1) Normal children or others who are ill, but showing none of the symptoms usually ascribed to acid-intoxication. (2) Children with a definite morbid state, side by side with the symptoms and signs of which the "acid-intoxication" syndrome may be detected. Examples furnished by children with diabetes, pneumonia, uræmia, toxic summer diarrhœa, certain cases of septic throat, and salicylate poisoning. (3) Children exhibiting in a striking manner the "acid-intoxication" syndrome for which no adequate explanation is forthcoming either during life or, in fatal cases, after death, and which is unaccompanied by other known disease. To the last group belongs "cyclical vomiting," but the first and second groups are far larger. Dr. Parkes Weber has referred to my use of the word "secondary." I quite agree with him that in cases of cyclical vomiting, both the vomiting and the "acid-intoxication" symptoms are due to some antecedent condition.

What this condition is and how it is brought about is still undetermined. That it is a form of cumulative toxæmia culminating in an attack there can be little doubt. I regard the "acid-intoxication" as only part of a more profound disturbance of metabolism, possibly an "inborn error," possibly acquired, but which of the two there is not at present sufficient evidence to say. The profound changes in the liver, which are very characteristic in its post-mortem appearance, certainly suggest that that organ plays an important part; this is supported by the resemblance of the symptoms to those of Eck's fistula. If one supposes the functional efficiency of the liver to be impaired there are at least three ways in which a toxæmia may result—the accumulation of precursors of urea, the imperfect katabolism of fats, and weakened defence against poisons derived from the bowel. Such considerations as these lead me to regard the condition underlying cyclical vomiting as one of great complexity. Dr. Parkes Weber has referred to the difficulty of detecting diacetic acid in the presence of salicylic acid and its derivatives. In the cases of "salicylic acid poisoning" which I described, Dr. Willcox kindly put the presence of diacetic acid in the urine beyond dispute by first extracting it with ether. That would seem to be the only reliable means of proving its presence.

Dr. PARKES WEBER (in reply): In this paper I have not entered into the question of preventive treatment between the attacks of vomiting, but the strict limitation or avoidance of fatty articles of diet (including cod liver oil) is certainly advisable, as well as the prohibition of sweets, &c., between meals, and the avoidance of any overloading of the stomach. An occasional alkaline purge (such as Gregory's powder) would probably be useful. In my present case the attacks were not severe enough to demand or warrant the intravenous injection of a solution of bicarbonate of sodium (sometimes rather difficult to carry out in small children, just as intravenous injections of salvarsan often are), but such injections are of course often tried in cases of diabetic coma or threatening diabetic coma. The occurrence of considerable pyrexia in attacks of cyclic vomiting might be misleading, as many different kinds of pyrexial diseases in children may be accompanied by vomiting and more or less acetonuria and diaceturia. The percentage (50 per cent.) of children showing the presence of acetone bodies in their urine on admission to hospital, as stated by Dr. Porter Parkinson, is certainly a very high estimate, and it suggests that in the hospital in question the proportion of children who were rather severely ill on admission was a relatively high one. I do not feel inclined to limit the term "acidosis" to the grave cases associated with decided hyperpnœa. There are many degrees of acidosis, and in mild cases the acetone bodies may be more or less in excess in the urine without there being any threatening symptoms present, such as marked hyperpnœa. The clinical test mentioned by Dr. Parkinson, to distinguish diacetic acid in the urine from a salicyluric constituent (by adding perchloride of iron to two specimens of urine, one, a well-boiled specimen, and, two, an unboiled specimen), though doubtless

often very useful, would unfortunately not reveal the presence of diacetic acid in the urine if a salicyluric constituent were likewise present. I am not sure whether the administration of glucose during attacks of non-diabetic acetonuria and diaceturia is so likely to be useful as it is when the acetonuria and diaceturia are connected with diabetes mellitus. What Dr. Langmead says about the changes in the liver found in necropsies on fatal cases of cyclic vomiting in children is very interesting, and there can hardly be any doubt that the liver does really play an important rôle in the production of the clinical syndrome in question; but similar *extremely* fatty livers are, I believe, not rarely found in children with rickets who die during attacks of broncho-pneumonia, &c. I am glad that Dr. Langmead agrees that the vomiting and the acidosis are not dependent the one on the other, but are both probably due to a common cause.

Section for the Study of Disease in Children.

President—Mr. SYDNEY STEPHENSON, C.M.

(*January* 26, 1916.)

(Chairman—Dr. R. HUTCHISON.)

Acute Pneumonia with Hyperpyrexia, followed by Heart-block.

By J. PORTER PARKINSON, M.D.

A BOY, aged 14 years, was admitted under my care into the London Temperance Hospital on November 22 last year. He was a healthy-looking boy with a good family and personal history. His temperature was 104° F., but went up to 105° F. four hours later. He had been taken ill four days previously, and there were signs of pneumonic consolidation in the lower lobe of the right lung. His general condition was good. At 8 o'clock the same evening, however, the sister noticed a change, and taking the temperature found it to be 110° F. Thinking there might be a mistake she took it again in the rectum with two other thermometers which both registered the same height. I was telephoned for at once, and ordered relays of iced towels to be applied to the chest and abdomen, while the arms and legs were sponged with iced water. This was done, so that when I arrived at the hospital shortly before 9 p.m. the temperature had fallen to 104° F. The cold was then discontinued and an ounce of brandy was given, as the boy, though by no means collapsed, had a rather small pulse of 120. I was surprised to learn that during the period of hyperpyrexia he was neither comatose nor delirious and that his breathing was not specially harassed. The sister told me, however, that each time the iced towels were placed on the precordium the pulse became much smaller, but not irregular nor more frequent.

The temperature rose again some hours later to 109·6° F., and again was lowered by the same method, though this time iced towels were not placed over the precordium; after this the temperature never rose above 105° F., near which height it remained for four more days, and then on

the ninth day of the illness it fell by crisis first to 97·6° F. and next day 95° F. It was a week before it rose to normal.

During the fever the pulse varied between 120 and 100 until the last two days when it was about 90; at the crisis it fell to between 60 and 70, and two days later it fell to 44. It was then perfectly regular, and I was able to demonstrate, by a paper flag on the neck, that the rate of beat of the auricle was twice that of the ventricle. I was unfortunate in being unable to obtain the use of a polygraph in time to make a record of these facts, as a few days later the condition changed, but at the time they were conclusively demonstrated to others who saw the case. After about two days this two to one heart-block altered, the pulse became more rapid and also irregular, or rather intermittent, some auricular impulses being still blocked but more coming through. The pulse now varied between 50 and 60. This condition gradually lessened, and after another week the pulse became almost regular and the rate normal. During this time the heart-sounds were normal, and there was no sign of dilatation. A little over a fortnight after the temperature became normal the patient was allowed to sit up a little, but as the pulse-rate increased considerably he was put to bed for a further period.

This case is of interest owing to the presence of two rare complications—hyperpyrexia and heart-block. The former is stated to occur in 0·4 per cent. of cases of acute pneumonia, but is much more common in broncho-pneumonia. It is also stated that it is almost always fatal when the temperature rises over 106·6° F. I attribute the happy result in this case to the patient being a young and healthy boy of good physique, and to the promptness of the treatment. This caused less disturbance to the patient than cold baths, and was undoubtedly equally rapid in its effects. The effect on the heart of iced towels over the precordium should be noted; it is evidently better not to use cold too vigorously over that area.

Heart-block after acute pneumonia is mentioned by Mackenzie, but he considers it very uncommon, and the experience of most of us confirms this. I regret I am unable to show any polygram of the apex and jugular pulsations, but the slowness and perfect regularity of the pulse and the demonstration of the jugular pulsations made the fact of a two to one block perfectly plain. Evidently the poison which had an unusual effect on the regulation of the heart's action had also an unusual effect on the heart muscle, impairing its conductivity. Heart-block of a very slight grade is, however, not uncommon, but as this merely consists in a lengthening of the A—V interval it can only be determined by graphic methods and has no effect on the pulse.

the muscles, because this boy's muscles have developed out of all proportion to the exercise to which they have been put. Another interesting feature is the absence of cutaneous fat referred to by Dr. Whipham. This is a peculiarity of the katabolic male, as contrasted with the anabolic female. The male tends to get thinner, if anything, after puberty, whereas the female tends to lay on fat at that time. In reference to my patient's mental state, I take it that it is yet too early to express an opinion. The boy I had under my care was a semi-idiot. With regard to the legs, my case showed bowing of the femora, but in this case it is difficult to judge of the condition of those bones by ordinary inspection, on account of the great development of the vasti.

Dr. J. D. ROLLESTON: It would be interesting to know what is the blood-pressure in this case. In the last case of sexual precocity shown before the Section, by Dr. E. C. Williams,[1] of Bristol, the systolic blood-pressure of the patient, a boy aged 6 years, was almost that of an adult—110 mm.

The CHAIRMAN (Dr. Guthrie): The most important thing to decide is whether this is really morbid, or whether conditions such as this may be simply normal abnormalities. Dr. Whipham has suggested that this condition of sexual precocity may be due to an adrenal tumour. I think he also mentioned that in such cases obesity only occurs in the female. That is not quite correct. Dr. Parkes Weber originally pointed out that there are two types of precocity in these cases of adrenal tumour. One is the infant Hercules type, such as the present case, and the other is the obese. This last type may occur as much in one sex as in the other. I have recorded the case of a boy who was enormously stout and heavy. He had a suprarenal tumour. But I am not certain that all these cases are due to suprarenal tumours. Out of thirty-five cases in boys, the notes of which I collected at one time, only four had suprarenal tumours: three of those four were of the Hercules type, and one of the obese. I think there is no doubt, as Dr. Whipham contends, these cases are measures of the secretory activity of, probably, the adrenal glands: but I am not certain that that activity is always morbid. I think that by the time some of these children reach the age of puberty they are no longer wonders, and that is so, I think, in both sexes. Of 100 cases in females, there were only twelve with hypernephroma or adrenal tumour. Other causes of this precocity may be tumours of the testicle, for instance. Sacchi reported the case of a boy who had a tumour of one testicle and showed all the signs of sex precocity. On removal of the testicle those signs disappeared. Dr. Whipham asked an interesting question, as to the development of the sexual instinct, whether it occurs when the organs are mature. I have always understood that there is no rule in these matters, and that certain persons, although sexually mature, never develop the instinct at all, that the development is rather due to tuition than to instinct. It would be very interesting if these cases could be followed up, so as to find out what becomes of them.

[1] *Proceedings*, 1913, vi (Child. Sect.), p. 24.

I have a strong impression that many after a certain age, in both sexes, cease to be wonders, and are regarded as ordinary members of society.

Dr. F. PARKES WEBER: This is a typical case of what we (in this Section) have mostly called the "infant Hercules" type of precocious bodily development. In regard to the question of prognosis and progress in such cases, I would suggest that Mr. Hugh Lett and any other members of the Section, who have shown cases of this type before this Society, or before the old "Society for the Study of Disease in Children," be asked to furnish, as far as they can, a report of the subsequent history of their cases.

(*February* 23, 1917.)

Case of Fragilitas Ossium.

By T. R. WHIPHAM, M.D.

THE patient is a boy, aged 9 years, who all his life has been liable to fractures of the bones from trivial causes. The first fractures occurred when he was five weeks old, both femora being then broken. Subsequently he has fractured the right leg twice, and the right forearm, and quite recently has sustained a fracture of the lower jaw as the result of a fall. He presents marked deformities of the lower limbs, but manages to get about with the help of crutches. His health is good, and he is said never to be ill. He has five brothers and sisters, who are all normal, and there is no history of any similar condition in the family.

DISCUSSION.

Mr. PAUL BERNARD ROTH: With regard to the treatment of this condition, my experience has been that no fractures occur after puberty has been reached. The way to treat these cases is to put the legs straight, and there is no surgical reason for not doing so: they should be put and kept in splints until the child is 14 or 15 years of age, after which it is very unlikely that fractures will occur. I have seen several cases which have been operated upon. Union did take place in them, and the resulting condition, though not beautiful, was perfectly satisfactory.

Dr. ERIC PRITCHARD: Some years ago I had a case of the same character, in which there was an ununited fracture. Sir William Arbuthnot Lane wired it with success, and it did very well. I attributed much of the improvement to the systematic massage and the passive muscular exercises which were given to this child. This boy had had many fractures before of the legs and other

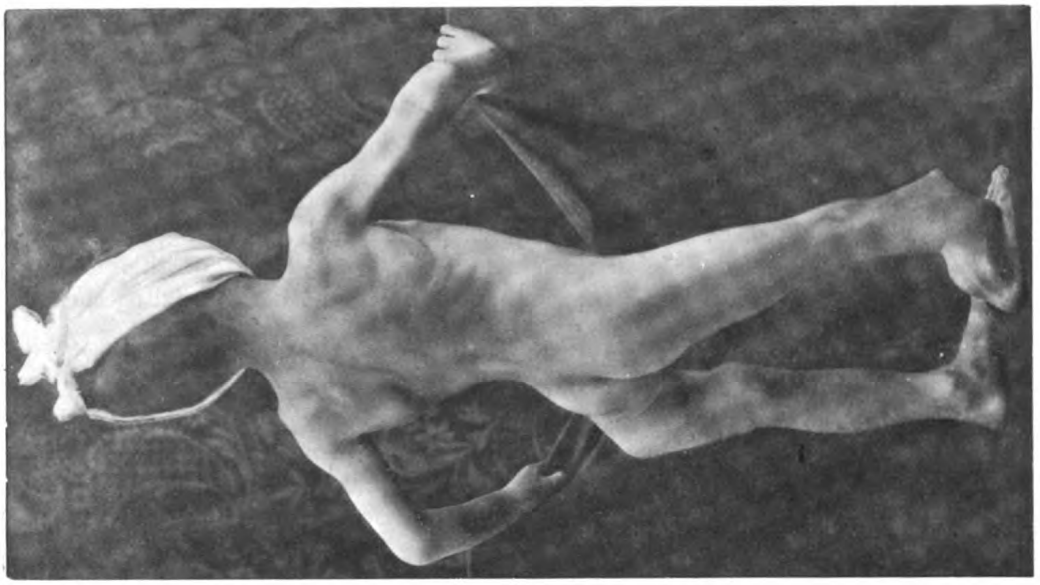


FIG. 2.
Fragilitas ossium.

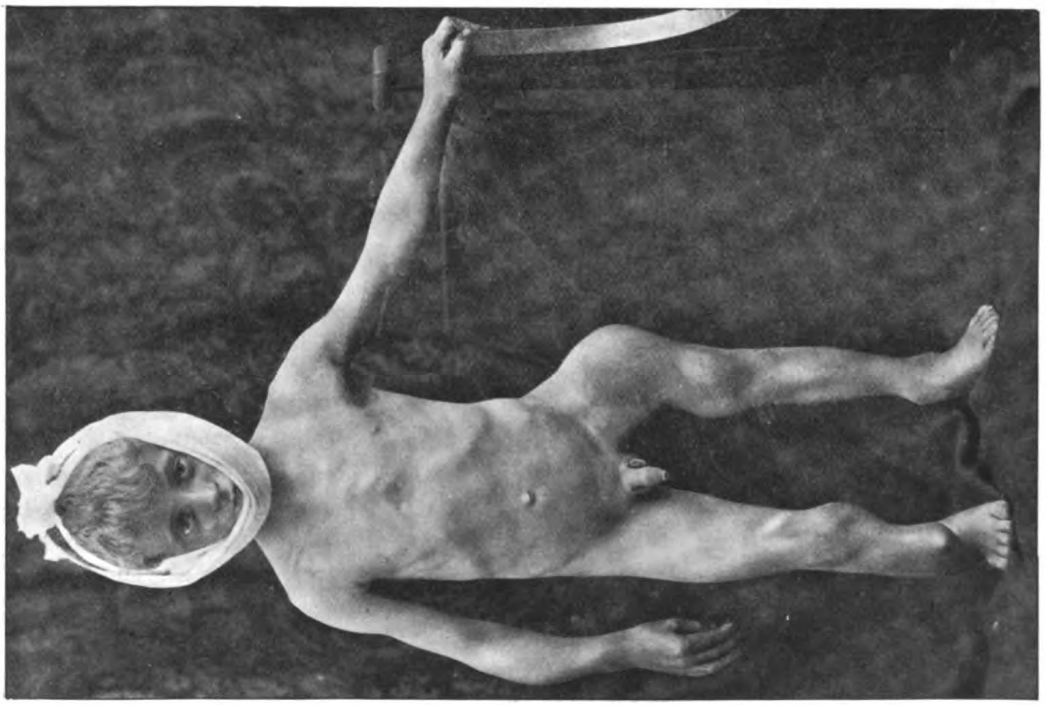


FIG. 1.
Fragilitas ossium. The bandage is owing to a recent fracture of the mandible.

parts, and on each occasion he had had them treated in the ordinary way by immobilization with splints, but as soon as he was able to leave his bed, and even before, he got repeated fractures. But after wiring the fractures and insisting on his having active muscular exercises, recurrences ceased and he improved very much. I attribute the improvement directly to the results of the active exercise.

Dr. F. PARKES WEBER: I should like to know what the ultimate condition is in cases of this class. Cases of von Recklinghausen's chronic generalized *osteitis fibrosa* may superficially resemble surviving patients of this class (osteogenesis imperfecta), but I take it they belong to another class altogether.

The CHAIRMAN (Dr. Guthrie): This case presents the blue sclerotics with which one is familiar in such cases, also the curious protuberance above the ears on either side, to which Dr. Cameron drew attention recently at this Section. There are some members here who can throw light on the origin and meaning of the blue sclerotics. I have never been able to find out the cause of the colour and the meaning of its association with osteogenesis imperfecta.

Dr. J. D. ROLLESTON: Some years ago,[1] I showed a case of blue sclerotics, which were present in both mother and child. In the child there was an association with brittle bones. Since then a number of cases have been published. Dr. Cockayne[2] has shown one since at this Section. I understand that blue sclerotics are due to a deficiency of fibrous tissue in the sclera, and that this is also the condition in the bones, which would account for their brittle condition. But in Dr. Whipham's case the blueness is not so marked as in the cases I showed, and in that shown by Dr. Cockayne. I think such sclerotics have been examined by Leslie Buchanan, of Glasgow.

Dr. EDITH BRONSON: In 1908, Dr. Buchanan of Glasgow, made a histological examination of a blue sclerotic, and reported that the cornea was three-fifths and the sclerotic one-third, the normal thickness. However, in his patient there was no history of fractures, and it is doubtful if it belonged to the fragility-blue sclerotic group. In Edinburgh last year, I obtained microscopic preparations of an eye from an infant, aged 11 months, who had blue sclerotics, and who belonged to a family of hereditary blue sclerotics associated with fragile bones. These sections were examined by Dr. J. V. Paterson, and the thickness of the sclerotic reported normal. Fridenburg who made the ophthalmological examination in Herrman's patient, suggested that the blue sclerotic was due to an unusual transmission of the choroidal pigment dependent upon the absence of lime salts in the connective tissue elements of the sclerotic. Peters thought the assumption of thinning of the sclerotic the most probable explanation. Either an increased transparency or an actual thinning has been suggested by most writers on the subject.

[1] *Proceedings*, 1911, iv (Child. Sect.), p. 96.

[2] *Ibid.*, 1914. vii (Child. Sect.), p. 101.

Dr. H. C. CAMERON: Are not these blue sclerotics generally found in the familiar type to which the name "fragilitas ossium" is best applied? In the cases of which Dr. Whipham has shown an example to-day—which I should have preferred to describe under the heading "osteogenesis imperfecta"—the sclerotics are not usually of the characteristic deep china-blue colour.

(*February* 23, 1917.)

Case of Vitiligo.

By J. L. BUNCH, M.D., D.Sc.

THE patient, a girl, aged 10, during the past twelve months, has developed some fifty patches of vitiligo on the trunk and lower limbs. The face and arms are entirely free. The first patch showed itself on the abdomen, to the left of the umbilicus, as a small white patch, which has now developed until it is the size of a five-shilling piece, dead white in colour, and contrasting strongly with the surrounding brown pigmented skin. Some of the other patches are also quite round, but many are irregular in shape, and, in places, adjacent lesions tend to coalesce. There are no subjective symptoms and I cannot determine that the lesions are associated with any local hyperæsthesia, or anæsthesia.

The chief point of interest in this case is the rapidity of onset of the disease. The child is aged 10 years, and fifty lesions have developed during the last twelve months, or less. It has been said that many of these cases only occur in congenital syphilitics, and the mother of this patient says that out of eleven children she has had only five are living. The Wassermann reaction, however, in this child is negative. In these cases there is no change of texture of the skin, the disease consists in a loss of pigment.

The other patient, whom I wanted to show, could not come. In this case there is a definite sclerodermatous change in the tissues, and the skin is distinctly shiny in the position of the lesions. There is much the same distribution as in the case shown, although the lesions are not so numerous, and I wanted to contrast the two.

(*February* 23, 1917.)

Case of Teratoma.

By J. P. Lockhart Mummery, F.R.C.S.

Patient, a girl, born October 25, 1916. One of twin girls born at seven months; both twins are living. Patient weighed 3½ lb. at birth, the other twin 8 lb. The patient at birth had a round tumour, about the shape and size of a tangerine orange, attached over the sacrum and lower lumbar vertebræ. The tumour was covered with normal skin, was somewhat irregular in shape, and contained a number of hard nodules. A little to the left of the centre of the tumour was a minute opening, which discharged a few drops of sticky, white fluid at intervals. The tumour did not seem to interfere with the child, and there was no sign of paresis in the legs, and the rectum, on examination with the finger, was normal. The child was so small and weakly that the question of operation had to be postponed, and the operation was not performed until February 2, 1917. During this time the tumour had grown considerably, being three or four times the size it was when the child came into hospital. The diagnosis of teratoma was made, and this was confirmed at operation. The tumour was difficult to remove owing to the extraordinary variety of tissues and complete absence of any normal anatomy in its neighbourhood. The child stood the operation well, and has now completely recovered.

On examination the tumour was an obvious teratoma, and contained portions of a third child. There was intestine containing meconium, cartilage, a structure which looked like an auricle of the heart, but no hair. Microscopic sections show fibrous tissue, cartilage, intestinal mucous membrane, and a glandular structure, which may be pancreas or salivary gland.

(*February* 23, 1917.)

Pathological Specimens: Thoracic Contents and Brain; Extensive Tuberculous Infiltration.

By ERIC PRITCHARD, M.D.

I EXHIBIT these specimens somewhat to my own confusion, because I have shown the patient before the Section as an intrathoracic new growth. It is, however, a chronic tuberculous condition, which, during life, showed very little evidence of its real nature. At the post-mortem examination the whole of the thoracic contents were found to be solid masses of tubercle, adherent entirely to the thoracic wall. There is so much consolidation that it is marvellous that the boy could have lived in comparative comfort, as he did until the end. Towards the termination he developed cerebral symptoms; he was absolutely blind, there was much œdema in both fundi, and paralysis of both hand and foot on the left side. I thought, at first, that there was a secondary growth in the brain; the progress both in the chest generally and in the lungs was what one would expect except for its slowness; there seemed little evidence in favour of tubercle. We had the boy examined several times with the X-rays, and every test we knew was applied. There had been practically no expectoration, except once or twice when he had some bronchitis, which was prevalent in the ward at the time. In the small quantity of sputum we obtained, no tubercle bacilli could be found.

The physical symptoms were very curious: there was no entry of air at the lower part of the lungs, and the upper part of the lungs showed progressive failure of air entry; yet at no time were there marked rhonchi or râles, or moist sounds. One could have understood this course if it had been a slow-growing sarcoma.

The boy was in hospital for two years, and the history of the symptoms extended over a period of two years and a half.

(*February* 23, 1917.)

Some Points in Lateral Curvature of the Spine.

By J. S. KELLETT SMITH, F.R.C.S.

THE first questions that occur to my mind in investigating a case of lateral curvature of the spine range themselves in somewhat the following order:—

(1) Has the curve to do with the spine alone, or is it a "curve of accommodation"?

(2) Is there evidence of any past or present internal condition of the chest likely to cause unequal development of the two sides of the thorax?

(3) Is the standing height of the legs equal?

(1) By a "curve of accommodation" is here meant a curve assumed by the patient as an attitude of ease, in order to relieve pressure on a sensitive viscus or nerve. Such a curve, which is postural at first, may become fixed by the efflux of time and end in more or less bony deformity. A tender viscus may also give rise to a spinal curve by reflex nerve irritation through which a unilateral hypertonus of the abdominal muscles or of the erector spinæ is initiated. In this case the patient is often very little conscious of any internal derangement, pain being generally referred to that particular region of the spine in nervous connexion with the viscus affected. Both these causes of a curve of accommodation may be in operation together—i.e., the patient may be conscious of the effort of seeking an attitude of ease, and at the same time examination may show hyperæsthesia of the skin with increased tonus and irritability of the underlying muscles at some region of the anterior abdominal wall and, or on the concave side of the spinal curve only.

These cases occur chiefly in patients of riper years, but they are also found in those of earlier age and are then not infrequently associated with cardiac mischief. It is manifestly useless to attempt any cure of the curve by exercises so long as the initial cause is left operative.

The practical deduction is that any case of lateral curvature in

which pain in the back is a prominent feature, demands an especially careful examination of all the internal organs, even if the patient does not complain of any discomfort therein. A tender ovary, an irritated appendix, a painful floating kidney, or a sensitive gall-bladder, for example, may be discovered, and the measures necessary for its relief will at the same time cure the spinal curvature if this be still entirely postural, or will place the patient in a position to receive successful treatment if it be in an early degree of fixation. It would seem superfluous to insist upon this class of case, but experience shows that their real nature is frequently overlooked in practice.

In the past year I had forty-three cases of lateral curvature under observation, and I propose to use these cases to illustrate various points in this paper. In the forty-three there were five examples of accommodation curves: two with left ovarian trouble, total curve right convex; one with movable and tender right kidney, left dorsal and right lumbar curve; one with pain, tenderness, and vasomotor signs over the sensory distribution of the posterior branch of the fifth left cervical nerve, high curve to the right; and one with recurrent biliary catarrh and general tenderness over the liver, total curve left convex. The first four were in adults. Two (ovarian) accepted operation, one (kidney) refused, and the fourth had the sensitive nerve submitted with success to high power light. In each treated case the ultimate result was good, both spinal curve and pain ceasing to give trouble. The fifth case occurred in a young girl aged 10 years. Attention to general health, an outdoor life, and a carefully modified series of exercises, which were possible from the beginning, provided a cure.

(2) In his monograph on ionic medication, Stéphane Leduc discussed an interesting phase in the relation between inflammatory affections of the chest and scoliosis. Leaving aside examples of gross mischief, he doubted if average pleural thickenings and adhesions could produce a curvature by reason alone of the contraction of cicatricial tissue. He advocated the view that a pleurisy or a broncho-pneumonic condition long continued might cause a retardation of growth—involving even the skeleton—on the affected side, the result of which would become evident in later years as a partial atrophy in comparison to the healthy side. The rôle played in this, and in any subsequent development of a curvature, by pleural thickenings and adhesions would be in limiting the freedom of the respiratory movements, and for this reason he advocated their treatment by chlorine ionization.

I believe we have here described a class of case which is not uncommon, in which one side of the thorax is found to be distinctly less broad than the other. There is little to be seen from the front. From the back the affected side seems to have lost its lateral convex contour: it looks even and narrow and, by reason of this, falsely long in comparison to its fellow—it appears as though it were ribbed up with ribs all of equal length. And quite in the early stage of curvature, when the spine is still capable of median position, the "sky line" of the flexed back shows the rib angles on the sound side to be more prominent than the degree of scoliosis would warrant. The whole appearance is quite typical. In the forty-three there were six examples, in four of which there was a history of severe pneumonia, and in two a history of whooping-cough with pulmonary complications.

(3) The influence of a large difference in the length of the two legs in causing a compensatory curvature of the spine is generally admitted. I wish to discuss here the influence of small differences—those of half-an-inch or so. For the purpose of measuring these I use a "pelvic level"[1] consisting essentially of a piece of wood curved to fit the body and carrying a spirit level adjusted to an upper true horizontal edge. Since it is the standing height of the legs that matters the patient stands erect, feet parallel, knees together and fully extended. A pencil dot is placed over each posterior superior iliac spine. These are readily found; the situation of each is marked by a dimple in the skin, which is generally unmistakable and is almost always discernible with ease. The upper edge of the pelvic level is then applied to the two dots, and the position of the air-bubble in the spirit tube observed. If one side is shown to be lower than the other, slabs of wood are placed beneath the patient's short leg until the bubble is central. The sum of the slabs gives the increased thickness of sole necessary to restore the theoretical base of the spine to true horizontal. The posterior iliac spines are used in preference to the anterior. These latter, on account of their wider distance apart, would tend to minimize any error of observation, but in using them we have to presume that the pelvis is symmetrical. In the forty-three cases there were sixteen in which one leg was shorter than the other by anything up to half-an-inch, and in two of these the pelvis was so twisted that the anterior spines gave a palpably wrong reading, the short leg as shown by posterior examination being actually on the side of the higher anterior spine.

[1] Figured in the *Lancet*, 1911, i, p. 174.

Incidentally I may say that flat-foot as a cause of difference in the standing height of the legs was curiously absent in my cases, but many of them presented eversion of the whole foot on one or both sides associated with abnormal shortness of the external malleolus. This developmental error is quite common; in the late fœtus and even at birth the malleoli are about of equal length, and if the outer one fails to grow downwards to form an external splint, as it were, to the ankle-joint, some eversion of the foot in walking is a likely consequence. It is one condition popularly known as "weak ankles," and may be seen frequently in any public thoroughfare.

Of the sixteen cases of short leg, five were short rights and eleven short lefts. An analysis of the former conveys nothing. Two of the cases had the primary curve convex to the right, but one of these had definite signs of sclerotic mischief in the left chest consequent upon pneumonia. Three had the primary curve convex to the left, but here again the issue was confused because one of them was left-handed, and another was the case of biliary catarrh already mentioned as a curve of accommodation. When we come to the short lefts we are in rather a different position. Four of them presented a single curve convex to the left, and seven presented a double curve with the lumbar section convex to the left. In other words, each of the eleven short lefts presented a curve in entire agreement with the statics of the case.

These figures are far too few to justify any conclusion, but when we find eleven cases behaving in exactly the same way, then we are justified at least in making a suggestion. I believe that we have here an argument in favour of the theory put forward in 1912 by Professor Jansen, of Leyden. He pointed out that the left half of the diaphragm acts more strongly, and has a greater excursion, than the right half. This asymmetry of action causes a tendency to a left low dorsal curve, which is the common constant factor in the great majority of all cases of curvature. If, then, there is already a tendency for the spine to tilt to the left, this diaphragmatic pull will increase it. Thus, even small deficiencies in the length of the left leg assume great importance.

To complete the analysis of the forty-three cases—there were two examples of amesial pelvis of the type described many years ago by Richard Barwell, one case following infantile paralysis, one associated with torticollis and another with Sprengel's shoulder, one due to tearing of the deep muscles of the back whilst lifting a heavy weight, one the result of empyema, and one interesting case in which the curvature was discovered after a long period of sling treatment for a

broken arm. The remainder—roughly 25 per cent., since three of the foregoing examples are quoted in a double category—were of the usual type in which no very evident actuating cause, beyond the habit of harmful posture, could be given.

DISCUSSION.

Mr. PAUL BERNARD ROTH: I do not agree with Mr. Kellett Smith on every point. I have spent much of my medical life in treating lateral curvature of the spine, yet only last month did I meet my first case of scoliosis clearly due to chest trouble—I am, of course, excepting cases of empyema. To get scoliosis following one-sided lobar pneumonia is very rare. But I recently had a case in which a boy had right-sided pneumonia with serous effusion, and after the pneumonia the lung did not expand again. At the present time there is very bad air entry into the lower half of the right lung, and the boy has got a curve of the spine, with the convexity to the left. When he takes a deep breath, the left side of the chest expands nearly twice as much as does the right side. When he stands, his left shoulder is high. I am sure this is directly due to the former lung trouble. That is the only case of the kind I have seen. In the large majority of cases, lateral curvature is due simply to weakness of the spinal muscles. I do not agree that a slight difference in the length of the legs does, as a rule, cause lateral curvature: if it did, curvature would be present in nearly everyone, because in anthropometric laboratories it is almost invariably found that a person's legs are of unequal length. Often one finds the lateral curvature on the side opposite to that of the shortened leg. Mr. Tubby, in his paper on "Symmetry and Asymmetry," read at this Section,[1] gave an explanation of these cases, but it was one which I myself was unable to follow.

Dr. ERIC PRITCHARD: Mr. Kellett Smith's invention of his new pelvic level supplies what is much needed. I have found it impossible to measure the length of the two legs of children with any degree of satisfaction by the usual methods, and I have often wished for some good means of doing so. I shall be very glad to secure Mr. Kellett Smith's new instrument, and use it for the measurement of legs which are suspected to be of uneven length.

Mr. BLUNDELL BANKART: I agree with Mr. Roth that most of the conditions mentioned by Mr. Kellett Smith as causes of scoliosis are the exception, rather than the rule. In my experience, it is uncommon to find a definite visceral condition as the basis of ordinary cases of scoliosis. The only constant feature in all cases of static scoliosis is weakness of the musculature. When the muscles are weak, the spine lapses into a curve, and if that persists long enough, it becomes permanent. I particularly object to the author's

[1] *Proceedings*, 1909, ii, p. 247.

appeal to normal anatomy as a cause of scoliosis. If a normal anatomical condition is a cause of scoliosis, I see no reason why everybody should not have the deformity. With regard to the use of a pelvic level, we have found that a couple of thumbs on either the anterior or the posterior superior iliac spines—we use them indifferently—will, with a little practice, indicate, for all practical purposes, whether the pelvis is level, or not.

Dr. H. C. CAMERON: I should be inclined to agree with Mr. Bankart in regarding laxity of the muscles as the principal cause of scoliosis. This want of tone of skeletal muscles is certainly the common cause of lordosis in children and adolescents. In lordosis there is often an accompanying postural albuminuria, I believe from a similar weakness in the vasomotor muscles. It would be interesting to know in what proportion of these cases of scoliosis, cases which gravitate to the surgeon rather than to the physician, a similar albuminuria is found.

Dr. F. PARKES WEBER: The last speaker's explanation, that postural albuminuria is not necessarily the result of the lordosis but that the lordosis is due to the same cause as the postural albuminuria, when the two conditions are combined in the same patient, is at variance with the observations of Ludwig Jehle and those who first prominently drew attention to the frequent association between lordosis and postural albuminuria (that is to say, orthostatic albuminuria) in children. They claimed that the postural albuminuria was directly due to the lordotic position, and that a temporary (artificial) postural albuminuria could actually be produced in ordinary children by merely keeping them for a certain length of time in a lordotic position. It is certainly true that in some children an *artificial* lordotic position will produce temporary albuminuria. But the true explanation of the relation of postural albuminuria to lordosis is probably not that of a simply mechanical effect produced by the lordosis on the kidneys.

Dr. H. C. CAMERON: I know that the suggestion, originally made in Germany, was to the effect that the spinal lordotic curve directly and mechanically caused the albuminuria by pressure upon the renal vein. To my mind this suggestion is in the highest degree unlikely. The author even goes on to elaborate it by urging that albuminuria in swimmers is due to the swimmer rearing his head out of the water and assuming a position of lordosis. I do not think he can have had much knowledge of swimming. I have not succeeded in producing albuminuria by putting children in plaster of Paris in the position of lordosis. Children with lordosis and postural albuminuria have sometimes other signs of vasomotor instability. I have noted dermographism for example, as occurring in association, and I believe that the explanation that I suggest is probably the correct one, that the lordosis, albuminuria, and dermographism are evidence of muscular weakness, involving the skeletal muscles as well as the vasomotor muscles. My question now is whether or not similar changes are found in scoliosis.

Dr. PARKES WEBER: I should like to add further that I do not believe, from what I have read and seen, that the purely mechanical theory of the causation of orthostatic albuminuria can hold good; it is for that reason that I am glad to hear other explanations. But one must admit that in a certain number of cases, though possibly only in predisposed children, an artificial position of lordosis has been sufficient to produce, for the time being, the so-called orthostatic albuminuria.

Mr. KELLETT SMITH (in reply): The number of cases described under the second heading may seem rather large, but Eastbourne has a great reputation as a school centre for children who have suffered from any chest mischief, and such cases are for this reason more likely to be found there in greater proportion than elsewhere. The pelvic level I have devised (and improved lately by hinging the wings and moving the spirit-level to a clearer view on the convex surface) has proved most useful in practice. I am quite convinced of the part played by a short left leg in favouring the occurrence of a curvature in those whose general physique renders them prone to static spinal trouble.

(*February* 23, 1917.)

Lipodystrophia Progressiva.[1]

By F. Parkes Weber, M.D.

Quite recently two genuine cases of lipodystrophia progressiva *in males* have been published. J. Gerstmann's case [33] is that of a soldier, aged 32 years, who at the age of 10 years commenced to show symmetrical wasting of the subcutaneous fat in the face. Since then the fat-atrophy has gradually spread over the neck, upper extremities, and trunk, as far as the pelvic bones (the inguinal folds and the iliac crests). There is excessive amount of subcutaneous fat in the buttocks and lower extremities. The muscular development in the lean parts is very good. The man presents likewise signs suggestive of thyroidal disturbance, "facial irritability," alimentary glycosuria, and some nervous symptoms, which may, however, not be in any way related to the lipodystrophia. H. Gerhartz's case [34] is that of a man, aged 29 years, whose "lipodystrophia progressiva superior," as Gerhartz prefers to call it, commenced at the age of 6 years, after an accident on the ice in which the patient nearly lost his life. In this case, however, there is no excessive accumulation of subcutaneous fat in the buttocks and lower extremities. The patient shows various other abnormalities ("facial irritability," hyperidrosis, alimentary glycosuria, &c.), the connexion of which with the fat-atrophy is by no means clear.

Lipodystrophia progressiva is a rare disease or morbid condition, which was at first supposed to be confined to the female sex. It is characterized by the progressive disappearance of the subcutaneous fat from the face and upper parts of the body. The term "lipodystrophia progressiva" was introduced by A. Simons (1911), and the appearance in his case as portrayed in his and E. Holländer's illustrations (1910) may be accepted as altogether typical for the disease [1]. Though Simons was undoubtedly the first to use the term lipodystrophia (from the Greek words λίπος, δυς-, and τροφή, signifying respectively *fat*, *badly*, and *nourishment*), a characteristic example of the disease was

[1] In this paper the reference numbers in brackets are to the Literature references at the end.

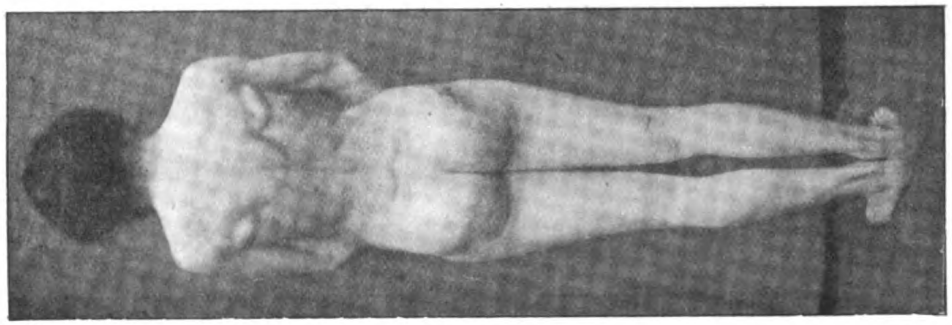
shown by Harry Campbell in 1907, at the Clinical Society of London, under the heading, "Disappearance, more or less complete, of the Subcutaneous Fat above the Region of the Lower Extremities" [2]. By the kindness of Dr. Campbell I am able to reproduce here photographs of his patient taken in 1913 (*see* figures).

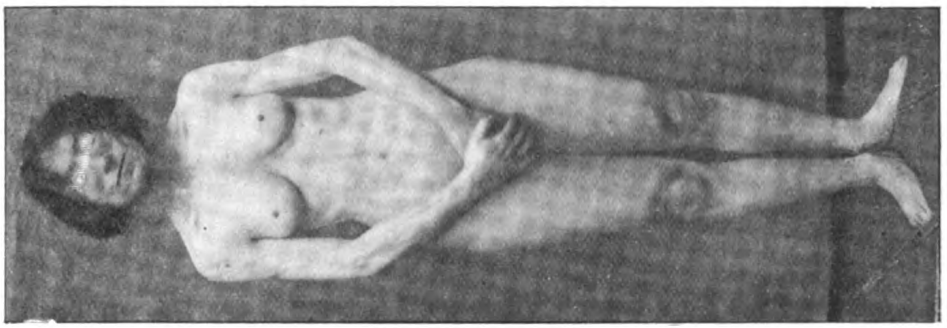
The fat atrophy seems first to attract attention in the face, and later on to spread to the trunk and upper extremities. In some cases the disease remains limited to the face and neck, or face, neck, and thorax; in Lewandowsky's case [11], although it had already lasted two years, it had not yet affected the upper extremities. Though the disease is called *progressive* lipodystrophia, it is really not progressive in all senses of the word, for the lower extremities and the buttocks are never involved; in most (nearly all) cases, indeed, there seems to be an abnormal accumulation of subcutaneous fat in the thighs and gluteal regions (sometimes in the lower abdomen also), such as occurs in many females, especially at middle age.[1] Moreover, when the subcutaneous fat has nearly all disappeared from the affected regions, the disease comes to a standstill. Although at the commencement there may have been associated neurotic or other troubles, when the disease once comes to a standstill, and sometimes during the progress of the disease, the general health appears to be in no wise affected by the lipodystrophia. The patients are ordinarily able to do as much work and stand as much fatigue as the average of normal women of the same age, or they may even excel in energy and strength. A cause of annoyance and trouble may be that employers and others, owing to the wasted appearance of the face, may suspect the presence of a disease of evil repute, such as pulmonary tuberculosis or cancer.

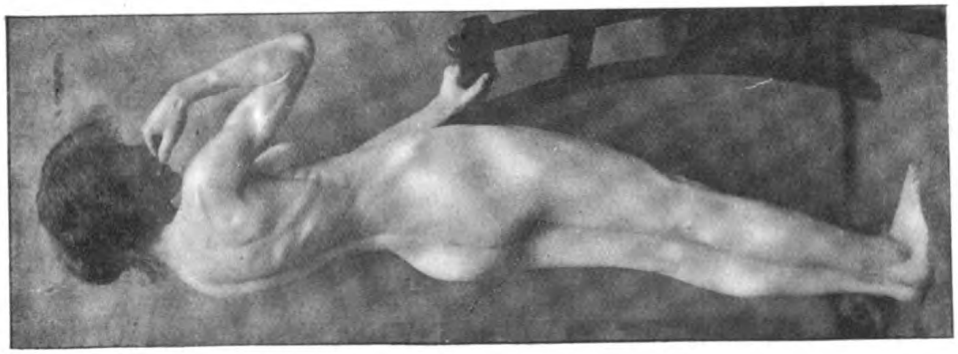
The ætiology of the disease is unknown, but an endocrinic origin has been suspected, that is to say, the peculiar fat atrophy in question has been supposed to be a result of some disorder of the internal secretions. In women menstruation and the ordinary sexual functions appear to be unaffected. Feer [13] suggests disorder in the function of the thyroid gland. Thyroid treatment and various drugs and other methods of treatment have been tried, but without any satisfactory result.

It is possible that the disease occurs relatively more frequently in

[1] In females the predominance of subcutaneous fat about the thighs and gluteal regions is practically a secondary sex-character. The gluteal prominence is greatly exaggerated in some African races, constituting the racial peculiarity known as "steatopygia," which is illustrated by the pictures of the "Hottentot Venus."







To illustrate the typical changes in lipodystrophia progressiva.

women of Hebrew race than in others. In my first case the patient was of Hebrew parentage, and so were Harry Campbell's and Herrman's patients. Several other patients, however, were certainly not Hebrew. If, moreover, the disease is slightly less rare among those of Hebrew origin than amongst others, it must nevertheless be exceedingly rare. During the whole time (more than twenty years) of my work as physician to the German Hospital in London (the in-patients and out-patients of which are largely Jews from Russia, Russian Poland, Germany, Austria, and the Balkan States) I have not met with a single case at that hospital, nor have I heard that any of my colleagues at the hospital have come across one.

In regard to the age at which the disease commences, and the circumstances (if any) which the patient or her friends suppose to have acted as exciting causes, there seems to be considerable difference in different cases; but the disease is one of the first half of life and generally commences in childhood, before puberty, especially at the age of 6 years or thereabouts.

In a case on which I published a note in 1911 [3], the patient, who was an unmarried woman, aged 27 years, of Hebrew parentage, presented no evidence of any visceral disease. She was said to have been a healthy girl up to the age of 16 years, when menstruation commenced. Since then she had had various troubles, and had likewise been treated for dyspepsia and insomnia. But it is doubtful whether these troubles had anything to do with the lipodystrophia. She was active, and discontented with life in her parents' home, being desirous of obtaining some useful occupation, which would render her more independent.

Since then I have met with another case, in a somewhat older woman, who, apart from the fat atrophy in question, enjoys apparently perfect health. Mentally she is also normal, but is sometimes annoyed because people think that owing to the emaciated aspect of her face she must have "consumption." She is quite certain that the fat atrophy commenced after an attack of measles, at 7 years of age, but it has long ago reached its maximum and is now quite non-progressive. I was not able to examine the trunk, but am assured that the atrophy is limited in this case to the face and neck, as in certain male patients referred to further on.

In Harry Campbell's case [2], when he first demonstrated it (1907), the patient was 21 years old. Dr. Campbell kindly informs me that she is of Hebrew parentage. The fat-atrophy commenced at the age

of 6 years and gradually progressed during the next eight years or so. The face was the part first affected. There was abundant subcutaneous fat in the buttocks and lower extremities. Dr. Campbell tells me that cosmetically she has been greatly improved by paraffin injections into the subcutaneous tissues of the face, for the first time in 1904, and again about one year later (as the paraffin had apparently become gradually absorbed after the first injection).

The patient of Simons and Holländer [5] was 21 years old when her case was described in 1910. The fat-atrophy was first noticed in the face, when she was 11 years old, and then gradually spread over the trunk and upper extremities. The leanness of the face, however, seems to have been preceded by excessive accumulation of fat in the gluteal region, for an increase in the size of that part of the body had attracted her mother's attention when she was only 5 years old. The appearance of her face was of special importance to her, as she was a professional dancer, and from the cosmetic point of view Holländer obtained a temporary good result by injecting a sterilized mixture of human fat and mutton suet into the subcutaneous tissue of her face. The good result, however, did not last long, for absorption soon took place. A "biopsy" examination of the affected skin and subcutaneous tissue was made in this case, and (unlike what is found at post-mortem examinations on even the most emaciated subjects of pulmonary tuberculosis) practically complete absence of fat was noted, so that only traces could be demonstrated by careful microscopical examination [6].

In a case which Sir William Osler kindly gave me permission to mention [7], and which doubtless belongs to the same class, the leanness was first noticed when the patient was about 5 years old, the face and back being the earliest parts to be affected. In 1895, at the age of 10 years, when Sir William Osler saw her, the contrast was very great between the extreme thinness of the face, trunk, and upper extremities, and the plumpness of the parts below the hips. Menstruation commenced at 12 years of age. In February, 1913, information was obtained that, though this patient still looked thin and weak, she said that she felt well and was actually stronger than most ordinary women.

In May, 1915, Dr. John Fawcett [4] kindly showed me a typical case of lipodystrophia progressiva in Guy's Hospital. The patient was a young Englishwoman (not of Hebrew origin), aged about 19 years, with apparently nothing abnormal about her, physically or mentally, excepting the fat-atrophy. The subcutaneous fat of the whole body

down to the pelvic bones was involved in the atrophy. The lower extremities showed a plentiful, but apparently not excessive, covering of fat. The disease had been long quiescent, for it commenced at about 8½ years of age and took only a year or so to reach its present stage. Menstruation, which commenced at 13½ years, was normal.

E. Feer, of Zurich, has recently described and illustrated two fresh cases of lipodystrophia progressiva [13]. The patients were girls, aged 12 and 10 years respectively (1914), in whom the fat-atrophy began at about 6 years of age in the face, spreading gradually to the neck, thorax and arms. The increase of fat in the thighs and buttocks was more striking in the second case (that of Dr. Boissonnas, of Geneva), in which there was likewise abnormal obesity of the abdominal wall.

The case of "Segmentary Adiposis of the Lower Limbs," published by Laignel-Lavastine and Viard [9] must probably be regarded as belonging to the group we are now considering, though the emaciation of the face and upper part of the body was less decided. Their patient was an unmarried woman, aged 39 years, an embroiderer, who complained of great enlargement of the lower extremities. This commenced, according to the patient's account, at the age of 22 years, and first involved the legs, then the thighs, and lastly the buttocks. Various methods of treatment had been resorted to (thyroid extract and iodine, milk diet, &c.), but without satisfactory results. The great size of her lower extremities offered a striking contrast to her thin chest and the general slenderness of the upper part of her body. The left thigh was decidedly larger than the right thigh, but both thighs, both buttocks, and both legs shared in the enlargement. The mammæ were very small. The thyroid gland was slightly enlarged. The menstrual periods, which had commenced at 14 years of age, lasted only two days each time. At the Salpêtrière the patient had been given thyroid and ovarian extracts, but as yet without any effect on the size of the lower extremities.

I have been kindly allowed to refer to a case which may perhaps be regarded as an "incomplete form" of lipodystrophia progressiva, somewhat like the above described one of Laignel-Lavastine and Viard. The case was shown by Edmund Cautley [29] at the meeting of the Harveian Society of London on February 3, 1916, and in the discussion Leonard Guthrie suggested that it might be one of lipodystrophia progressiva. The patient was a woman, aged 24 years, whose lower extremities (excluding the feet) were remarkable for their excess of subcutaneous

fat; so also was the lower part of the abdomen. The upper part of the body and face appeared thin (at all events, by contrast). The increase in the size of the legs commenced at the age of 6 years (in 1898), after an attack of diphtheria. The patient complained of numbness in the outer parts of the legs (chiefly the left one) and breathlessness on excitement and exertion, but these troubles may have been quite independent of the abnormality in the subcutaneous fat.

I cannot here give an account of all the published cases of lipodystrophia progressiva, but must refer to my recent article on the subject in the *Quarterly Journal of Medicine* [35], from which I have borrowed the material for the present paper, and to the accompanying table of female cases (*see* pp. 88 and 89).

There remains, however, a group of cases of bilateral atrophy of the subcutaneous tissues of the face, which have been supposed to be allied to progressive facial hemiatrophy, in fact, thought to be (if the expression be permitted) a progressive "bilateral facial hemiatrophy." Many of these have occurred in males, and since the publication of certain remarks by A. Simons [25], and since the above-described observations of Gerstmann [33] and Gerhartz [34], one may well suppose that some of them represent a modified (more limited) form of lipodystrophia progressiva in males, and it is possible that the latter disease is more frequently limited to the face (or face and neck) in males than in females. Some of the following examples have been quoted by H. Oppenheim, of Berlin, in his large, well-known text-book.

A. Schlesinger [16] refers to a case of that kind observed by himself, two cases recorded by Moebius, one by Julius Wolff [17], and one by Flashar [18]. Schlesinger's case was that of a girl, aged 10 years, in Monti's clinic. The facial atrophy commenced at 4 years of age, a few months after measles. It was not accompanied by neuralgia or any kind of pain, and it was noticed on the left side of the face before the right side was involved. One of Moebius's two patients was a woman, aged 28 years, in whom the bilateral facial atrophy was first observed after she complained of pains following an injury to her right eye. The other of Moebius's patients was a woman, aged 19 years, in whom the bilateral facial atrophy was said to have followed local pains and an attack of pneumonia. Wolff's patient was a woman, aged 24 years, in whom the right side of the face commenced to waste before the left side was involved. Flashar's (and Eulenburg's) case was that of a woman, aged 23 years, in whom progressive bilateral facial atrophy followed a supposed attack of measles (without cutaneous eruption) at about 4 years of age.

LIPODYSTROPHIA PROGRESSIVA. TABLE OF MORE OR LESS FULLY DESCRIBED CASES IN FEMALES.

Reference	Age of patient when the affection was first noticed	Age of patient when the case was described	Parts affected by the fat-atrophy	Condition of other parts	Remarks
(1) Campbell [2] ...	6 years	21 years	Down to pelvic bones	Abundant fat in buttocks and lower extremities	Of Hebrew parentage; temporary cosmetic improvement by subcutaneous paraffin injections
(2) Simons and Holländer [5 and 6]	11 years	21 years	Down to pelvic bones	Excess of fat in buttocks and lower extremities	Increase of size of gluteal region noted at 5 years of age; temporary cosmetic improvement by subcutaneous injection of human fat; biopsy examination made
(3) Weber [3] ...	Probably 16 years	27 years	Down to pelvic bones	Normal amount of subcutaneous fat in buttocks and lower extremities	Of Hebrew parentage; very active disposition
(4) Weber [35] ...	7 years	Over 30 years	Said to be limited to face and neck	Apparently normal	Commenced after measles; has long been non-progressive
(5) Osler, recorded by Weber [3]	5 years	28 years	Down to pelvic bones	"Plumpness" of parts below the hips	Fat-atrophy quiescent; feels well and in capacity for work is stronger than most women
(6) Fawcett [4], recorded by Weber [35]	8½ years	About 19 years	Down to pelvic bones	Normal amount of subcutaneous fat in buttocks and lower extremities	Fat-atrophy long quiescent; enjoys ordinary health
(7) Pic and Gardère [8]	Age not stated	4 years after commencement	Down to the umbilicus	"Pseudo-hypertrophy" of the pevic region and the lower extremities	A course of treatment by rest and feeding led to increase of fat in the lower extremities, but not in the face, thorax, and upper extremities
(8) Laignel-Lavastine and Viard [9]	22 years	39 years	The chest was thin, and there was general slenderness of the upper part of the body	Excess of subcutaneous fat in lower extremities and buttocks	Increase of fat first noticed in the legs 22 years of age

(9) Cautley[29],quoted by Weber [35]	6 years	24 years	Face and upper part of the body appeared thin	Excess of subcutaneous fat in lower extremities and lower part of abdomen	The increase in the size of the legs commenced after diphtheria at 6 years of age
(10) Barraquer, quoted by Laignel-Lavastine and Viard [9]	13 years	25 years	Face and upper part of thorax	"Plumpness" of lower part of trunk and lower extremities	The fat-atrophy commenced rapidly after an influenzal attack at 13 years of age
(11) Cohn [10]... ...	6 years	17 years	Down to pelvic bones	Excess of subcutaneous fat in lower extremities and buttocks	The patient complained of weakness in the arms, &c.; her father had had syphilis
(12) Lewandowsky [11]	A young woman	2 years after commencement	The face and trunk, but not arms, were affected	The buttocks were overloaded with fat	The arms as yet had preserved their normal subcutaneous fat
(13) Herrman [12] ...	6 years	32 years	The face, neck, arms, and thorax	Excess of subcutaneous fat in the lower part of the trunk and in the lower extremities	Of Russian Hebrew origin; beyond the disfigurement there were no bad effects from the disease
(14) Feer [13]	6 years	12 years	The face, neck, arms, and thorax	Abundant fat in thighs and buttocks	Increase of subcutaneous fat not very excessive; biopsy examination made
(15) Boissonnas, recorded by Feer [13]	6 years	10 years	The face, neck, arms, and thorax	Excess of fat in thighs, buttocks, and abdominal wall	The obesity of the abdominal wall is a special feature of this case
(16) Jolowicz [14] ...	8 years	21 years	The face, neck, arms, and thorax	Excess of subcutaneous fat in thighs and buttocks	At 9 years of age there was temporary arrest of mental development
(17) Christiansen [15]	12 years	18 years	The face, trunk, and arms	Excess of subcutaneous fat in lower extremities and buttocks	Temporary cosmetic improvement by subcutaneous paraffin injections

A case described by Nicaise [19] does not concern us in regard to the present question, because the facial atrophy (in a woman, aged 24 years), although it was bilateral (as far as it went), affected only a vertical stripe, exactly in the middle line of the face, from the root of the nose to the margin of the hairy scalp. It was doubtless allied to the "morphœa" kind of sclerodermia.

Bilateral wasting of the subcutaneous tissues of the face has also been observed in connexion with skin lesions (lupus erythematosus ?) and in connexion with ozæna (Okouneff, 1907).

Other cases of bilateral facial atrophy have been recorded in England. In 1905 H. Batty Shaw [20] demonstrated a boy, aged 10 years, who had commenced to show bilateral wasting of the subcutaneous tissues of the face when he was 2½ years old. The boy was brought to the hospital because his mother feared he might have tuberculosis. A. F. Hertz and W. Johnson [21], in January, 1913, brought forward the case of a young man, aged 26 years, whose face had become progressively thinner during the last two years, so that his friends thought he must be consumptive. There was no weakness of the facial muscles, and otherwise he was well developed and strong. He had had double otorrhœa in childhood. The same authors [22], somewhat later, met with another case of bilateral atrophy of the face, but in that case it was associated with wrist-drop from lead palsy. The patient was an Italian plaster-modeller, aged 38 years. In his book on "Diseases of the Nervous System," J. S. Bury has reproduced the photograph of a young lad with bilateral facial atrophy [23].

Other cases somewhat of the same kind have recently been described by J. Husler (1914) [24]. He gives portraits of two boys, aged 10 and 9 years respectively, affected in this way. According to A. Simons [25], however, both Husler's cases are genuine ones of lipodystrophia progressiva, differing from typical cases only in the sex of the patients. Yet it should be remembered that typical facial hemiatrophy may commence with wasting apparently limited to the subcutaneous fat.

This brings me to the microscopical appearances of the skin in typical cases of lipodystrophia progressiva. As already stated, the only change that was found from the "biopsy" examination in Simons's case was practically complete absence of subcutaneous fat. The disappearance of the fat was more complete than what is found in the emaciated subjects of the last stage of chronic pulmonary tuberculosis. This result has been confirmed by "biopsy" examination in Feer's first

case [13]. The lean skin of an affected part in that case showed nothing abnormal, excepting relative absence of subcutaneous fat. E. Kuznitzky and E. Melchior have discussed the question of lipodystrophia progressiva in describing the case of a very thin man, aged 20 years, with a chalky deposit in the subcutaneous tissue at the right elbow [26], but their case appears to me to be allied rather to those of so-called "calcinosis" (multiple calcification in the subcutaneous tissues), with or without the co-existence of sclerodermatous changes [27]. The atrophic process recently described by T. C. Gilchrist and L. W. Ketron seems to be of a hitherto unrecorded kind. Their case was that of a girl, aged 8 years, with an affection in her legs, which the authors say is unique; it is an "atrophy of the fatty layer of the skin, preceded by the ingestion of the fat by large phagocytic cell-macrophages" [28].

In regard to the question of the true nature and ætiology of lipodystrophia progressiva I must refer to the disease known in England as "diffuse symmetrical lipomatosis"; the sides of the face, shoulders, upper arms, and back of the thorax are often specially affected, as well as the neck. The disease should be mentioned here because to some extent the change in the subcutaneous fat is the opposite of what occurs in "lipodystrophia progressiva." Moreover, it occurs almost exclusively in males. I have seen only one case in a female [30]. The patients have practically all of them indulged in malt liquor or other alcoholic drinks. The accumulation of subcutaneous fat in the upper arms in this condition may, as I can vouch, actually hinder movements in the shoulder-joints and prevent the sufferer from getting his coat on and off quickly. I have no doubt that A. Bittorf's case [31], to which Freer [13] refers for purposes of contrast, was an acute example of diffuse symmetrical lipomatosis of this kind. The commonest clinical forms of the disease are those of the by no means very rare "diffuse lipomata of the back of the neck," or "Madelung's Fetthals," so called in Germany because Professor O. W. Madelung wrote about it in *Langenbeck's Archiv* in 1888 [32]. Bittorf's patient was a brewer, aged 28 years, and Bittorf suggested the term "adipositas acuta symmetrica partialis, of thyroid origin," because a good result was obtained in his case by thyroid treatment.

Conclusions.

In conclusion, I wish to emphasize that recent observations show:—

(1) That "lipodystrophia progressiva" is not always *progressive*, certainly not in regard to the area affected.

(2) That it usually commences in childhood, especially at 6 to 8 years of age.

(3) That in some cases the fat-atrophy in the upper parts was preceded by increase of fat in the buttocks or legs (Nos. 2, 8, 9, in my table of female cases); this increase in fat was therefore apparently the first sign of the commencement of the disease or syndrome in question.

(4) That this disease or syndrome is not confined, as at first it was supposed, to the female sex. Genuine examples have been recently recorded in males, and it is probable that some of the cases (especially in males) which were formerly labelled "bilateral facial atrophy," were likewise genuine (though less extensive) examples of lipodystrophia progressiva. Perhaps it will be found that in males the fat-atrophy is more often limited to the face and neck than in females.

(5) That the ætiology is unknown, but is probably connected with a disorder of the internal secretions (endocrinic origin).

(6) That the fat-atrophy, however disfiguring it may be, and though it may give rise to annoying suspicions of tuberculosis, &c., does not signify any danger to life, and is not usually accompanied by loss of strength and general health.

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[1] A. Simons. *Zeitschr. f. d. ges. Neur. u. Psych.*, Berl., 1911 (Originalien), v, p. 29; Eugen Holländer, *Münch. med. Wochenschr.*, 1910, lvii, p. 1794. Excellent illustrations of the same case and other cases are given by C. Herrman, of New York, *Arch. Intern. Med.*, Chicago, 1916, xvii, pp. 516-524.

[2] H. Campbell. *Trans. Clin. Soc. Lond.*, 1907, xl, p. 272. *See* also H. Campbell, *Proc. Roy. Soc. Med.*, 1913 (Sect. Neur.), vi, p. 71.

[3] F. Parkes Weber. *Proc. Roy. Soc. Med.*, 1913 (Sect. Neur.), vi, pp. 127-133.

[4] J. Fawcett. Case recorded by Weber (*see* [35]).

[5] Simons. Loc. cit.; and also *Zeitschr. f. d. ges. Neur. u. Psych.*, Berl., 1913 (Originalien), xix, p. 377.

[6] *See* additional remarks by A. Simons in the discussion reported in the *Berl. klin. Wochenschr.*, 1913, l, p. 1455, and in Simons's second paper, loc. cit. (with microscopic drawings).

[7] F. Parkes Weber. *Proc. Roy. Soc. Med.*, loc. cit., p. 130.

[8] Pic and Gardère. *Lyon med.*, 1909, cxiii, p. 61.

[9] Laignel-Lavastine and Viard. *Nouv. Iconog. de la Sal.*, Par., 1912, xxv, p. 473 (with plate).

[10] Toby Cohn. *Berl. klin. Wochenschr.*, 1913, l, p. 1322.

[11] A. Simons. *Berl. klin. Wochenschr.*, 1913, l, pp. 1454-5.

[12] C. Herrman. *Archiv. Intern. Med.*, Chicago, 1916, xvii, pp. 516-524.

[13] E. Feer. *Jahrb. f. Kinderheilk.*, 1915, lxxxii, p. 1, with illustrations. The second case had been demonstrated by Dr. Boissonnas, of Geneva, on January 29, 1914, at the Medical Society of Geneva (*Rev. Méd. de la Suisse romande*, Geneva, 1914, xxxiv, p. 214).

[14] E. Jolowicz. *Neur. Centralb.*, Leipz., 1915, xxxiv, p. 930 (illustrations).

[15] Viggo Christiansen. "Lipodystrophia progressiva," *Hosp.-Tid.*, Copen., 1914, lvii, pp. 225 and 269. Abstract in *Zeitschr. f. d. ges. Neur. u. Psych.*, 1914, ix, p. 750.

[16] A. Schlesinger. *Arch. f. Kinderheilk.*, Stutt., 1905, xlii, pp. 374-9.

[17] J. Wolff. *Virchow's Archiv*, 1883, xciv, p. 393.

[18] Flashar. *Berl. klin. Wochenschr.*, 1880, xvii, p. 441.

[19] Nicaise. *Rev. de Méd.*, Par., 1885, v, p. 690.

[20] H. Batty Shaw. *Trans. Clin. Soc. Lond.*, 1905, xxxviii, p. 222.

[21] Hertz and Johnson. *Proc. Roy. Soc. Med.*, 1913 (Clin. Sect.), vi, p. 92.

[22] *Ibid.*, 1914, vii, p. 11. *See* also Hertz and Johnson, "Two Cases of Bilateral Atrophy of the Face," *Guy's Hosp. Repts.*, Lond., 1913, lxvii, p. 112.

[23] Judson S. Bury. "Diseases of the Nervous System," Manch., 1912, p. 267, fig. 102.

[24] J. Husler. *Zeitschr. f. Kinderheilk.*, Berl., 1914 (Originalien), x, p. 116.

[25] A. Simons. "Bemerkungen zur Arbeit J. Huslers," *Zeitschr. f. Kinderheilk*, Berl., 1914 (Originalien), xi, p. 508.

[26] E. Kuznitzky and E. Melchior. "Subcutane Lymphsackbildung und Kalkablagerungen in der Haut bei universellem Fettschwund: ein Beitrag zur Kenntnis der Lipodystrophia progressiva," *Arch. f. Derm. u. Syph.*, Vienna, 1916, cxxiii, p. 133.

[27] *See* the references given by F. Parkes Weber, "Subcutaneous Calcinosis or Multiple Calcification in the Subcutaneous Tissue," *Trans. XVIIth Internat. Cong. Med.* (Sect. Derm.), Lond., 1913, p. 179.

[28] T. C. Gilchrist and L. W. Ketron. *Bull. Johns Hopkins Hosp.*, Baltimore, 1916, xxvi, p. 291 (good illustrations); also in the *Journ. Cut. Dis.*, Boston, U.S.A., 1916, xxxiv, p. 728.

[29] E. Cautley. *Proc. Harveian Soc. Lond.* (not yet published).

[30] F. Parkes Weber. "Diffuse Lipomatosis in a Woman," *Trans. Clin. Soc. Lond.*, 1904, xxxvii, p. 220; cf. F. P. Weber, "Diseases in their Relation to Obesity," *Med. Press*, Lond., 1916, clii, p. 119.

[31] A. Bittorf. "Zur Kasuistik der Störungen der inneren Sekretion," *Berl. klin. Wochenschr.*, 1912, xlix, p. 1072.

[32] O. W. Madelung. "Ueber den Fetthals," *Langenbeck's Arch. f. klin. Chir.*, Berl., 1888, xxxvii, p. 106. Madelung refers to a good deal of older English literature on the subject.

[33] J. Gerstmann. *Wien. klin. Wochenschr.*, 1916, xxix, p. 1209.

[34] H. Gerhartz. *Münch. med. Wochenschr.*, 1916, lxiii, p. 823.

[35] F. Parkes Weber. "Lipodystrophia progressiva," *Quart. Journ. Med.*, Oxford, 1917, x, p. 131.

[36] A. V. Neel. "Lipodystrophia progressiva," *Hosp.-Tid.*, Copenhagen, 1916, lix, p. 1253. Neel gives illustrations of two female patients, but unfortunately his paper arrived too late for me to make use of it.

DISCUSSION.

Dr. EDMUND CAUTLEY: It seems to me there are possibly two very different classes of case. In one class, like that of Dr. Campbell's case, of which Dr. Weber sent round a picture, there is dystrophy; whereas, in another class you find lipomatosis, the dystrophy being only relative, for there is no actual wasting. Some people, who may have been very fat when they were young, get thinner later in life, especially about the chest rather than in the lower part of the body. My case, to which Dr. Weber referred, and which you saw, Sir, belonged more, I think, to the lipomatosis type than to the dystrophic. I could not say the upper part of the body was wasted; I was not at all clear there was no associated lymphatic obstruction. Perhaps we may see mixed cases.

Dr. PARKES WEBER (in reply): I think Dr. Cautley's remarks are to the point. But the fact that in several of these cases there is a fat-accumulation in the lower parts, occurring more or less simultaneously with the fat-atrophy in the upper parts of the body, suggests that some of the cases in which there is relatively little fat-atrophy in the upper parts of the body, but very decided accumulation of fat in the lower parts, are of the same class, especially if this fat-accumulation has been noticed to commence at an early age—for instance, between 6 and 8 years, when the fat-atrophy has been first observed in the most typical cases of lipodystrophia progressiva (cf. the table which I have given of the female cases).

As in certain cases of facial hemiatrophy the atrophic process has, I think, been supposed to be limited to the subcutaneous fat, it is just conceivable that such cases of hemiatrophy of the face (if the atrophy does not later on involve tissues other than the subcutaneous fat) may represent *minor* and *unilateral* forms of lipodystrophia progressiva (though such forms could not of course, strictly speaking, be termed *progressive*).

Section for the Study of Disease in Children.

President—Mr. SYDNEY STEPHENSON, C.M.

(*March* 23, 1917.)

Chairman—Dr. LEONARD GUTHRIE.

Case of Amyotonia Congenita.

By H. C. CAMERON, M.D.

E. S., AGED 2 years. The family history is without bearing on the case. The child was breast-fed till aged 12 months. Teeth were cut without disturbance at the age of 8 months. There has never been any digestive disturbance and the child though small is fairly well nourished. She has been under my observation for nine months. Lately there has been very rapid improvement, and crawling is now accomplished comparatively easily. The muscles of the upper extremities especially have recently gained considerably in tone. She is being treated with massage and exercises. Skiagrams show slender bones, not otherwise abnormal. There is no sign of rickets. The stools were pale in colour and of a glistening appearance, due to the presence of fatty acid crystals and soaps. Stercobilin was present.

DISCUSSION.

Major MORLEY FLETCHER: I fail to find in this child the flaccidity and the hyper-mobility of joints which are generally associated with amyotonia congenita; also the long feet and hands, the curious flabby state of the muscles, and the type of facies which are usually present in that rare condition. I think this case exhibits muscular weakness, probably associated with rickets, though the bony changes, commonly found in rickets, are not very definite as yet. There is an ætiological factor present which is not mentioned in the notes—namely, that the mother was suckling her previous child, whose age is

now 4 years, during two or three months of her pregnancy with this patient. I have noticed that this type of muscular weakness is rather apt to occur when that factor is present—namely, pregnancy during lactation. Another factor favouring my view is the rapid improvement which has taken place in this child. In amyotonia congenita, though some improvement may occur, it is neither so rapid nor so definite as that which has occurred in this child. I think this patient will, in a short time, gain the complete use of its limbs.

Dr. F. LANGMEAD: Since amyotonia congenita was first described there has been a tendency to include under that term a large number of cases of hypotonia, which have nothing to do with the disease described by Oppenheim. One sees as much hypotonia as in this case with many acute illnesses in small children, especially if the disease is of a serious nature, and the knee-jerk may be absent for a considerable time. One finds it in rickets, in mongolism, and in a large number of other conditions.

Addendum.—Dr. CAMERON (writes, in reply): I regret that I was prevented by illness from being present to defend my diagnosis. The case appears to me to accord completely with the description by Oppenheim. Apart from the extreme hypotonus, which prevents the child from standing, even with support, at the age of 2 years, and has only recently allowed her to begin crawling movements, there has been no departure from health. A careful X-ray examination has excluded the slightest trace of rickets, and I see no reason to suggest, as does Major Morley Fletcher, that rickety changes may be developed at some future date. I agree with Dr. Langmead that there is a tendency wrongly to include cases of secondary hypotonus under the name "amyotonia congenita," but this child has never had any illness in her life, is not a mongol, has no rickets, has always had a good digestion, and has not suffered from malnutrition or wasting. The recent improvement is on the scale which Oppenheim encourages us to expect. I cannot agree with Major Morley Fletcher that so distressing a condition is likely to have as its cause a habit so universally practised as suckling during pregnancy.

(*March* 23, 1917.)

Case of Splenic Enlargement.

By EDMUND CAUTLEY, M.D.

MALE, aged 5 years 2 months; twelfth child. Four of the children are dead and the mother is reported to have died of carcinoma mammæ. He was brought up on milk and water. He is a very small and anæmic child, 18 lb. 12 oz. in weight, and markedly rachitic, with a large lax abdomen and kyphotic lumbar curve, and is unable to walk or crawl.

The spleen is enormous and hard, extending down to the pubes and a good inch beyond the middle line below the level of the umbilicus. The liver extends about 4 in. below the costal margin. Blood count: Hæmoglobin, 25 to 30 per cent.; erythrocytes, 1,460,000, and leucocytes, 5,600 per cubic millimetre. Differential count: Polymorphonuclears, 49; large lymphocytes, 23; small lymphocytes, 20; hyaline mononuclears, 3; transitionals, 3; mast cells, 1; neutrophile myelocytes, 1 per cent. Poikilocytosis present. Marked polychromatosis rendered it difficult to distinguish between nucleated red cells and small lymphocytes. Two normoblasts and a megaloblast were seen while counting 100 cells (H. H. Sanguinetti).

A blood count was made a fortnight later by another pathologist, and it showed some variation: polymorphonuclears, 62·3 per cent.; small lymphocytes, 17·6 per cent.; large mononuclears, 13·3 per cent.; eosinophils, 2·3 per cent.; the nucleated reds, 4·6 per cent. There was much more marked poikilocytosis, and a great variation in the size of the red cells, many of the cells being megalocytes. A Wassermann was done and was positive.

I should like to hear opinions as to the diagnosis, and as to whether this is a case in which excision of the spleen would be a justifiable operation. It belongs to a type of von Jaksch's disease, but in an older and possibly syphilitic child. That type of case does persist, and the spleen remains very large. I do not regard it as "splenic anæmia." I do not admit syphilis, by itself, as a cause of such great splenic enlargement in children of this age, and I have seen spleens as large as this in children in whom there has been no indication of syphilis. This boy is the twelfth child in the family, and eight of the children are living. I have not been able to obtain much detail of the family history, because, unfortunately, the mother is dead, so I cannot be sure as to syphilis. There is no history of rashes. The child, though aged 5 years, has the growth of one of 3 years or less, and cannot talk. One sees such physically backward children as a result of marasmus and neglect, apart from any actual disease. I am anxious to know whether one should advise operation.

DISCUSSION.

Dr. F. PARKES WEBER: I think this case has a congenitally syphilitic basis. As Dr. Cautley said, the child gave a positive Wassermann reaction. Secondly, the patient has a typical "saddle-nose." Thirdly, there is enlargement of spleen and liver, which not rarely occurs in congenitally syphilitic children, though the

splenomegaly is seldom as marked as that present in this child. Fourthly, there is a condition of dwarfism and infantilism, the occasional occurrence of which is well known in connexion with congenital syphilis in children. The child is, however, also distinctly rachitic, and there are signs of general nutritional disorder. If we admit that the child is syphilitic and badly rachitic, I think there is enough to account for the enlargement of the spleen and liver. As to treatment, a careful trial of antisyphilitic treatment might be made. Certainly that should be tried before any idea of excising the spleen is entertained, though the operation of splenectomy has, I believe, sometimes been performed for splenomegaly on a congenitally syphilitic basis.

Major MORLEY FLETCHER: I agree with Dr. Parkes Weber about this case, that it is probably one of congenital syphilis: the blood gives a positive Wassermann reaction, and there is a remarkably depressed bridge of the nose. Dr. Cautley has not told us whether there were any other manifestations of syphilis in the first year or so of life. Considering this as a case of visceral disease due to syphilis, it is most probably a mixed cirrhosis, that is, a syphilitic cirrhosis with a portal cirrhosis superadded. In St. Bartholomew's Hospital I have, at the present time, an almost identical case in a girl aged 9 years. With regard to treatment, I think it is very remarkable, if the enlargement of liver and spleen is due to syphilis, how indifferently they respond to energetic treatment. The case I mention has had weekly injections of galyl for a considerable time, as well as mercury and iodide. The child has improved in a general way, but the liver and spleen have scarcely diminished in size. I do not see what purpose would be served by removing the spleen of this child.

Dr. CAUTLEY (in reply): I strongly disagree with Dr. Parkes Weber. As I have before stated in this Section, I disagree with the attitude of assuming that because a child has got congenital syphilis, therefore every disorder it shows is due to congenital syphilis. In the next place, I do not regard a positive Wassermann reaction, when it has been tried only once, as reliable evidence of congenital syphilis. A second, or even a third, test should be made, and by different observers. Again, this is the twelfth child of a family of which eight members are living, and, as far as I could ascertain, there is no evidence of syphilis in the family: the mother died of carcinoma. Further, the size of the spleen does not help the diagnosis. In fact I should say a very large spleen in early life is contra-indicative of congenital syphilis. Of course, in severe cases of congenital syphilis one gets visceral syphilis, but these patients usually die in the first weeks of life. Taking the ordinary cases of congenital syphilis, as seen in hospital, it is very rare to see a greatly enlarged spleen, though that organ may be somewhat enlarged. In von Jaksch's disease, "pseudo-leukæmica infantum," you find the spleen as large as it is here, and a similar blood count; and in a high proportion, perhaps 75 per cent., of the cases there is no evidence of congenital syphilis. So I think we may take it that the mere association of an enlarged spleen with a positive Wassermann

reaction is not sufficient evidence that the splenic enlargement is due to syphilis, or has anything to do with it. The form of this child's nose has been referred to. I can find you plenty of children of that age, especially if they are backward children, who have just such a bridge of the nose, but no associated syphilis. I do not think infantilism is evidence of congenital syphilis. I regard the whole condition as due to malnutrition following on bad feeding and general neglect. But what the cause of the enlargement of the spleen is remains a mystery, as it does also in pseudo-leukæmica infantum. Moreover, this spleen has become definitely smaller, and the child has improved generally since he entered the hospital. When he came in, the spleen extended an inch to the right of the umbilicus, below the level of the navel, whereas now it only reaches to the middle line. The size of the liver remains the same, and he is less anæmic, in spite of the fact that he has had no anti-syphilitic treatment. I agree with what has been said in regard to operation. There is no advantage, that I can see, in removing the spleen, and operation would probably be fatal from shock. I have occasionally seen babies in the first or second year of life with spleens relatively as large as this, due to so-called von Jaksch's disease, and have seen them in later life with little or no splenic enlargement.

(*March* 23, 1917.)

(?) Juvenile Bilateral Optic Nerve Atrophy, connected with Inherited Syphilis, corresponding perhaps to the Optic Atrophy sometimes following Acquired Syphilis in Adults, with or without definite Tabes Dorsalis.

By F. Parkes Weber, M.D.

The patient, M. L., aged 7 years, is a bright intelligent boy, born in London of Russian Hebrew parents. In December, 1916, it was found that his sight was failing and this has progressed, until now he can only see enough to be able to count fingers in a good light. There is horizontal nystagmus. Both pupils are moderately dilated (the right one somewhat more than the left), and neither of them reacts to light or accommodation. Ophthalmoscopic examination shows nearly complete optic nerve atrophy in both eyes; the arteries are only moderately contracted (Dr. R. Gruber). Röntgen-ray examination furnishes no evidence of anything abnormal at the base of the skull. There is no obvious hydrocephalus nor cranial deformity, nor are there signs of disease elsewhere in the body. Excepting a doubtful history of injury to the head, there is nothing in the past history of the patient

which throws light on the case. But his blood-serum gives a positive Wassermann reaction (Dr. H. Schmidt, February 22, 1917), and so do that of his mother and of one of his sisters (A. L.); whilst another of his sisters (P. L.) has been treated at another hospital, apparently for congenital syphilis. The patient's cerebrospinal fluid, obtained by lumbar puncture, also gives a positive Wassermann reaction. The patient's father is a strong-looking man, whose blood-serum gives a negative Wassermann reaction, but who gives a history of once having had a chancre. The patient's mother has had five children and two miscarriages. The five children are all living; two of them, besides the patient himself, have been already mentioned; the other two are said to be healthy.

I wish to suggest an analogy between the optic atrophy in the present case and that which sometimes supervenes after (and as a result of) acquired syphilis in adults, with or without definite signs of tabes dorsalis. In this connexion I purposely avoid using the term "pre-ataxic optic atrophy," as that term implies that definite tabes dorsalis must ultimately develop. At the present time the patient's knee-jerks can be obtained, and he shows no signs of tabes dorsalis nor of any disease of the nervous system, excepting that of the eyes.

Dr. PARKES WEBER (in reply to a remark made): I do not mean to imply that definite signs of tabes dorsalis will necessarily develop; that is one reason why I have altered the heading of my description of the case.

(*March* 23, 1917.)

Cerebral Degeneration and Epileptiform Fits, with Amaurosis, in an Only Child.

By F. PARKES WEBER, M.D.

THE patient, T. L., aged $6\frac{3}{4}$ years, is a fairly well-grown girl, born in London, the only child of Hebrew parents. The father was born in Russia, and the mother in Russian Poland. The child is somewhat mentally deficient, subject to occasional slight epileptiform convulsions, and almost completely blind in both eyes. She can probably only distinguish light from darkness. Dr. C. Markus has examined the eyes carefully, and reports as follows: "The retinal blood-vessels are extremely small (narrow); the optic disks are uniformly pink, slightly

pale, but not definitely atrophic; the maculæ luteæ appear as small red-brown spots and are not distinctly abnormal. The vessels and optic disks resemble what one sees in cases of retinitis pigmentosa, but the characteristic pigmentary change of fully-developed retinitis pigmentosa is altogether absent."

There is no evidence of disease in the thoracic and abdominal organs, and the urine is free from albumin and sugar. Nor are there any signs in the child of congenital syphilis, excepting that the blood-serum (Dr. H. Schmidt, March, 1917) gives a *weakly* positive Wassermann reaction; the reaction was, however, apparently found to be negative on a previous occasion at another hospital. Moreover, the cerebrospinal fluid (March, 1917) gives a negative Wassermann reaction. The knee-jerks are present.

As stated above, the patient is the only child, and apparently the mother has been only once pregnant. The mother, aged 31 years, seems to be well; but her Wassermann reaction (March, 1917) is doubtful. The father, aged 33 years, also looks well, his sight is not deficient, and the ophthalmoscopic appearances in his eyes are normal (Dr. C. Markus). He claims to have enjoyed good health and never to have had any venereal disease, but his Wassermann reaction (March, 1917) is weakly positive. The patient's paternal grandfather, a well-developed man, aged 58 years, is blind in both eyes. The blindness developed eighteen years ago, and there is bilateral optic nerve atrophy (Dr. C. Markus). In other respects he has enjoyed good health, but his blood-serum gives a positive Wassermann reaction (Dr. H. Schmidt, March, 1917).

The patient is said to have been a bright and intelligent child up to the age of 5 years. Her tonsils were excised at the age of 3 years, and her bowels always tended to be confined. After the age of 5 years signs of cerebral degeneration commenced; she lost the power of memory and her speech deteriorated. About May, 1916, she commenced to suffer from transient "fits," and soon afterwards her sight was found to be failing. According to her mother she could see quite well nine months ago, but since then her visual power has gradually diminished, and for the last four months she has been almost blind. The "fits" are transient epileptiform, of the "petit mal" kind, lasting about "a couple of moments." The patient is observed to "turn her eyes," and there are convulsive movements of the body, but no involuntary passage of urine or fæces has been observed in connexion with the fits. After them she appears tired and sleepy. Ten or eleven such fits were observed up till

the end of the year 1916. Since then only one has been noted—namely, about the commencement of February. The mother attributes the diminution in the fits to medicinal treatment, which was commenced in August, 1916. Mercurial inunction is now to be tried (March 16, 1917).

Remarks.

In spite of the absence of definite macular changes and of family history, the case may be allied to F. E. Batten's second group of maculo-cerebral degeneration. The *first group* includes the cases of the Tay-Sachs type of so-called "family amaurotic idiocy," occurring in infancy and practically exclusively in Hebrew families, though E. A. Cockayne and J. Attlee have recently (1915) described an apparently typical case in an English male child, aged 1 year. Batten's *second group* is the group of "juvenile progressive cerebral degeneration with amaurosis, with or without macular and retinal changes," including the cases of "family maculo-cerebral degeneration," and of the so-called "juvenile form of family amaurotic idiocy," the various cases of Spielmeyer, Mülberger, Vogt, Bielschowsky, Mayou and Batten. The main features of Batten's second group are loss of intellectual faculties, loss of vision, and loss of motor power; but the symptoms vary in the order in which they appear, in the age at which they first appear, and in the rapidity of progress; no special racial proclivity has been observed, such as there is in the Tay-Sachs type of family amaurotic idiocy.

In regard to a possible relationship between Batten's second group of maculo-cerebral degeneration and retinitis pigmentosa, I would refer to the remarks of M. S. Mayou, R. D. Batten, and others, in the discussion on a case of "pigmented degeneration of the retina, associated with epileptic fits," shown by F. E. Batten at the Section of Ophthalmology on November 1, 1916. In retinitis pigmentosa, which may be familial, and may also be associated with idiocy or deaf-mutism, the symptoms may commence in early childhood, or possibly even congenitally. The ophthalmoscopic appearance is characterized at the commencement by narrowness of the retinal arteries and veins, and by a look of "greyness" in the retina; the characteristic spots of pigmentation in the retina are not seen at first, and in some "atypical" cases never appear at all. A certain resemblance of the ophthalmoscopic appearance in the present patient to that observed in early retinitis pigmentosa has been noted above.

In the present case, although antisyphilitic treatment is being tried,

I hesitate to attribute the condition to syphilis. The fact of the child being of Hebrew parentage has probably no connexion with the disease. The negative Wassermann reaction with the patient's cerebrospinal fluid is against the diagnosis of commencing juvenile general paralysis, or of syphilitic disease at the base of the brain.

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DISCUSSION.

Dr. E. CAUTLEY: Was the cerebrospinal fluid examined, and, if so, did it show the changes characteristic of general paralysis? The case seems to me more of the type of cerebral sclerosis occurring in a syphilitic child than one of general paralysis. As the grandfather became blind at an early age, there may be a familial history of optic atrophy.

Dr. PARKES WEBER (in reply): I am obliged to Dr. Cautley for his suggestion. I think the cerebrospinal fluid may well be examined, and perhaps in my description of the case I shall be able to include a report of the result.

(*March* 23, 1917.)

A Rare Disease in Two Brothers.

By CHARLES HUNTER, Major C.A.M.C., M.D.

R. C. AND G. C., brothers, aged 10 and 8 years, of British parentage, were admitted into Winnipeg General Hospital on May 12, 1915. Father living, aged 48 years, strong and healthy, and of normal

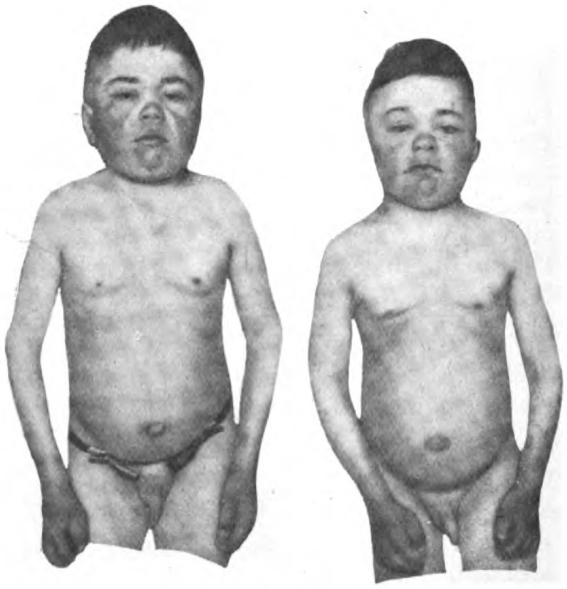


FIG. 1.

appearance. Mother died at the age of 45 years of kidney disease, while five months pregnant; had been previously a normal, healthy woman.

Their father's parents were cousins and had twelve children, one of these, when aged about 24 years, had an accident to his back and later went "insane with delusions about himself"; the others are healthy and their children are also healthy. The father knows his wife's family well; her parents, brothers and sisters were normal. She had, however, a deaf and dumb uncle.

The boys are the only living children. There was first a miscarriage at the age of 4 months; then full-term twins who died at birth—the confinement being difficult, and instrumental (these twins had, according to the father, large heads); then a miscarriage; and, lastly, death of the mother when pregnant five months.

The two children were full-term and were delivered without instruments; were both breast-fed and had no digestive disturbance in

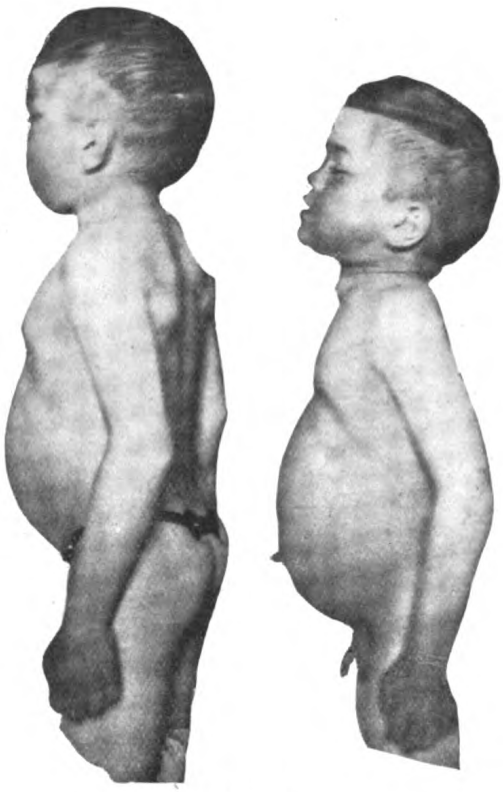


FIG. 2.

infancy; were both walking about the age of 17 months. The elder began to talk when aged about 1 year, is bright and intelligent, went to school at the age of 7 years and is in Grade 3. The younger was late in learning to talk and is still somewhat backward; he went to school a year ago and is making slow progress. They are good natured children on the whole, though the younger is at times a little "cranky"; they enjoy playing the ordinary games of childhood. They have been healthy in every way, apart from throat trouble. Both were operated

on for tonsils and adenoids; both are dull of hearing, and the father thinks this is getting slightly worse. They always get puffed when they run about. Both have had good appetites and regular bowels. Both had inguinal hernia; the younger was able to dispense with his truss three years ago, the elder still requires to wear one. They never had rheumatism nor growing pains.

Present condition: The children present an extraordinary appearance, and apart from their difference in size and one or two minor points to be

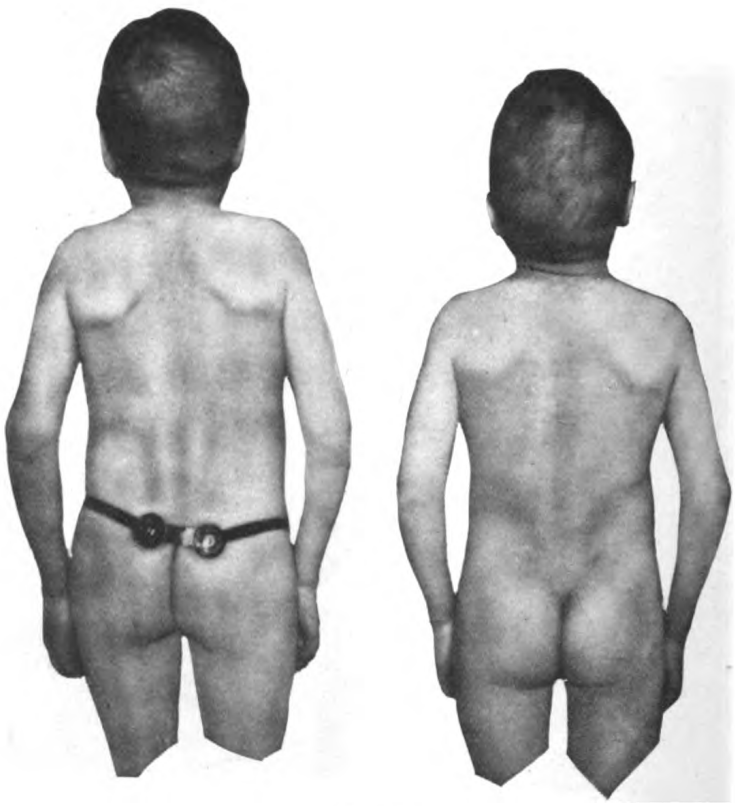


FIG. 3.

noted, they are as alike as two peas, so a common description may be given, the accompanying photographs (figs. 1 to 4), exhibiting the main features of interest. The children are undersized, 3 ft. 11 in. and 3ft. 9 in. (average, 4 ft. 4 in. and 4 ft.); weight, 56 lb. and 50 lb. (average, 66½ lb. and 54½ lb.); heads extremely large, measuring in greatest circumference 23 in. and 22 in. (average, 21 in. and 20½ in.). The head is curiously shaped, with very marked bulging of the squamous portion of the

temporal bone and of the frontal bones; the hair of the head rather thin and very harsh, especially in the younger. The face is very large, of deep burnt-red colour, as after much exposure, with a tinge of cyanosis in cheeks and lips; eyes very puffy; saddle nose, with large thick nostrils; thick lips, slightly open mouth, very large tongue; teeth good, but with irregular furrows and slightly spaced; very short neck, with slight enlargement of right lobe of thyroid in both. The chest is broad; abdomen very large and deep, greatly protruding, with small umbilical hernia; penis rather large. From behind, the scapulæ are seen to be placed extremely high, closely resembling a double Sprengel's deformity;

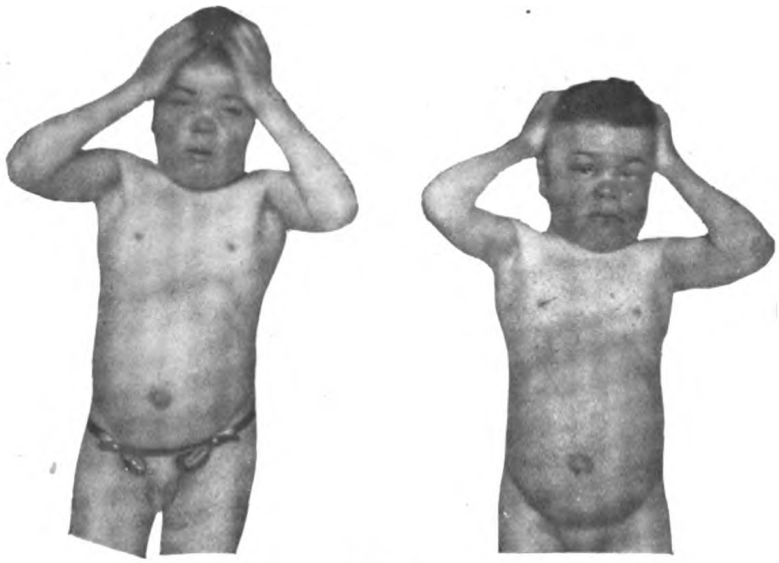


FIG. 4.

the neck is very short. The spinal column is straight, the natural curves being obliterated; the thighs are slightly bent, and the whole trunk inclines slightly forward. The arms are held somewhat abducted from the body and bent at the elbows so that the hands rest on the front of the thighs instead of on the side. The upper arm is disproportionately short in relation to the forearm, which is abnormally flat. The wrists are very thick; the hands very broad, short and thick; the fingers very short and bent. The knees are slightly flexed; both knees and ankles are thick, and the feet are broad, short and thick. The gait is very clumsy and stiff; the trunk is slightly bent forward and is held rigid. The normal extent of movement is curtailed in all

the joints of the extremities. The hands, particularly of the elder brother, have entirely lost their supple freedom of movement; they cannot be clenched; complete extension of the fingers is similarly defective, and even the movements possible are clumsy and stiff. The elbow and shoulder share in the general limitation of movement, and this is well shown in fig. 4, where the children are shown trying unsuccessfully to raise their hands above their heads. The photograph shows too the slightly greater freedom of movement possessed by the

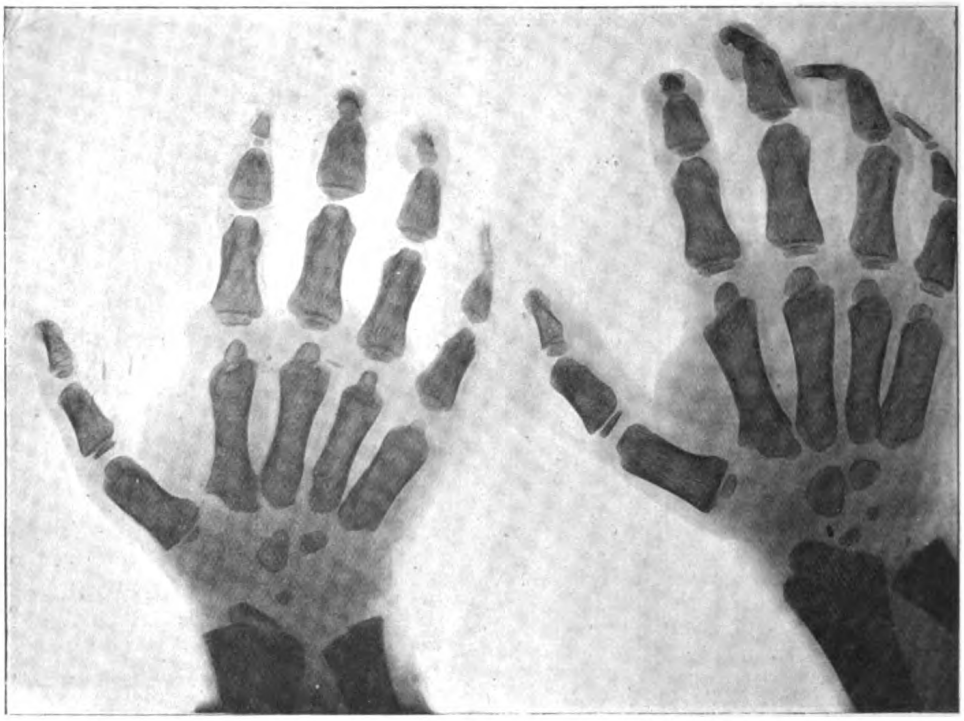


FIG. 5.

younger child. Active and passive movements of the spine are very much limited. The hip- and knee-joints have lost a little of their range of movement. The toes, while not deformed like the fingers, have completely lost the suppleness characteristic of youth. The skin of the trunk is smooth and not specially dry. The backs of the hands and fingers are deeply bronzed and the skin is there very thick and rough. In the younger child, over strips of skin $1\frac{1}{2}$ in. wide, extending from the angles of both scapulæ parallel to the ribs forward to the mid-axillary

lines, there are pinhead elevations, grouped closely and regularly, smooth of surface, normal in colour, and not unlike, though more superficial than, the lesions of cheiropompholyx. Some sixteen similar thickenings occur over an area of the size of 50 cents, in the upper part of the right arm. No pubic nor axillary hair. Nails normal, with crescents. The breathing is audible even at rest and becomes loud and puffing on exertion; the children are easily winded; in sleep, their

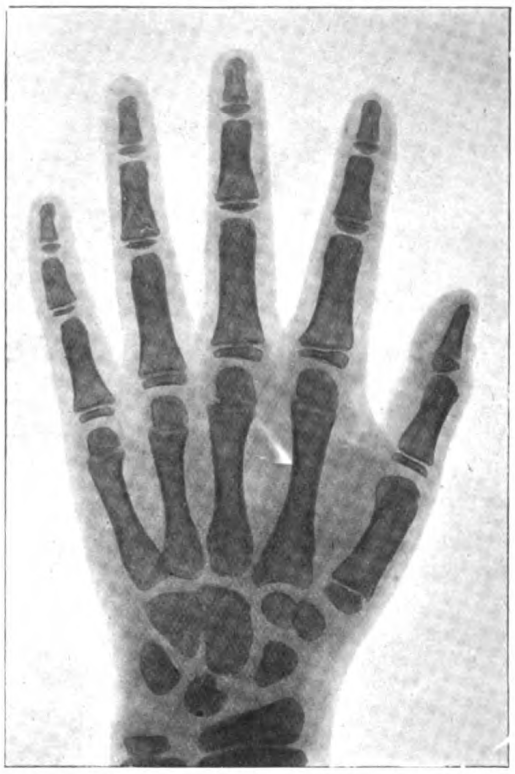


FIG. 6.

mouths remain wide open, the breathing being very laboured, uneasy and stertorous; there is an overhanging epiglottis; the lungs are normal. The heart in the younger is normal; in the elder, it is enlarged to the left, the apex beat being in fifth interspace just outside the nipple; there is a distinct diastolic murmur audible in the third and fourth left interspaces close to the sternum, the second sound at pulmonic and aortic areas being, however, clear; at the apex, a systolic murmur is conducted slightly towards the axilla. The elder seems, however, capable

of quite as much exertion as the younger, and like the younger he has only a tinge of cyanosis on cheeks and lips. Blood count in the elder: Hæmoglobin, 80 per cent.; red blood cells, 6,000,000; white cells, 7,000. The liver is very much enlarged in both, crossing in the case of the elder from the level of the right anterior superior spine to an inch above

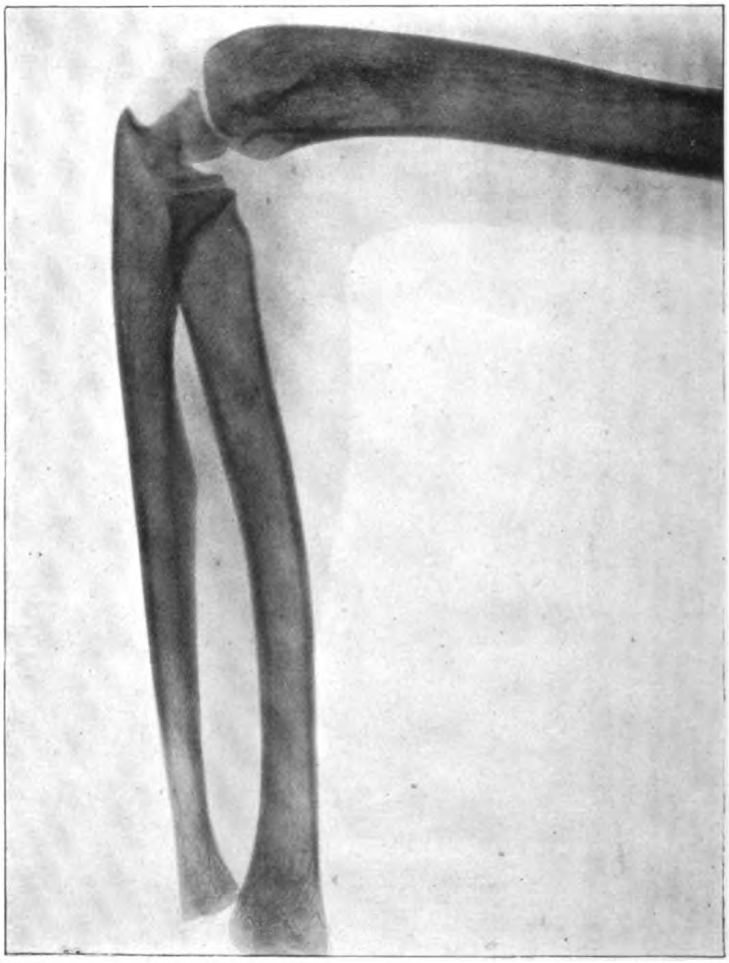


FIG 7.

the umbilicus, and in the younger, reaching a shade lower; the organ is smooth, not hard, the edge moderately thin, free from tenderness. The spleen is very much enlarged, reaching, in the elder fully two, and in the younger fully three, finger-breadths below the costal margin. The urine is normal. The testes are normal in size.

The children are bright and intelligent, particularly the elder, though both are hampered by distinct dullness of hearing. Speech is rather indistinct and they talked little, but they were under observation only two days, and during that time they were subjected to much examination. The father reported that they talked freely at home. General examination of the nervous system proved negative.

Wassermann reaction negative in both children and also in the father.

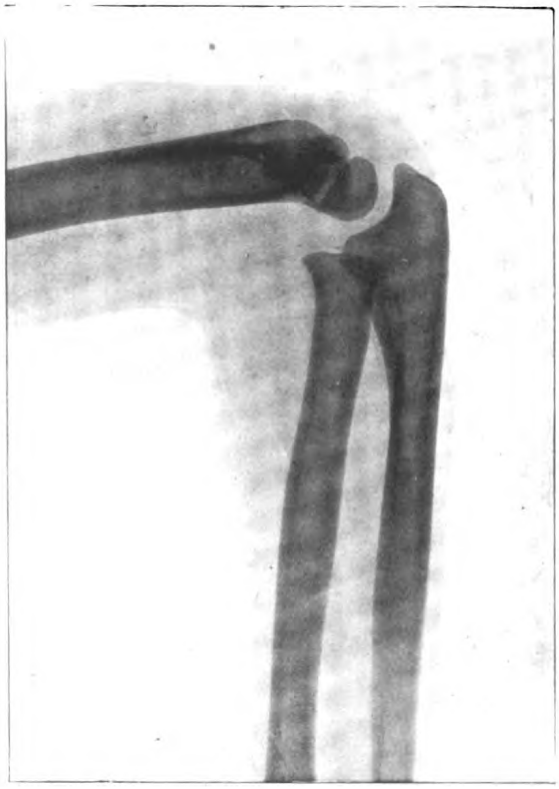


FIG. 8.

Dr. Prowse reported that both had some adenoids and that the whole of Waldeyer's ring was rather prominent; tympanic membranes retracted and somewhat hyperæmic. There were no signs of syphilitic disease about the nose and throat.

When the X-ray photographs are examined, we are struck with the abnormal thickness of all the bones and the pronounced irregular epiphyseal ossification. Fig. 5 shows the hand of the elder boy on the

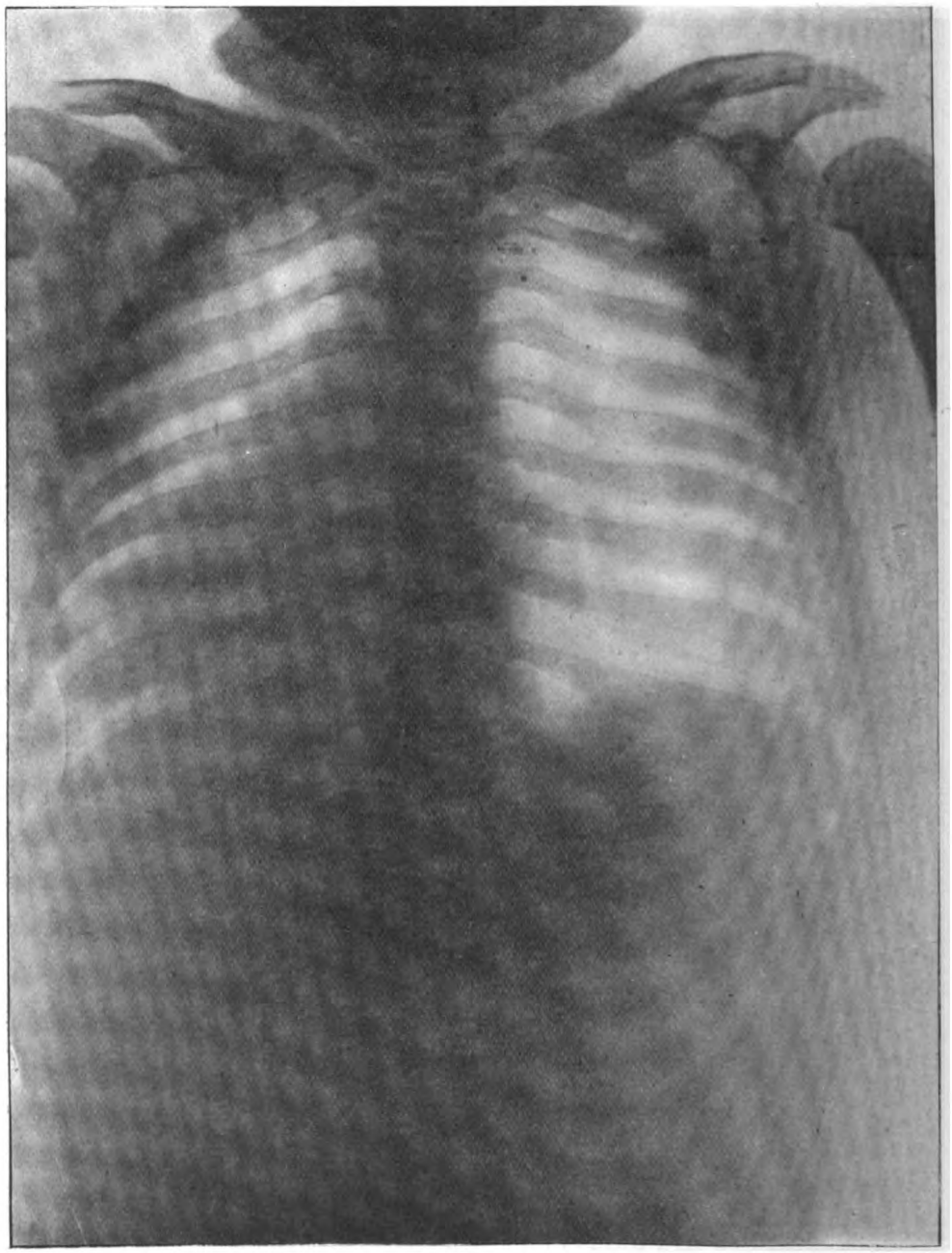


FIG. 9.

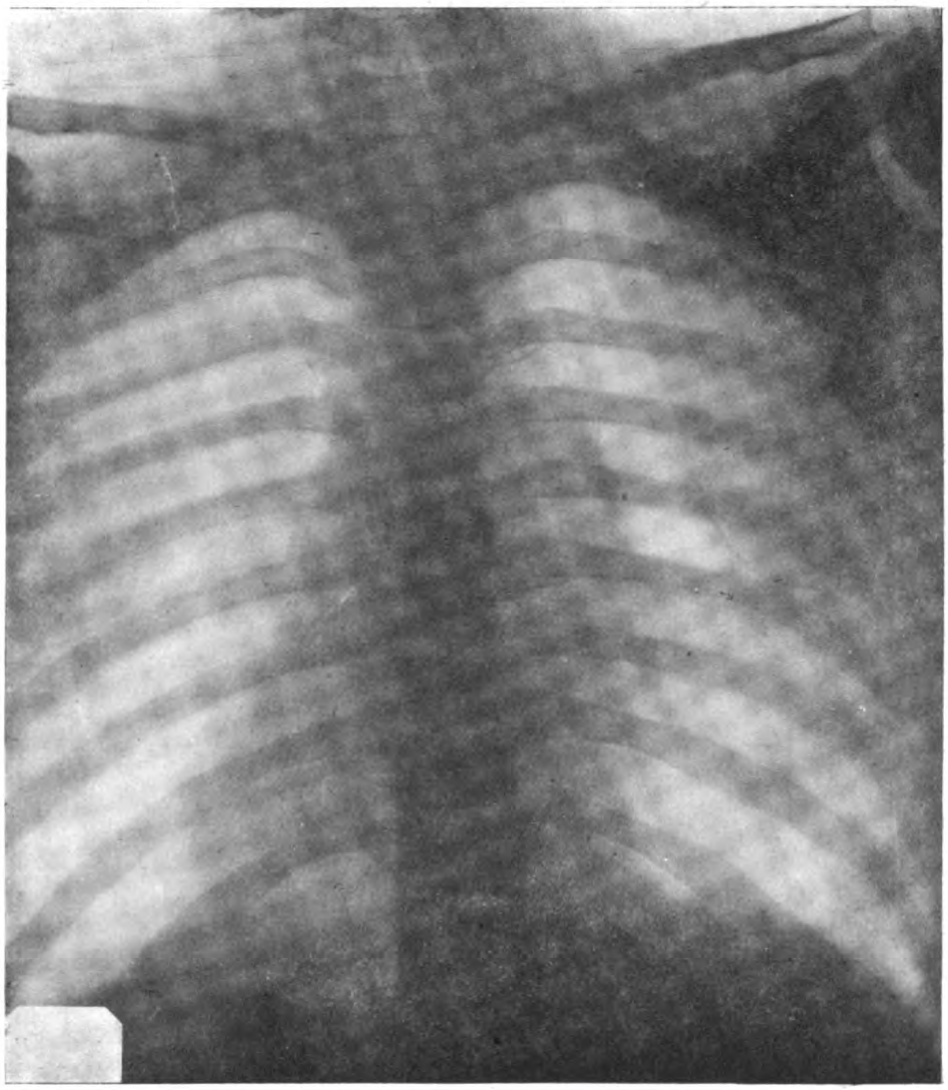


FIG. 10.

plethoric" appearance of their faces, such as is seen in some case hypernephroma in children. The appearance of the face and hands is described by the author as that of a middle-aged farmer who is for malt liquor, and whose work naturally exposes him much to the weat

Mr. BLUNDELL BANKART: I think that these are cases of multiple genital defects of development. When viewed behind, these children pre the appearance of bilateral Sprengel's deformity (congenital elevation o scapula), a condition which is frequently associated with contracture o shoulder-joint and defects of the vertebræ, ribs and other parts, as see these cases. The contracture of the fingers is another congenital cond which is often seen either alone or in conjunction with other contrac or defects. Sprengel's shoulder is attributed to an arrest of the nc descent of the scapula during intra-uterine development. It is difficu see how any endocrine disturbance can be held responsible for such de

Section for the Study of Disease in Children.

President—Mr. SYDNEY STEPHENSON, C.M.

(*April* 27, 1917.)

Chairman—H. MORLEY FLETCHER, Major R.A.M.C., M.D.

Lipodystrophia Progressiva in a Male.

By F. PARKES WEBER, M.D.

THE patient, J. H., aged 13 years, born in London, of English parentage, was moderately fat in the face and body till the age of 8 years. He then began to look thinner in the face, though in other respects he continued to appear and feel perfectly well. The loss of subcutaneous fat gradually progressed, and for the last three years there has been practically no fat left in the face and neck excepting in the orbits. The arms, thorax, and abdomen are to some extent affected in the same way, but on the gluteal regions and lower extremities the fat covering is fairly good. The mother, indeed, thinks that the boy has lately been putting on fat in the buttocks and thighs. The illustrations (*see* figs. 1 to 3) show his appearance at the age of 1 year, at the age of 7 years, and as he now is (aged 13 years). In other respects there is not much to be said. There are no signs of disease in the heart, lungs or abdominal organs. The urine is free from albumin and sugar. He is of quite average intelligence, and presents no symptoms of disease in the nervous system. In March, 1913, he underwent a radical mastoid operation for middle-ear disease (right side), and in January, 1916, an aural polypus was removed from the same ear. There can be no doubt that the case is a typical one of lipodystrophia progressiva. The aural disease might have been supposed to have

acted as an exciting cause if it had preceded the fat atrophy in the face, but according to the mother the fat atrophy was noticed before the onset of any obvious ear disease.

It should be mentioned that the atrophy of subcutaneous fat in the upper part of the trunk has produced a condition of what is known as "elastic skin," that is to say, a fold of skin can be stretched out abnormally far from the bony and muscular wall of the thoracic cage without causing discomfort or pain. To such a condition of "elastic skin" the

FIG. 1.

FIG. 2.

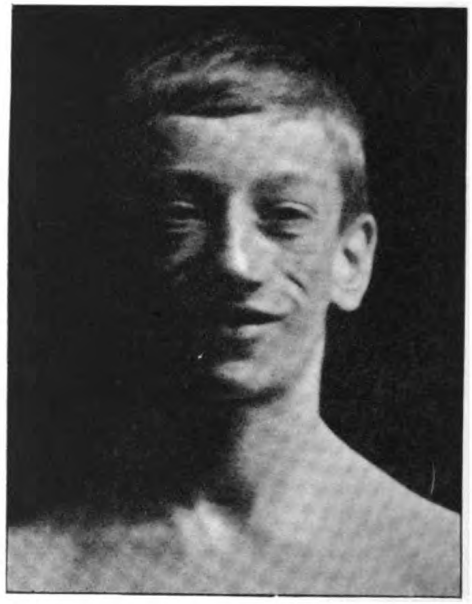


FIG. 3.

Fig. 1.—The patient J. H., at age of 1 year.
Fig. 2.—The same patient, aged 7 years.
Fig. 3.—The same patient at present time, aged 13 years.

ambiguous term "dermatolysis" has sometimes been applied. It would be interesting to know whether any of the so-called "elastic-skinned men" were likewise examples of "lipodystrophia progressiva."

The boy's father and mother appear healthy. The mother has had three children and two miscarriages. Both the other children are living and healthy (aged respectively $14\frac{1}{2}$ years and 11 years).

I am indebted for the case to the kindness of Dr. C. E. Lakin and Dr. E. A. Cockayne.

Dr. E. A. Cockayne has likewise given me particulars of another case of lipodystrophia progressiva in a male. The boy, when he saw him in Chelsea in 1914, was aged about 11½ years, and felt perfectly well, but the doctor of the school had sent him up for special examination on account of the extraordinary thinness of his face. This wasting of the subcutaneous fat had commenced two or three years previously, that is to say, when he was aged about 9 years. He appeared otherwise healthy. There was no glycosuria. The trunk and limbs, though thin, did not show the extreme loss of subcutaneous fat that was noticeable in the face. He was fairly muscular and the deeper structures of the face were not wasted. Unfortunately the patient has been lost sight of, but I think the case was probably one of lipodystrophia progressiva.

In my last paper on the subject [13] I included a table of published cases of lipodystrophia progressiva in females, and I now give a table of male cases, including several cases of so-called "bilateral facial atrophy," in which the atrophy seems to have been confined to the subcutaneous

LIPODYSTROPHIA PROGRESSIVA. TABLE OF CERTAIN OR PROBABLE CASES IN MALES.

The numbers in brackets refer to the literature on the subject given at the end.

Reference	Age of patient when the affection was first noticed	Age of patient when the case was described or last seen	Parts affected by the fat atrophy
Present case	8 years	13 years	Face, neck, and trunk
E. A. Cockayne, recorded in the present paper	About 9 years	About 11½ years	Chiefly the face
Gerstmann [10]	10 years	32 years	Face, neck, upper extremities, and trunk as far as the pelvic bones (inguinal folds and the iliac crests)
Gerhartz [11]	6 years	29 years	
Husler's first case [8 and 9]*	6 years	10 years	Face
Husler's second case [8 and 9]	6½ years	9 years	Chiefly the face and neck
Hertz and Johnson, first case [5]	24 years	26 years	Face and neck
Hertz and Johnson, second case [6]	About 37½ years	38 years	Face
Batty Shaw [4]	2½ years	10 years	Face
J. S. Bury [7]	?	Youth	Face

* This patient died about three years later, in his fourteenth year, of epidemic cerebro-spinal meningitis. At the necropsy his thymus gland was found still present, but otherwise, excepting for the fatal meningitis, the result of the post-mortem examination was practically negative.

fat. As to whether lipodystrophia progressiva may occur in a u form or not I made the following observation in the discussion last paper :—

"Since in certain cases of facial hemiatrophy the atrophic has, I think, been supposed to be limited to the subcutaneous just conceivable that such cases of hemiatrophy of the face atrophy does not later on involve tissues other than the subcu fat) may represent *minor* and *unilateral* forms of lipodystrop gressiva, though such forms might not of course, strictly spea termed progressive."

LITERATURE ON LIPODYSTROPHIA PROGRESSIVA.

Further references will be found in my last paper [13].

[1] A. Simons. *Zeitschr. f. d. ges. Neur. u. Psych.*, Berl., 1911 (Originalien) Eugen Holländer, *Münch. med. Wochenschr.*, 1910, lvii, p. 1794. Exce trations of the same case and other cases are given by C. Herrman, of *Arch. Intern. Med.*, Chicago, 1916, xvii, pp. 516-524.
[2] H. Campbell. *Trans. Clin. Soc. Lond.*, 1907, xl, p. 272. *See* also H. *Proc. Roy. Soc. Med.*, 1913, vi (Sect. Neur.), p. 71.
[3] F. Parkes Weber. *Proc. Roy. Soc. Med.*, 1913, vi (Sect. Neur.), pp. 127-1
[4] H. Batty Shaw. *Trans. Clin. Soc. Lond.*, 1905, xxxviii, p. 222.
[5] Hertz and Johnson. *Proc. Roy. Soc. Med.*, 1913, vi (Clin. Sect.), p. 92.
[6] *Ibid.*, 1914, vii, p. 11. *See* also Hertz and Johnson, "Two Cases of Bilate of the Face," *Guy's Hosp. Repts.*, Lond., 1913, lxvii, p. 112.
[7] Judson S. Bury. "Diseases of the Nervous System," Manch., 1912, p. 267
[8] J. Husler. *Zeitschr. f. Kinderheilk.*, Berl., 1914 (Originalien), x, p. 116.
[9] A. Simons. "Bemerkungen zur Arbeit J. Huslers," *Zeitschr. f. Kinderhe* 1914 (Originalien), xi, p. 508.
[10] J. Gerstmann. *Wien. klin. Wochenschr.*, 1916, xxix, p. 1209.
[11] H. Gerhartz. *Münch. med. Wochenschr.*, 1916, lxiii, p. 823.
[12] F. Parkes Weber. "Lipodystrophia progressiva," *Quart. Journ. Med.*, O x, p. 131.
[13] *Idem.* "Lipodystrophia progressiva," *Proc. Roy. Soc. Med.*, 1917, x (Sect. fo of Dis. in Child.), p. 81.

DISCUSSION.

The Chairman (Major H. Morley Fletcher): To many of us dition is a very rare one, but some of the cases may have been seen b out our having recognized their nature. I have had a case under my tion for more than twelve years, and until three or four years ago I w searching for a clue as to its clinical classification. At that time, h came across the record of one of the German cases later included in D list. Having once seen a case, or a picture of one, I think the co comparatively easy to recognize. I ask whether Dr. Parkes Weber c anything more as to the suggested pathology of the condition.

Dr. PARKES WEBER (in reply): As I mentioned in my recent paper on the subject, I think there is abundant evidence to show that lipodystrophia progressiva is a special type of morbid syndrome, and not merely a form of ordinary leanness or emaciation. Emaciation in very severe pulmonary tuberculosis seldom, if ever, leads to such complete atrophy or disappearance of subcutaneous fat as has been demonstrated by "biopsy" examination in some of the recorded cases of lipodystrophia progressiva. In the latter condition, moreover, the lower limbs are not involved in the fat-atrophy, as they are in ordinary cases of emaciation (from chronic tuberculosis, &c.). Apart from the fat-atrophy, it should also be noted that patients with lipodystrophia progressiva often appear to be in perfect health. The pathology of these cases is by no means clear, but the condition appears to be connected with some endocrine disturbance. This hypothetical endocrine disturbance cannot be one limited to the female generative organs, such as was at first suggested, because it is now clear that males may be affected as well as females.

(*April* 27, 1917.)

Bilateral Optic Nerve Atrophy in a Child, with Positive Wassermann Reaction and History of Infantile Convulsions.

By F. PARKES WEBER, M.D.

THE patient, M. P., female, aged 3½ years, was prematurely born (at seven months), but appears physically and mentally fairly normal, excepting that she is blind and presents incomplete bilateral optic nerve atrophy (Dr. R. Gruber). The mother is not sure that the child could ever see more than enough to distinguish light from darkness. There is a strong history of infantile convulsions up to the age of 1 year and 2 months. She commenced to suffer from fits when she was aged 2 months, the first one lasting about fifteen minutes. They recurred frequently for three days, and then they ceased until she was aged 6 months. From that time they appeared in the form of frequent attacks of "jerky movements" (six to eight attacks daily) until she was aged 14 months, when they ceased. The child's blood-serum and that of her mother both give a positive Wassermann reaction (Dr. H. Schmidt, April, 1917). The mother has one other child, a boy, aged 9 years, who is living and seems to be healthy, and whose blood-serum gives a negative Wassermann reaction. She had likewise one miscarriage (at three months), about 6½ years ago. The child's father, who gives a weakly positive Wassermann reaction, denies ever having had any

venereal disease. A younger brother of the father is said to h blind, prematurely-born, child, who lived only fifteen months.

I regard this case of bilateral optic nerve atrophy as a example of a post-syphilitic change, analogous to the bilat atrophy which one sometimes finds associated with tabes, without tabetic symptoms, in adults after acquired syphilis

DISCUSSION.

The CHAIRMAN (Major H. Morley Fletcher): Dr. Weber does r whether there is any pigmentary change present in the fundus. atrophy the sole abnormality?

Dr. PARKES WEBER (in reply): There is no pigmentary change ophthalmoscopic examination in the present case.

(*April* 27, 1917.)

Congenital Word- and Letter-Blindness—Cong Alexia, with Agraphia, without Aphasia.

By F. PARKES WEBER, M.D.

THE patient, O. H. S., aged 10 years, a bodily well-dev of apparently average intelligence, has had great difficult because practically he cannot read or write. He has, indee learned to read and write a few letters of the alphabet, nota two or three letters, but he often makes mistakes, for instan says that the letter "D" is "B." As in some other cases, make no difference whether the letters are small or capital let or written. He has learned to read and write Arabic numera well, and this corresponds to the observations of James H and others, that the recognition of Arabic numerals is read in cases of congenital word-blindness. When one tells h down his age (9 years), he at once writes down 9, as numeral, but cannot write the word *years* after it. He figures a little, but is certainly extremely backward for arithmetic. He has learned to write his own name, and c his name when someone else writes it. In regard to however, when he tries even merely to copy them, he

mistakes, and copies them without understanding what they mean. He recognizes objects and pictures of objects, and the meaning of pictures and picture-stories. There is no word-deafness and no aphasia. He pronounces words well and talks fluently, if he is not shy, and has learned to recite and sing various songs.

Dr. R. Gruber, to whom I am indebted for the case, reports that the patient's eyes (including ophthalmoscopic appearances) and eyesight are quite normal. He is not colour-blind.

The patient's mother says that she, as a child, was somewhat backward in learning to read. She has had only one other child, a boy now aged 8½ years, who is not word- or letter-blind.

I find nothing abnormal in the patient's thoracic and abdominal organs, nor in the urine, sexual organs, mouth, or nervous reflexes. The Wassermann reaction (Dr. H. Schmidt, April, 1917) in the patient is positive. In his mother and brother it is likewise positive. The bridge of the brother's nose is somewhat depressed. His father died at the age of 37 years in a lunatic asylum (general paralysis?). His mother looks healthy, and has had no miscarriages (she has only twice been pregnant).

The case seems to be very similar to Dr. T. R. Whipham's case of "Congenital Word- and Letter-Blindness," lately shown before this Section,[1] but Dr. Whipham's patient was a girl (aged 8 years), and out of sixty-four recorded cases to which he alludes only seventeen were in females. I shall not here go over all the points so recently discussed by Dr. Whipham. His case, moreover, resembled the present one in giving a positive Wassermann reaction; but it is doubtful whether there can be any direct relationship between inherited (congenital) syphilis and conditions allied to congenital word-blindness, though it is supposed by some authorities that a congenital syphilitic taint favours disorders of growth and development.

DISCUSSION.

Dr. T. R. WHIPHAM: I agree that this case seems to be in many ways identical with the one I showed. In some respects, however, this boy is a little more advanced than was the girl I showed, and is able to do certain things better. It is true he is two years older. My patient, although aged 8 when I showed her, could not, for instance, tell the time, did not know the value of

[1] T. R. Whipham, *Proc. Roy. Soc. Med.*, 1916, ix (Sect. for the Study of Dis. in Child.), p. 8; and *Brit. Journ. Child. Dis.*, Lond., 1916, xiii, p. 33.

the ninth day of the illness it fell by crisis first to 97·6° F. and next day 95° F. It was a week before it rose to normal.

During the fever the pulse varied between 120 and 100 until the last two days when it was about 90; at the crisis it fell to between 60 and 70, and two days later it fell to 44. It was then perfectly regular, and I was able to demonstrate, by a paper flag on the neck, that the rate of beat of the auricle was twice that of the ventricle. I was unfortunate in being unable to obtain the use of a polygraph in time to make a record of these facts, as a few days later the condition changed, but at the time they were conclusively demonstrated to others who saw the case. After about two days this two to one heart-block altered, the pulse became more rapid and also irregular, or rather intermittent, some auricular impulses being still blocked but more coming through. The pulse now varied between 50 and 60. This condition gradually lessened, and after another week the pulse became almost regular and the rate normal. During this time the heart-sounds were normal, and there was no sign of dilatation. A little over a fortnight after the temperature became normal the patient was allowed to sit up a little, but as the pulse-rate increased considerably he was put to bed for a further period.

This case is of interest owing to the presence of two rare complications—hyperpyrexia and heart-block. The former is stated to occur in 0·4 per cent. of cases of acute pneumonia, but is much more common in broncho-pneumonia. It is also stated that it is almost always fatal when the temperature rises over 106·6° F. I attribute the happy result in this case to the patient being a young and healthy boy of good physique, and to the promptness of the treatment. This caused less disturbance to the patient than cold baths, and was undoubtedly equally rapid in its effects. The effect on the heart of iced towels over the precordium should be noted; it is evidently better not to use cold too vigorously over that area.

Heart-block after acute pneumonia is mentioned by Mackenzie, but he considers it very uncommon, and the experience of most of us confirms this. I regret I am unable to show any polygram of the apex and jugular pulsations, but the slowness and perfect regularity of the pulse and the demonstration of the jugular pulsations made the fact of a two to one block perfectly plain. Evidently the poison which had an unusual effect on the regulation of the heart's action had also an unusual effect on the heart muscle, impairing its conductivity. Heart-block of a very slight grade is, however, not uncommon, but as this merely consists in a lengthening of the A—V interval it can only be determined by graphic methods and has no effect on the pulse.

the muscles, because this boy's muscles have developed out of all proportion to the exercise to which they have been put. Another interesting feature is the absence of cutaneous fat referred to by Dr. Whipham. This is a peculiarity of the katabolic male, as contrasted with the anabolic female. The male tends to get thinner, if anything, after puberty, whereas the female tends to lay on fat at that time. In reference to my patient's mental state, I take it that it is yet too early to express an opinion. The boy I had under my care was a semi-idiot. With regard to the legs, my case showed bowing of the femora, but in this case it is difficult to judge of the condition of those bones by ordinary inspection, on account of the great development of the vasti.

Dr. J. D. ROLLESTON: It would be interesting to know what is the blood-pressure in this case. In the last case of sexual precocity shown before the Section, by Dr. E. C. Williams,[1] of Bristol, the systolic blood-pressure of the patient, a boy aged 6 years, was almost that of an adult—110 mm.

The CHAIRMAN (Dr. Guthrie): The most important thing to decide is whether this is really morbid, or whether conditions such as this may be simply normal abnormalities. Dr. Whipham has suggested that this condition of sexual precocity may be due to an adrenal tumour. I think he also mentioned that in such cases obesity only occurs in the female. That is not quite correct. Dr. Parkes Weber originally pointed out that there are two types of precocity in these cases of adrenal tumour. One is the infant Hercules type, such as the present case, and the other is the obese. This last type may occur as much in one sex as in the other. I have recorded the case of a boy who was enormously stout and heavy. He had a suprarenal tumour. But I am not certain that all these cases are due to suprarenal tumours. Out of thirty-five cases in boys, the notes of which I collected at one time, only four had suprarenal tumours: three of those four were of the Hercules type, and one of the obese. I think there is no doubt, as Dr. Whipham contends, these cases are measures of the secretory activity of, probably, the adrenal glands: but I am not certain that that activity is always morbid. I think that by the time some of these children reach the age of puberty they are no longer wonders, and that is so, I think, in both sexes. Of 100 cases in females, there were only twelve with hypernephroma or adrenal tumour. Other causes of this precocity may be tumours of the testicle, for instance. Sacchi reported the case of a boy who had a tumour of one testicle and showed all the signs of sex precocity. On removal of the testicle those signs disappeared. Dr. Whipham asked an interesting question, as to the development of the sexual instinct, whether it occurs when the organs are mature. I have always understood that there is no rule in these matters, and that certain persons, although sexually mature, never develop the instinct at all, that the development is rather due to tuition than to instinct. It would be very interesting if these cases could be followed up, so as to find out what becomes of them.

[1] *Proceedings*, 1913, vi (Child. Sect.), p. 24.

I have a strong impression that many after a certain age, in both sexes, cease to be wonders, and are regarded as ordinary members of society.

Dr. F. PARKES WEBER: This is a typical case of what we (in this Section) have mostly called the "infant Hercules" type of precocious bodily development. In regard to the question of prognosis and progress in such cases, I would suggest that Mr. Hugh Lett and any other members of the Section, who have shown cases of this type before this Society, or before the old "Society for the Study of Disease in Children," be asked to furnish, as far as they can, a report of the subsequent history of their cases.

(*February* 23, 1917.)

Case of Fragilitas Ossium.

By T. R. WHIPHAM, M.D.

THE patient is a boy, aged 9 years, who all his life has been liable to fractures of the bones from trivial causes. The first fractures occurred when he was five weeks old, both femora being then broken. Subsequently he has fractured the right leg twice, and the right forearm, and quite recently has sustained a fracture of the lower jaw as the result of a fall. He presents marked deformities of the lower limbs, but manages to get about with the help of crutches. His health is good, and he is said never to be ill. He has five brothers and sisters, who are all normal, and there is no history of any similar condition in the family.

DISCUSSION.

Mr. PAUL BERNARD ROTH: With regard to the treatment of this condition, my experience has been that no fractures occur after puberty has been reached. The way to treat these cases is to put the legs straight, and there is no surgical reason for not doing so: they should be put and kept in splints until the child is 14 or 15 years of age, after which it is very unlikely that fractures will occur. I have seen several cases which have been operated upon. Union did take place in them, and the resulting condition, though not beautiful, was perfectly satisfactory.

Dr. ERIC PRITCHARD: Some years ago I had a case of the same character, in which there was an ununited fracture. Sir William Arbuthnot Lane wired it with success, and it did very well. I attributed much of the improvement to the systematic massage and the passive muscular exercises which were given to this child. This boy had had many fractures before of the legs and other

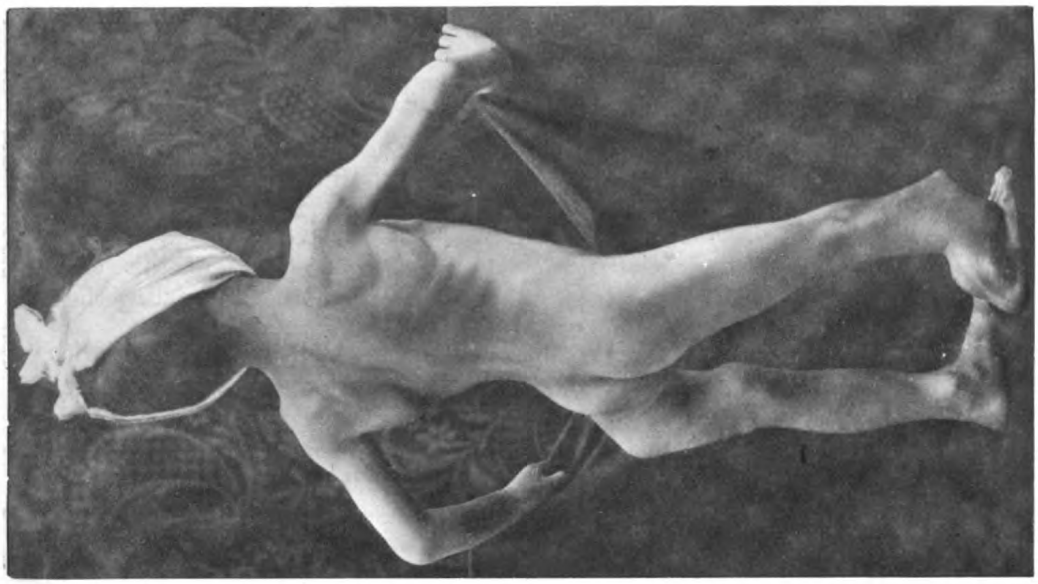


FIG. 2.
Fragilitas ossium.

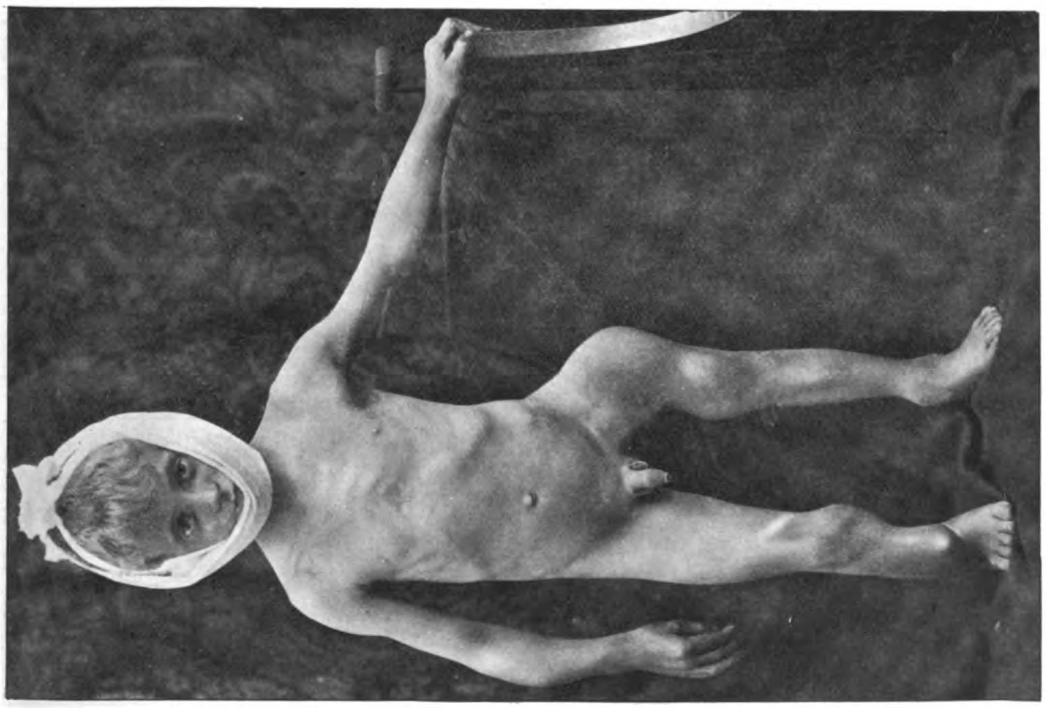


FIG. 1.
Fragilitas ossium. The bandage is owing to a recent fracture of the mandible.

parts, and on each occasion he had had them treated in the ordinary way by immobilization with splints, but as soon as he was able to leave his bed, and even before, he got repeated fractures. But after wiring the fractures and insisting on his having active muscular exercises, recurrences ceased and he improved very much. I attribute the improvement directly to the results of the active exercise.

Dr. F. PARKES WEBER: I should like to know what the ultimate condition is in cases of this class. Cases of von Recklinghausen's chronic generalized *osteitis fibrosa* may superficially resemble surviving patients of this class (osteogenesis imperfecta), but I take it they belong to another class altogether.

The CHAIRMAN (Dr. Guthrie): This case presents the blue sclerotics with which one is familiar in such cases, also the curious protuberance above the ears on either side, to which Dr. Cameron drew attention recently at this Section. There are some members here who can throw light on the origin and meaning of the blue sclerotics. I have never been able to find out the cause of the colour and the meaning of its association with osteogenesis imperfecta.

Dr. J. D. ROLLESTON: Some years ago,[1] I showed a case of blue sclerotics, which were present in both mother and child. In the child there was an association with brittle bones. Since then a number of cases have been published. Dr. Cockayne[2] has shown one since at this Section. I understand that blue sclerotics are due to a deficiency of fibrous tissue in the sclera, and that this is also the condition in the bones, which would account for their brittle condition. But in Dr. Whipham's case the blueness is not so marked as in the cases I showed, and in that shown by Dr. Cockayne. I think such sclerotics have been examined by Leslie Buchanan, of Glasgow.

Dr. EDITH BRONSON: In 1908, Dr. Buchanan of Glasgow, made a histological examination of a blue sclerotic, and reported that the cornea was three-fifths and the sclerotic one-third, the normal thickness. However, in his patient there was no history of fractures, and it is doubtful if it belonged to the fragility-blue sclerotic group. In Edinburgh last year, I obtained microscopic preparations of an eye from an infant, aged 11 months, who had blue sclerotics, and who belonged to a family of hereditary blue sclerotics associated with fragile bones. These sections were examined by Dr. J. V. Paterson, and the thickness of the sclerotic reported normal. Fridenburg who made the ophthalmological examination in Herrman's patient, suggested that the blue sclerotic was due to an unusual transmission of the choroidal pigment dependent upon the absence of lime salts in the connective tissue elements of the sclerotic. Peters thought the assumption of thinning of the sclerotic the most probable explanation. Either an increased transparency or an actual thinning has been suggested by most writers on the subject.

[1] *Proceedings*, 1911, iv (Child. Sect.), p. 96.
[2] *Ibid.*, 1914. vii (Child. Sect.), p. 101.

Dr. H. C. CAMERON: Are not these blue sclerotics generally found in the familiar type to which the name "fragilitas ossium" is best applied? In the cases of which Dr. Whipham has shown an example to-day—which I should have preferred to describe under the heading "osteogenesis imperfecta"—the sclerotics are not usually of the characteristic deep china-blue colour.

(*February* 23, 1917.)

Case of Vitiligo.

By J. L. BUNCH, M.D., D.Sc.

THE patient, a girl, aged 10, during the past twelve months, has developed some fifty patches of vitiligo on the trunk and lower limbs. The face and arms are entirely free. The first patch showed itself on the abdomen, to the left of the umbilicus, as a small white patch, which has now developed until it is the size of a five-shilling piece, dead white in colour, and contrasting strongly with the surrounding brown pigmented skin. Some of the other patches are also quite round, but many are irregular in shape, and, in places, adjacent lesions tend to coalesce. There are no subjective symptoms and I cannot determine that the lesions are associated with any local hyperæsthesia, or anæsthesia.

The chief point of interest in this case is the rapidity of onset of the disease. The child is aged 10 years, and fifty lesions have developed during the last twelve months, or less. It has been said that many of these cases only occur in congenital syphilitics, and the mother of this patient says that out of eleven children she has had only five are living. The Wassermann reaction, however, in this child is negative. In these cases there is no change of texture of the skin, the disease consists in a loss of pigment.

The other patient, whom I wanted to show, could not come. In this case there is a definite sclerodermatous change in the tissues, and the skin is distinctly shiny in the position of the lesions. There is much the same distribution as in the case shown, although the lesions are not so numerous, and I wanted to contrast the two.

(*February* 23, 1917.)

Case of Teratoma.

By J. P. Lockhart Mummery, F.R.C.S.

Patient, a girl, born October 25, 1916. One of twin girls born at seven months; both twins are living. Patient weighed 3½ lb. at birth, the other twin 8 lb. The patient at birth had a round tumour, about the shape and size of a tangerine orange, attached over the sacrum and lower lumbar vertebræ. The tumour was covered with normal skin, was somewhat irregular in shape, and contained a number of hard nodules. A little to the left of the centre of the tumour was a minute opening, which discharged a few drops of sticky, white fluid at intervals. The tumour did not seem to interfere with the child, and there was no sign of paresis in the legs, and the rectum, on examination with the finger, was normal. The child was so small and weakly that the question of operation had to be postponed, and the operation was not performed until February 2, 1917. During this time the tumour had grown considerably, being three or four times the size it was when the child came into hospital. The diagnosis of teratoma was made, and this was confirmed at operation. The tumour was difficult to remove owing to the extraordinary variety of tissues and complete absence of any normal anatomy in its neighbourhood. The child stood the operation well, and has now completely recovered.

On examination the tumour was an obvious teratoma, and contained portions of a third child. There was intestine containing meconium, cartilage, a structure which looked like an auricle of the heart, but no hair. Microscopic sections show fibrous tissue, cartilage, intestinal mucous membrane, and a glandular structure, which may be pancreas or salivary gland.

(*February* 23, 1917.)

Pathological Specimens: Thoracic Contents and Brain; Extensive Tuberculous Infiltration.

By ERIC PRITCHARD, M.D.

I EXHIBIT these specimens somewhat to my own confusion, because I have shown the patient before the Section as an intrathoracic new growth. It is, however, a chronic tuberculous condition, which, during life, showed very little evidence of its real nature. At the post-mortem examination the whole of the thoracic contents were found to be solid masses of tubercle, adherent entirely to the thoracic wall. There is so much consolidation that it is marvellous that the boy could have lived in comparative comfort, as he did until the end. Towards the termination he developed cerebral symptoms; he was absolutely blind, there was much œdema in both fundi, and paralysis of both hand and foot on the left side. I thought, at first, that there was a secondary growth in the brain; the progress both in the chest generally and in the lungs was what one would expect except for its slowness; there seemed little evidence in favour of tubercle. We had the boy examined several times with the X-rays, and every test we knew was applied. There had been practically no expectoration, except once or twice when he had some bronchitis, which was prevalent in the ward at the time. In the small quantity of sputum we obtained, no tubercle bacilli could be found.

The physical symptoms were very curious: there was no entry of air at the lower part of the lungs, and the upper part of the lungs showed progressive failure of air entry; yet at no time were there marked rhonchi or râles, or moist sounds. One could have understood this course if it had been a slow-growing sarcoma.

The boy was in hospital for two years, and the history of the symptoms extended over a period of two years and a half.

(*February* 23, 1917.)

Some Points in Lateral Curvature of the Spine.

By J. S. KELLETT SMITH, F.R.C.S.

THE first questions that occur to my mind in investigating a case of lateral curvature of the spine range themselves in somewhat the following order:—

(1) Has the curve to do with the spine alone, or is it a "curve of accommodation"?

(2) Is there evidence of any past or present internal condition of the chest likely to cause unequal development of the two sides of the thorax?

(3) Is the standing height of the legs equal?

(1) By a "curve of accommodation" is here meant a curve assumed by the patient as an attitude of ease, in order to relieve pressure on a sensitive viscus or nerve. Such a curve, which is postural at first, may become fixed by the efflux of time and end in more or less bony deformity. A tender viscus may also give rise to a spinal curve by reflex nerve irritation through which a unilateral hypertonus of the abdominal muscles or of the erector spinæ is initiated. In this case the patient is often very little conscious of any internal derangement, pain being generally referred to that particular region of the spine in nervous connexion with the viscus affected. Both these causes of a curve of accommodation may be in operation together—i.e., the patient may be conscious of the effort of seeking an attitude of ease, and at the same time examination may show hyperæsthesia of the skin with increased tonus and irritability of the underlying muscles at some region of the anterior abdominal wall and, or on the concave side of the spinal curve only.

These cases occur chiefly in patients of riper years, but they are also found in those of earlier age and are then not infrequently associated with cardiac mischief. It is manifestly useless to attempt any cure of the curve by exercises so long as the initial cause is left operative.

The practical deduction is that any case of lateral curvature in

which pain in the back is a prominent feature, demands an especially careful examination of all the internal organs, even if the patient does not complain of any discomfort therein. A tender ovary, an irritated appendix, a painful floating kidney, or a sensitive gall-bladder, for example, may be discovered, and the measures necessary for its relief will at the same time cure the spinal curvature if this be still entirely postural, or will place the patient in a position to receive successful treatment if it be in an early degree of fixation. It would seem superfluous to insist upon this class of case, but experience shows that their real nature is frequently overlooked in practice.

In the past year I had forty-three cases of lateral curvature under observation, and I propose to use these cases to illustrate various points in this paper. In the forty-three there were five examples of accommodation curves: two with left ovarian trouble, total curve right convex; one with movable and tender right kidney, left dorsal and right lumbar curve; one with pain, tenderness, and vasomotor signs over the sensory distribution of the posterior branch of the fifth left cervical nerve, high curve to the right; and one with recurrent biliary catarrh and general tenderness over the liver, total curve left convex. The first four were in adults. Two (ovarian) accepted operation, one (kidney) refused, and the fourth had the sensitive nerve submitted with success to high power light. In each treated case the ultimate result was good, both spinal curve and pain ceasing to give trouble. The fifth case occurred in a young girl aged 10 years. Attention to general health, an outdoor life, and a carefully modified series of exercises, which were possible from the beginning, provided a cure.

(2) In his monograph on ionic medication, Stéphane Leduc discussed an interesting phase in the relation between inflammatory affections of the chest and scoliosis. Leaving aside examples of gross mischief, he doubted if average pleural thickenings and adhesions could produce a curvature by reason alone of the contraction of cicatricial tissue. He advocated the view that a pleurisy or a broncho-pneumonic condition long continued might cause a retardation of growth—involving even the skeleton—on the affected side, the result of which would become evident in later years as a partial atrophy in comparison to the healthy side. The rôle played in this, and in any subsequent development of a curvature, by pleural thickenings and adhesions would be in limiting the freedom of the respiratory movements, and for this reason he advocated their treatment by chlorine ionization.

I believe we have here described a class of case which is not uncommon, in which one side of the thorax is found to be distinctly less broad than the other. There is little to be seen from the front. From the back the affected side seems to have lost its lateral convex contour: it looks even and narrow and, by reason of this, falsely long in comparison to its fellow—it appears as though it were ribbed up with ribs all of equal length. And quite in the early stage of curvature, when the spine is still capable of median position, the "sky line" of the flexed back shows the rib angles on the sound side to be more prominent than the degree of scoliosis would warrant. The whole appearance is quite typical. In the forty-three there were six examples, in four of which there was a history of severe pneumonia, and in two a history of whooping-cough with pulmonary complications.

(3) The influence of a large difference in the length of the two legs in causing a compensatory curvature of the spine is generally admitted. I wish to discuss here the influence of small differences—those of half-an-inch or so. For the purpose of measuring these I use a "pelvic level"[1] consisting essentially of a piece of wood curved to fit the body and carrying a spirit level adjusted to an upper true horizontal edge. Since it is the standing height of the legs that matters the patient stands erect, feet parallel, knees together and fully extended. A pencil dot is placed over each posterior superior iliac spine. These are readily found; the situation of each is marked by a dimple in the skin, which is generally unmistakable and is almost always discernible with ease. The upper edge of the pelvic level is then applied to the two dots, and the position of the air-bubble in the spirit tube observed. If one side is shown to be lower than the other, slabs of wood are placed beneath the patient's short leg until the bubble is central. The sum of the slabs gives the increased thickness of sole necessary to restore the theoretical base of the spine to true horizontal. The posterior iliac spines are used in preference to the anterior. These latter, on account of their wider distance apart, would tend to minimize any error of observation, but in using them we have to presume that the pelvis is symmetrical. In the forty-three cases there were sixteen in which one leg was shorter than the other by anything up to half-an-inch, and in two of these the pelvis was so twisted that the anterior spines gave a palpably wrong reading, the short leg as shown by posterior examination being actually on the side of the higher anterior spine.

[1] Figured in the *Lancet*, 1911, i, p. 174.

Incidentally I may say that flat-foot as a cause of difference in the standing height of the legs was curiously absent in my cases, but many of them presented eversion of the whole foot on one or both sides associated with abnormal shortness of the external malleolus. This developmental error is quite common; in the late fœtus and even at birth the malleoli are about of equal length, and if the outer one fails to grow downwards to form an external splint, as it were, to the ankle-joint, some eversion of the foot in walking is a likely consequence. It is one condition popularly known as "weak ankles," and may be seen frequently in any public thoroughfare.

Of the sixteen cases of short leg, five were short rights and eleven short lefts. An analysis of the former conveys nothing. Two of the cases had the primary curve convex to the right, but one of these had definite signs of sclerotic mischief in the left chest consequent upon pneumonia. Three had the primary curve convex to the left, but here again the issue was confused because one of them was left-handed, and another was the case of biliary catarrh already mentioned as a curve of accommodation. When we come to the short lefts we are in rather a different position. Four of them presented a single curve convex to the left, and seven presented a double curve with the lumbar section convex to the left. In other words, each of the eleven short lefts presented a curve in entire agreement with the statics of the case.

These figures are far too few to justify any conclusion, but when we find eleven cases behaving in exactly the same way, then we are justified at least in making a suggestion. I believe that we have here an argument in favour of the theory put forward in 1912 by Professor Jansen, of Leyden. He pointed out that the left half of the diaphragm acts more strongly, and has a greater excursion, than the right half. This asymmetry of action causes a tendency to a left low dorsal curve, which is the common constant factor in the great majority of all cases of curvature. If, then, there is already a tendency for the spine to tilt to the left, this diaphragmatic pull will increase it. Thus, even small deficiencies in the length of the left leg assume great importance.

To complete the analysis of the forty-three cases—there were two examples of amesial pelvis of the type described many years ago by Richard Barwell, one case following infantile paralysis, one associated with torticollis and another with Sprengel's shoulder, one due to tearing of the deep muscles of the back whilst lifting a heavy weight, one the result of empyema, and one interesting case in which the curvature was discovered after a long period of sling treatment for a

broken arm. The remainder—roughly 25 per cent., since three of the foregoing examples are quoted in a double category—were of the usual type in which no very evident actuating cause, beyond the habit of harmful posture, could be given.

DISCUSSION.

Mr. PAUL BERNARD ROTH: I do not agree with Mr. Kellett Smith on every point. I have spent much of my medical life in treating lateral curvature of the spine, yet only last month did I meet my first case of scoliosis clearly due to chest trouble—I am, of course, excepting cases of empyema. To get scoliosis following one-sided lobar pneumonia is very rare. But I recently had a case in which a boy had right-sided pneumonia with serous effusion, and after the pneumonia the lung did not expand again. At the present time there is very bad air entry into the lower half of the right lung, and the boy has got a curve of the spine, with the convexity to the left. When he takes a deep breath, the left side of the chest expands nearly twice as much as does the right side. When he stands, his left shoulder is high. I am sure this is directly due to the former lung trouble. That is the only case of the kind I have seen. In the large majority of cases, lateral curvature is due simply to weakness of the spinal muscles. I do not agree that a slight difference in the length of the legs does, as a rule, cause lateral curvature: if it did, curvature would be present in nearly everyone, because in anthropometric laboratories it is almost invariably found that a person's legs are of unequal length. Often one finds the lateral curvature on the side opposite to that of the shortened leg. Mr. Tubby, in his paper on "Symmetry and Asymmetry," read at this Section,[1] gave an explanation of these cases, but it was one which I myself was unable to follow.

Dr. ERIC PRITCHARD: Mr. Kellett Smith's invention of his new pelvic level supplies what is much needed. I have found it impossible to measure the length of the two legs of children with any degree of satisfaction by the usual methods, and I have often wished for some good means of doing so. I shall be very glad to secure Mr. Kellett Smith's new instrument, and use it for the measurement of legs which are suspected to be of uneven length.

Mr. BLUNDELL BANKART: I agree with Mr. Roth that most of the conditions mentioned by Mr. Kellett Smith as causes of scoliosis are the exception, rather than the rule. In my experience, it is uncommon to find a definite visceral condition as the basis of ordinary cases of scoliosis. The only constant feature in all cases of static scoliosis is weakness of the musculature. When the muscles are weak, the spine lapses into a curve, and if that persists long enough, it becomes permanent. I particularly object to the author's

[1] *Proceedings*, 1909, ii, p. 247.

appeal to normal anatomy as a cause of scoliosis. If a normal anatomical condition is a cause of scoliosis, I see no reason why everybody should not have the deformity. With regard to the use of a pelvic level, we have found that a couple of thumbs on either the anterior or the posterior superior iliac spines—we use them indifferently—will, with a little practice, indicate, for all practical purposes, whether the pelvis is level, or not.

Dr. H. C. CAMERON: I should be inclined to agree with Mr. Bankart in regarding laxity of the muscles as the principal cause of scoliosis. This want of tone of skeletal muscles is certainly the common cause of lordosis in children and adolescents. In lordosis there is often an accompanying postural albuminuria, I believe from a similar weakness in the vasomotor muscles. It would be interesting to know in what proportion of these cases of scoliosis, cases which gravitate to the surgeon rather than to the physician, a similar albuminuria is found.

Dr. F. PARKES WEBER: The last speaker's explanation, that postural albuminuria is not necessarily the result of the lordosis but that the lordosis is due to the same cause as the postural albuminuria, when the two conditions are combined in the same patient, is at variance with the observations of Ludwig Jehle and those who first prominently drew attention to the frequent association between lordosis and postural albuminuria (that is to say, orthostatic albuminuria) in children. They claimed that the postural albuminuria was directly due to the lordotic position, and that a temporary (artificial) postural albuminuria could actually be produced in ordinary children by merely keeping them for a certain length of time in a lordotic position. It is certainly true that in some children an *artificial* lordotic position will produce temporary albuminuria. But the true explanation of the relation of postural albuminuria to lordosis is probably not that of a simply mechanical effect produced by the lordosis on the kidneys.

Dr. H. C. CAMERON: I know that the suggestion, originally made in Germany, was to the effect that the spinal lordotic curve directly and mechanically caused the albuminuria by pressure upon the renal vein. To my mind this suggestion is in the highest degree unlikely. The author even goes on to elaborate it by urging that albuminuria in swimmers is due to the swimmer rearing his head out of the water and assuming a position of lordosis. I do not think he can have had much knowledge of swimming. I have not succeeded in producing albuminuria by putting children in plaster of Paris in the position of lordosis. Children with lordosis and postural albuminuria have sometimes other signs of vasomotor instability. I have noted dermographism for example, as occurring in association, and I believe that the explanation that I suggest is probably the correct one, that the lordosis, albuminuria, and dermographism are evidence of muscular weakness, involving the skeletal muscles as well as the vasomotor muscles. My question now is whether or not similar changes are found in scoliosis.

Dr. PARKES WEBER: I should like to add further that I do not believe, from what I have read and seen, that the purely mechanical theory of the causation of orthostatic albuminuria can hold good; it is for that reason that I am glad to hear other explanations. But one must admit that in a certain number of cases, though possibly only in predisposed children, an artificial position of lordosis has been sufficient to produce, for the time being, the so-called orthostatic albuminuria.

Mr. KELLETT SMITH (in reply): The number of cases described under the second heading may seem rather large, but Eastbourne has a great reputation as a school centre for children who have suffered from any chest mischief, and such cases are for this reason more likely to be found there in greater proportion than elsewhere. The pelvic level I have devised (and improved lately by hinging the wings and moving the spirit-level to a clearer view on the convex surface) has proved most useful in practice. I am quite convinced of the part played by a short left leg in favouring the occurrence of a curvature in those whose general physique renders them prone to static spinal trouble.

(*February* 23, 1917.)

Lipodystrophia Progressiva.[1]

By F. Parkes Weber, M.D.

Quite recently two genuine cases of lipodystrophia progressiva *in males* have been published. J. Gerstmann's case [33] is that of a soldier, aged 32 years, who at the age of 10 years commenced to show symmetrical wasting of the subcutaneous fat in the face. Since then the fat-atrophy has gradually spread over the neck, upper extremities, and trunk, as far as the pelvic bones (the inguinal folds and the iliac crests). There is excessive amount of subcutaneous fat in the buttocks and lower extremities. The muscular development in the lean parts is very good. The man presents likewise signs suggestive of thyroidal disturbance, "facial irritability," alimentary glycosuria, and some nervous symptoms, which may, however, not be in any way related to the lipodystrophia. H. Gerhartz's case [34] is that of a man, aged 29 years, whose "lipodystrophia progressiva superior," as Gerhartz prefers to call it, commenced at the age of 6 years, after an accident on the ice in which the patient nearly lost his life. In this case, however, there is no excessive accumulation of subcutaneous fat in the buttocks and lower extremities. The patient shows various other abnormalities ("facial irritability," hyperidrosis, alimentary glycosuria, &c.), the connexion of which with the fat-atrophy is by no means clear.

Lipodystrophia progressiva is a rare disease or morbid condition, which was at first supposed to be confined to the female sex. It is characterized by the progressive disappearance of the subcutaneous fat from the face and upper parts of the body. The term "lipodystrophia progressiva" was introduced by A. Simons (1911), and the appearance in his case as portrayed in his and E. Holländer's illustrations (1910) may be accepted as altogether typical for the disease [1]. Though Simons was undoubtedly the first to use the term lipodystrophia (from the Greek words λίπος, δυς-, and τροφή, signifying respectively *fat*, *badly*, and *nourishment*), a characteristic example of the disease was

[1] In this paper the reference numbers in brackets are to the Literature references at the end.

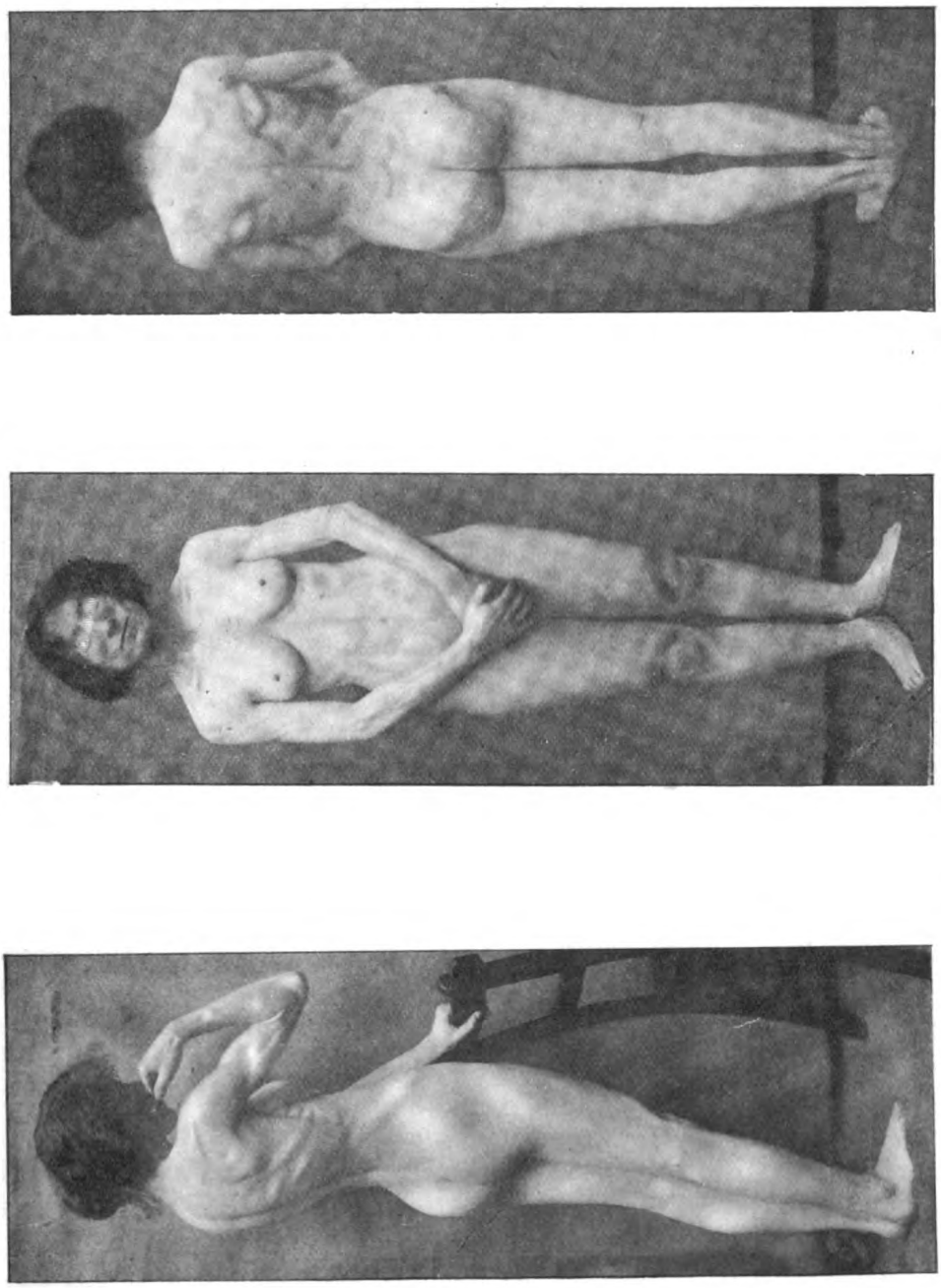
shown by Harry Campbell in 1907, at the Clinical Society of London, under the heading, "Disappearance, more or less complete, of the Subcutaneous Fat above the Region of the Lower Extremities" [2]. By the kindness of Dr. Campbell I am able to reproduce here photographs of his patient taken in 1913 (*see* figures).

The fat atrophy seems first to attract attention in the face, and later on to spread to the trunk and upper extremities. In some cases the disease remains limited to the face and neck, or face, neck, and thorax; in Lewandowsky's case [11], although it had already lasted two years, it had not yet affected the upper extremities. Though the disease is called *progressive* lipodystrophia, it is really not progressive in all senses of the word, for the lower extremities and the buttocks are never involved; in most (nearly all) cases, indeed, there seems to be an abnormal accumulation of subcutaneous fat in the thighs and gluteal regions (sometimes in the lower abdomen also), such as occurs in many females, especially at middle age.[1] Moreover, when the subcutaneous fat has nearly all disappeared from the affected regions, the disease comes to a standstill. Although at the commencement there may have been associated neurotic or other troubles, when the disease once comes to a standstill, and sometimes during the progress of the disease, the general health appears to be in no wise affected by the lipodystrophia. The patients are ordinarily able to do as much work and stand as much fatigue as the average of normal women of the same age, or they may even excel in energy and strength. A cause of annoyance and trouble may be that employers and others, owing to the wasted appearance of the face, may suspect the presence of a disease of evil repute, such as pulmonary tuberculosis or cancer.

The ætiology of the disease is unknown, but an endocrinic origin has been suspected, that is to say, the peculiar fat atrophy in question has been supposed to be a result of some disorder of the internal secretions. In women menstruation and the ordinary sexual functions appear to be unaffected. Feer [13] suggests disorder in the function of the thyroid gland. Thyroid treatment and various drugs and other methods of treatment have been tried, but without any satisfactory result.

It is possible that the disease occurs relatively more frequently in

[1] In females the predominance of subcutaneous fat about the thighs and gluteal regions is practically a secondary sex-character. The gluteal prominence is greatly exaggerated in some African races, constituting the racial peculiarity known as "steatopygia," which is illustrated by the pictures of the "Hottentot Venus."



To illustrate the typical changes in lipodystrophia progressiva.

women of Hebrew race than in others. In my first case the patient was of Hebrew parentage, and so were Harry Campbell's and Herrman's patients. Several other patients, however, were certainly not Hebrew. If, moreover, the disease is slightly less rare among those of Hebrew origin than amongst others, it must nevertheless be exceedingly rare. During the whole time (more than twenty years) of my work as physician to the German Hospital in London (the in-patients and out-patients of which are largely Jews from Russia, Russian Poland, Germany, Austria, and the Balkan States) I have not met with a single case at that hospital, nor have I heard that any of my colleagues at the hospital have come across one.

In regard to the age at which the disease commences, and the circumstances (if any) which the patient or her friends suppose to have acted as exciting causes, there seems to be considerable difference in different cases; but the disease is one of the first half of life and generally commences in childhood, before puberty, especially at the age of 6 years or thereabouts.

In a case on which I published a note in 1911 [3], the patient, who was an unmarried woman, aged 27 years, of Hebrew parentage, presented no evidence of any visceral disease. She was said to have been a healthy girl up to the age of 16 years, when menstruation commenced. Since then she had had various troubles, and had likewise been treated for dyspepsia and insomnia. But it is doubtful whether these troubles had anything to do with the lipodystrophia. She was active, and discontented with life in her parents' home, being desirous of obtaining some useful occupation, which would render her more independent.

Since then I have met with another case, in a somewhat older woman, who, apart from the fat atrophy in question, enjoys apparently perfect health. Mentally she is also normal, but is sometimes annoyed because people think that owing to the emaciated aspect of her face she must have "consumption." She is quite certain that the fat atrophy commenced after an attack of measles, at 7 years of age, but it has long ago reached its maximum and is now quite non-progressive. I was not able to examine the trunk, but am assured that the atrophy is limited in this case to the face and neck, as in certain male patients referred to further on.

In Harry Campbell's case [2], when he first demonstrated it (1907), the patient was 21 years old. Dr. Campbell kindly informs me that she is of Hebrew parentage. The fat-atrophy commenced at the age

of 6 years and gradually progressed during the next eight years or so. The face was the part first affected. There was abundant subcutaneous fat in the buttocks and lower extremities. Dr. Campbell tells me that cosmetically she has been greatly improved by paraffin injections into the subcutaneous tissues of the face, for the first time in 1904, and again about one year later (as the paraffin had apparently become gradually absorbed after the first injection).

The patient of Simons and Holländer [5] was 21 years old when her case was described in 1910. The fat-atrophy was first noticed in the face, when she was 11 years old, and then gradually spread over the trunk and upper extremities. The leanness of the face, however, seems to have been preceded by excessive accumulation of fat in the gluteal region, for an increase in the size of that part of the body had attracted her mother's attention when she was only 5 years old. The appearance of her face was of special importance to her, as she was a professional dancer, and from the cosmetic point of view Holländer obtained a temporary good result by injecting a sterilized mixture of human fat and mutton suet into the subcutaneous tissue of her face. The good result, however, did not last long, for absorption soon took place. A "biopsy" examination of the affected skin and subcutaneous tissue was made in this case, and (unlike what is found at post-mortem examinations on even the most emaciated subjects of pulmonary tuberculosis) practically complete absence of fat was noted, so that only traces could be demonstrated by careful microscopical examination [6].

In a case which Sir William Osler kindly gave me permission to mention [7], and which doubtless belongs to the same class, the leanness was first noticed when the patient was about 5 years old, the face and back being the earliest parts to be affected. In 1895, at the age of 10 years, when Sir William Osler saw her, the contrast was very great between the extreme thinness of the face, trunk, and upper extremities, and the plumpness of the parts below the hips. Menstruation commenced at 12 years of age. In February, 1913, information was obtained that, though this patient still looked thin and weak, she said that she felt well and was actually stronger than most ordinary women.

In May, 1915, Dr. John Fawcett [4] kindly showed me a typical case of lipodystrophia progressiva in Guy's Hospital. The patient was a young Englishwoman (not of Hebrew origin), aged about 19 years, with apparently nothing abnormal about her, physically or mentally, excepting the fat-atrophy. The subcutaneous fat of the whole body

down to the pelvic bones was involved in the atrophy. The lower extremities showed a plentiful, but apparently not excessive, covering of fat. The disease had been long quiescent, for it commenced at about 8½ years of age and took only a year or so to reach its present stage. Menstruation, which commenced at 13½ years, was normal.

E. Feer, of Zurich, has recently described and illustrated two fresh cases of lipodystrophia progressiva [13]. The patients were girls, aged 12 and 10 years respectively (1914), in whom the fat-atrophy began at about 6 years of age in the face, spreading gradually to the neck, thorax and arms. The increase of fat in the thighs and buttocks was more striking in the second case (that of Dr. Boissonnas, of Geneva), in which there was likewise abnormal obesity of the abdominal wall.

The case of "Segmentary Adiposis of the Lower Limbs," published by Laignel-Lavastine and Viard [9] must probably be regarded as belonging to the group we are now considering, though the emaciation of the face and upper part of the body was less decided. Their patient was an unmarried woman, aged 39 years, an embroiderer, who complained of great enlargement of the lower extremities. This commenced, according to the patient's account, at the age of 22 years, and first involved the legs, then the thighs, and lastly the buttocks. Various methods of treatment had been resorted to (thyroid extract and iodine, milk diet, &c.), but without satisfactory results. The great size of her lower extremities offered a striking contrast to her thin chest and the general slenderness of the upper part of her body. The left thigh was decidedly larger than the right thigh, but both thighs, both buttocks, and both legs shared in the enlargement. The mammæ were very small. The thyroid gland was slightly enlarged. The menstrual periods, which had commenced at 14 years of age, lasted only two days each time. At the Salpêtrière the patient had been given thyroid and ovarian extracts, but as yet without any effect on the size of the lower extremities.

I have been kindly allowed to refer to a case which may perhaps be regarded as an "incomplete form" of lipodystrophia progressiva, somewhat like the above described one of Laignel-Lavastine and Viard. The case was shown by Edmund Cautley [29] at the meeting of the Harveian Society of London on February 3, 1916, and in the discussion Leonard Guthrie suggested that it might be one of lipodystrophia progressiva. The patient was a woman, aged 24 years, whose lower extremities (excluding the feet) were remarkable for their excess of subcutaneous

fat; so also was the lower part of the abdomen. The upper part of the body and face appeared thin (at all events, by contrast). The increase in the size of the legs commenced at the age of 6 years (in 1898), after an attack of diphtheria. The patient complained of numbness in the outer parts of the legs (chiefly the left one) and breathlessness on excitement and exertion, but these troubles may have been quite independent of the abnormality in the subcutaneous fat.

I cannot here give an account of all the published cases of lipodystrophia progressiva, but must refer to my recent article on the subject in the *Quarterly Journal of Medicine* [35], from which I have borrowed the material for the present paper, and to the accompanying table of female cases (*see* pp. 88 and 89).

There remains, however, a group of cases of bilateral atrophy of the subcutaneous tissues of the face, which have been supposed to be allied to progressive facial hemiatrophy, in fact, thought to be (if the expression be permitted) a progressive "bilateral facial hemiatrophy." Many of these have occurred in males, and since the publication of certain remarks by A. Simons [25], and since the above-described observations of Gerstmann [33] and Gerhartz [34], one may well suppose that some of them represent a modified (more limited) form of lipodystrophia progressiva in males, and it is possible that the latter disease is more frequently limited to the face (or face and neck) in males than in females. Some of the following examples have been quoted by H. Oppenheim, of Berlin, in his large, well-known text-book.

A. Schlesinger [16] refers to a case of that kind observed by himself, two cases recorded by Moebius, one by Julius Wolff [17], and one by Flashar [18]. Schlesinger's case was that of a girl, aged 10 years, in Monti's clinic. The facial atrophy commenced at 4 years of age, a few months after measles. It was not accompanied by neuralgia or any kind of pain, and it was noticed on the left side of the face before the right side was involved. One of Moebius's two patients was a woman, aged 28 years, in whom the bilateral facial atrophy was first observed after she complained of pains following an injury to her right eye. The other of Moebius's patients was a woman, aged 19 years, in whom the bilateral facial atrophy was said to have followed local pains and an attack of pneumonia. Wolff's patient was a woman, aged 24 years, in whom the right side of the face commenced to waste before the left side was involved. Flashar's (and Eulenburg's) case was that of a woman, aged 23 years, in whom progressive bilateral facial atrophy followed a supposed attack of measles (without cutaneous eruption) at about 4 years of age.

LIPODYSTROPHIA PROGRESSIVA. TABLE OF MORE OR LESS FULLY DESCRIBED CASES IN FEMALES.

Reference	Age of patient when the affection was first noticed	Age of patient when the case was described	Parts affected by the fat-atrophy	Condition of other parts	Remarks
(1) Campbell [2] ...	6 years	21 years	Down to pelvic bones	Abundant fat in buttocks and lower extremities	Of Hebrew parentage; temporary cosmetic improvement by subcutaneous paraffin injections
(2) Simons and Holländer [5 and 6]	11 years	21 years	Down to pelvic bones	Excess of fat in buttocks and lower extremities	Increase of size of gluteal region noted at 5 years of age; temporary cosmetic improvement by subcutaneous injection of human fat; biopsy examination made
(3) Weber [3] ...	Probably 16 years	27 years	Down to pelvic bones	Normal amount of subcutaneous fat in buttocks and lower extremities	Of Hebrew parentage; very active disposition
(4) Weber [35] ...	7 years	Over 30 years	Said to be limited to face and neck	Apparently normal	Commenced after measles; has long been non-progressive
(5) Osler, recorded by Weber [3]	5 years	28 years	Down to pelvic bones	"Plumpness" of parts below the hips	Fat-atrophy quiescent; feels well and in capacity for work is stronger than most women
(6) Fawcett [4], recorded by Weber [35]	8½ years	About 19 years	Down to pelvic bones	Normal amount of subcutaneous fat in buttocks and lower extremities	Fat-atrophy long quiescent; enjoys ordinary health
(7) Pic and Gardère [8]	Age not stated	4 years after commencement	Down to the umbilicus	"Pseudo-hypertrophy" of the pevic region and the lower extremities	A course of treatment by rest and feeding led to increase of fat in the lower extremities, but not in the face, thorax, and upper extremities
(8) Laignel-Lavastine and Viard [9]	22 years	39 years	The chest was thin, and there was general slenderness of the upper part of the body	Excess of subcutaneous fat in lower extremities and buttocks	Increase of fat first noticed in the legs 22 years of age

(9) Cautley [29], quoted by Weber [35]	6 years	24 years	Face and upper part of the body appeared thin	Excess of subcutaneous fat in lower extremities and lower part of abdomen	The increase in the size of the legs commenced after diphtheria at 6 years of age
(10) Barraquer, quoted by Laignel-Lavastine and Viard [9]	13 years	25 years	Face and upper part of thorax	"Plumpness" of lower part of trunk and lower extremities	The fat-atrophy commenced rapidly after an influenzal attack at 13 years of age
(11) Cohn [10]	6 years	17 years	Down to pelvic bones	Excess of subcutaneous fat in lower extremities and buttocks	The patient complained of weakness in the arms, &c.; her father had had syphilis
(12) Lewandowsky [11]	A young woman	2 years after commencement	The face and trunk, but not arms, were affected	The buttocks were overloaded with fat	The arms as yet had preserved their normal subcutaneous fat
(13) Herrman [12] ...	6 years	32 years	The face, neck, arms, and thorax	Excess of subcutaneous fat in the lower part of the trunk and in the lower extremities	Of Russian Hebrew origin; beyond the disfigurement there were no bad effects from the disease
(14) Feer [13]	6 years	12 years	The face, neck, arms, and thorax	Abundant fat in thighs and buttocks	Increase of subcutaneous fat not very excessive; biopsy examination made
(15) Boissonnas, recorded by Feer [13]	6 years	10 years	The face, neck, arms, and thorax	Excess of fat in thighs, buttocks, and abdominal wall	The obesity of the abdominal wall is a special feature of this case
(16) Jolowicz [14] ...	8 years	21 years	The face, neck, arms, and thorax	Excess of subcutaneous fat in thighs and buttocks	At 9 years of age there was temporary arrest of mental development
(17) Christiansen [15]	12 years	18 years	The face, trunk, and arms	Excess of subcutaneous fat in lower extremities and buttocks	Temporary cosmetic improvement by subcutaneous paraffin injections

A case described by Nicaise [19] does not concern us in regard to the present question, because the facial atrophy (in a woman, aged 24 years), although it was bilateral (as far as it went), affected only a vertical stripe, exactly in the middle line of the face, from the root of the nose to the margin of the hairy scalp. It was doubtless allied to the "morphœa" kind of sclerodermia.

Bilateral wasting of the subcutaneous tissues of the face has also been observed in connexion with skin lesions (lupus erythematosus ?) and in connexion with ozæna (Okouneff, 1907).

Other cases of bilateral facial atrophy have been recorded in England. In 1905 H. Batty Shaw [20] demonstrated a boy, aged 10 years, who had commenced to show bilateral wasting of the subcutaneous tissues of the face when he was 2½ years old. The boy was brought to the hospital because his mother feared he might have tuberculosis. A. F. Hertz and W. Johnson [21], in January, 1913, brought forward the case of a young man, aged 26 years, whose face had become progressively thinner during the last two years, so that his friends thought he must be consumptive. There was no weakness of the facial muscles, and otherwise he was well developed and strong. He had had double otorrhœa in childhood. The same authors [22], somewhat later, met with another case of bilateral atrophy of the face, but in that case it was associated with wrist-drop from lead palsy. The patient was an Italian plaster-modeller, aged 38 years. In his book on "Diseases of the Nervous System," J. S. Bury has reproduced the photograph of a young lad with bilateral facial atrophy [23].

Other cases somewhat of the same kind have recently been described by J. Husler (1914) [24]. He gives portraits of two boys, aged 10 and 9 years respectively, affected in this way. According to A. Simons [25], however, both Husler's cases are genuine ones of lipodystrophia progressiva, differing from typical cases only in the sex of the patients. Yet it should be remembered that typical facial hemiatrophy may commence with wasting apparently limited to the subcutaneous fat.

This brings me to the microscopical appearances of the skin in typical cases of lipodystrophia progressiva. As already stated, the only change that was found from the "biopsy" examination in Simons's case was practically complete absence of subcutaneous fat. The disappearance of the fat was more complete than what is found in the emaciated subjects of the last stage of chronic pulmonary tuberculosis. This result has been confirmed by "biopsy" examination in Feer's first

case [13]. The lean skin of an affected part in that case showed nothing abnormal, excepting relative absence of subcutaneous fat. E. Kuznitzky and E. Melchior have discussed the question of lipodystrophia progressiva in describing the case of a very thin man, aged 20 years, with a chalky deposit in the subcutaneous tissue at the right elbow [26], but their case appears to me to be allied rather to those of so-called "calcinosis" (multiple calcification in the subcutaneous tissues), with or without the co-existence of sclerodermatous changes [27]. The atrophic process recently described by T. C. Gilchrist and L. W. Ketron seems to be of a hitherto unrecorded kind. Their case was that of a girl, aged 8 years, with an affection in her legs, which the authors say is unique; it is an "atrophy of the fatty layer of the skin, preceded by the ingestion of the fat by large phagocytic cell-macrophages" [28].

In regard to the question of the true nature and ætiology of lipodystrophia progressiva I must refer to the disease known in England as "diffuse symmetrical lipomatosis"; the sides of the face, shoulders, upper arms, and back of the thorax are often specially affected, as well as the neck. The disease should be mentioned here because to some extent the change in the subcutaneous fat is the opposite of what occurs in "lipodystrophia progressiva." Moreover, it occurs almost exclusively in males. I have seen only one case in a female [30]. The patients have practically all of them indulged in malt liquor or other alcoholic drinks. The accumulation of subcutaneous fat in the upper arms in this condition may, as I can vouch, actually hinder movements in the shoulder-joints and prevent the sufferer from getting his coat on and off quickly. I have no doubt that A. Bittorf's case [31], to which Freer [13] refers for purposes of contrast, was an acute example of diffuse symmetrical lipomatosis of this kind. The commonest clinical forms of the disease are those of the by no means very rare "diffuse lipomata of the back of the neck," or "Madelung's Fetthals," so called in Germany because Professor O. W. Madelung wrote about it in *Langenbeck's Archiv* in 1888 [32]. Bittorf's patient was a brewer, aged 28 years, and Bittorf suggested the term "adipositas acuta symmetrica partialis, of thyroid origin," because a good result was obtained in his case by thyroid treatment.

Conclusions.

In conclusion, I wish to emphasize that recent observations show:—

(1) That "lipodystrophia progressiva" is not always *progressive*, certainly not in regard to the area affected.

(2) That it usually commences in childhood, especially at 6 to 8 years of age.

(3) That in some cases the fat-atrophy in the upper parts was preceded by increase of fat in the buttocks or legs (Nos. 2, 8, 9, in my table of female cases); this increase in fat was therefore apparently the first sign of the commencement of the disease or syndrome in question.

(4) That this disease or syndrome is not confined, as at first it was supposed, to the female sex. Genuine examples have been recently recorded in males, and it is probable that some of the cases (especially in males) which were formerly labelled "bilateral facial atrophy," were likewise genuine (though less extensive) examples of lipodystrophia progressiva. Perhaps it will be found that in males the fat-atrophy is more often limited to the face and neck than in females.

(5) That the ætiology is unknown, but is probably connected with a disorder of the internal secretions (endocrinic origin).

(6) That the fat-atrophy, however disfiguring it may be, and though it may give rise to annoying suspicions of tuberculosis, &c., does not signify any danger to life, and is not usually accompanied by loss of strength and general health.

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[4] J. Fawcett. Case recorded by Weber (*see* [35]).

[5] Simons. Loc. cit.; and also *Zeitschr. f. d. ges. Neur. u. Psych.*, Berl., 1913 (Originalien), xix, p. 377.

[6] *See* additional remarks by A. Simons in the discussion reported in the *Berl. klin. Wochenschr.*, 1913, l, p. 1455, and in Simons's second paper, loc. cit. (with microscopic drawings).

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[31] A. Bittorf. "Zur Kasuistik der Störungen der inneren Sekretion," *Berl. klin. Wochenschr.*, 1912, xlix, p. 1072.

[32] O. W. Madelung. "Ueber den Fetthals," *Langenbeck's Arch. f. klin. Chir.*, Berl., 1888, xxxvii, p. 106. Madelung refers to a good deal of older English literature on the subject.

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[36] A. V. Neel. "Lipodystrophia progressiva," *Hosp.-Tid.*, Copenhagen, 1916, lix, p. 1253. Neel gives illustrations of two female patients, but unfortunately his paper arrived too late for me to make use of it.

DISCUSSION.

Dr. EDMUND CAUTLEY: It seems to me there are possibly two very different classes of case. In one class, like that of Dr. Campbell's case, of which Dr. Weber sent round a picture, there is dystrophy; whereas, in another class you find lipomatosis, the dystrophy being only relative, for there is no actual wasting. Some people, who may have been very fat when they were young, get thinner later in life, especially about the chest rather than in the lower part of the body. My case, to which Dr. Weber referred, and which you saw, Sir, belonged more, I think, to the lipomatosis type than to the dystrophic. I could not say the upper part of the body was wasted; I was not at all clear there was no associated lymphatic obstruction. Perhaps we may see mixed cases.

Dr. PARKES WEBER (in reply): I think Dr. Cautley's remarks are to the point. But the fact that in several of these cases there is a fat-accumulation in the lower parts, occurring more or less simultaneously with the fat-atrophy in the upper parts of the body, suggests that some of the cases in which there is relatively little fat-atrophy in the upper parts of the body, but very decided accumulation of fat in the lower parts, are of the same class, especially if this fat-accumulation has been noticed to commence at an early age—for instance, between 6 and 8 years, when the fat-atrophy has been first observed in the most typical cases of lipodystrophia progressiva (cf. the table which I have given of the female cases).

As in certain cases of facial hemiatrophy the atrophic process has, I think, been supposed to be limited to the subcutaneous fat, it is just conceivable that such cases of hemiatrophy of the face (if the atrophy does not later on involve tissues other than the subcutaneous fat) may represent *minor* and *unilateral* forms of lipodystrophia progressiva (though such forms could not of course, strictly speaking, be termed *progressive*).

Section for the Study of Disease in Children.

President—Mr. SYDNEY STEPHENSON, C.M.

(*March* 23, 1917.)

Chairman—Dr. LEONARD GUTHRIE.

Case of Amyotonia Congenita.

By H. C. CAMERON, M.D.

E. S., AGED 2 years. The family history is without bearing on the case. The child was breast-fed till aged 12 months. Teeth were cut without disturbance at the age of 8 months. There has never been any digestive disturbance and the child though small is fairly well nourished. She has been under my observation for nine months. Lately there has been very rapid improvement, and crawling is now accomplished comparatively easily. The muscles of the upper extremities especially have recently gained considerably in tone. She is being treated with massage and exercises. Skiagrams show slender bones, not otherwise abnormal. There is no sign of rickets. The stools were pale in colour and of a glistening appearance, due to the presence of fatty acid crystals and soaps. Stercobilin was present.

DISCUSSION.

Major MORLEY FLETCHER: I fail to find in this child the flaccidity and the hyper-mobility of joints which are generally associated with amyotonia congenita; also the long feet and hands, the curious flabby state of the muscles, and the type of facies which are usually present in that rare condition. I think this case exhibits muscular weakness, probably associated with rickets, though the bony changes, commonly found in rickets, are not very definite as yet. There is an ætiological factor present which is not mentioned in the notes—namely, that the mother was suckling her previous child, whose age is

now 4 years, during two or three months of her pregnancy with this patient. I have noticed that this type of muscular weakness is rather apt to occur when that factor is present—namely, pregnancy during lactation. Another factor favouring my view is the rapid improvement which has taken place in this child. In amyotonia congenita, though some improvement may occur, it is neither so rapid nor so definite as that which has occurred in this child. I think this patient will, in a short time, gain the complete use of its limbs.

Dr. F. LANGMEAD: Since amyotonia congenita was first described there has been a tendency to include under that term a large number of cases of hypotonia, which have nothing to do with the disease described by Oppenheim. One sees as much hypotonia as in this case with many acute illnesses in small children, especially if the disease is of a serious nature, and the knee-jerk may be absent for a considerable time. One finds it in rickets, in mongolism, and in a large number of other conditions.

Addendum.—Dr. CAMERON (writes, in reply): I regret that I was prevented by illness from being present to defend my diagnosis. The case appears to me to accord completely with the description by Oppenheim. Apart from the extreme hypotonus, which prevents the child from standing, even with support, at the age of 2 years, and has only recently allowed her to begin crawling movements, there has been no departure from health. A careful X-ray examination has excluded the slightest trace of rickets, and I see no reason to suggest, as does Major Morley Fletcher, that rickety changes may be developed at some future date. I agree with Dr. Langmead that there is a tendency wrongly to include cases of secondary hypotonus under the name "amyotonia congenita," but this child has never had any illness in her life, is not a mongol, has no rickets, has always had a good digestion, and has not suffered from malnutrition or wasting. The recent improvement is on the scale which Oppenheim encourages us to expect. I cannot agree with Major Morley Fletcher that so distressing a condition is likely to have as its cause a habit so universally practised as suckling during pregnancy.

(*March* 23, 1917.)

Case of Splenic Enlargement.

By EDMUND CAUTLEY, M.D.

MALE, aged 5 years 2 months; twelfth child. Four of the children are dead and the mother is reported to have died of carcinoma mammæ. He was brought up on milk and water. He is a very small and anæmic child, 18 lb. 12 oz. in weight, and markedly rachitic, with a large lax abdomen and kyphotic lumbar curve, and is unable to walk or crawl.

The spleen is enormous and hard, extending down to the pubes and a good inch beyond the middle line below the level of the umbilicus. The liver extends about 4 in. below the costal margin. Blood count: Hæmoglobin, 25 to 30 per cent.; erythrocytes, 1,460,000, and leucocytes, 5,600 per cubic millimetre. Differential count: Polymorphonuclears, 49; large lymphocytes, 23; small lymphocytes, 20; hyaline mononuclears, 3; transitionals, 3; mast cells, 1; neutrophile myelocytes, 1 per cent. Poikilocytosis present. Marked polychromatosis rendered it difficult to distinguish between nucleated red cells and small lymphocytes. Two normoblasts and a megaloblast were seen while counting 100 cells (H. H. Sanguinetti).

A blood count was made a fortnight later by another pathologist, and it showed some variation: polymorphonuclears, 62·3 per cent.; small lymphocytes, 17·6 per cent.; large mononuclears, 13·3 per cent.; eosinophils, 2·3 per cent.; the nucleated reds, 4·6 per cent. There was much more marked poikilocytosis, and a great variation in the size of the red cells, many of the cells being megalocytes. A Wassermann was done and was positive.

I should like to hear opinions as to the diagnosis, and as to whether this is a case in which excision of the spleen would be a justifiable operation. It belongs to a type of von Jaksch's disease, but in an older and possibly syphilitic child. That type of case does persist, and the spleen remains very large. I do not regard it as "splenic anæmia." I do not admit syphilis, by itself, as a cause of such great splenic enlargement in children of this age, and I have seen spleens as large as this in children in whom there has been no indication of syphilis. This boy is the twelfth child in the family, and eight of the children are living. I have not been able to obtain much detail of the family history, because, unfortunately, the mother is dead, so I cannot be sure as to syphilis. There is no history of rashes. The child, though aged 5 years, has the growth of one of 3 years or less, and cannot talk. One sees such physically backward children as a result of marasmus and neglect, apart from any actual disease. I am anxious to know whether one should advise operation.

DISCUSSION.

Dr. F. PARKES WEBER: I think this case has a congenitally syphilitic basis. As Dr. Cautley said, the child gave a positive Wassermann reaction. Secondly, the patient has a typical "saddle-nose." Thirdly, there is enlargement of spleen and liver, which not rarely occurs in congenitally syphilitic children, though the

splenomegaly is seldom as marked as that present in this child. Fourthly, there is a condition of dwarfism and infantilism, the occasional occurrence of which is well known in connexion with congenital syphilis in children. The child is, however, also distinctly rachitic, and there are signs of general nutritional disorder. If we admit that the child is syphilitic and badly rachitic, I think there is enough to account for the enlargement of the spleen and liver. As to treatment, a careful trial of antisyphilitic treatment might be made. Certainly that should be tried before any idea of excising the spleen is entertained, though the operation of splenectomy has, I believe, sometimes been performed for splenomegaly on a congenitally syphilitic basis.

Major MORLEY FLETCHER: I agree with Dr. Parkes Weber about this case, that it is probably one of congenital syphilis: the blood gives a positive Wassermann reaction, and there is a remarkably depressed bridge of the nose. Dr. Cautley has not told us whether there were any other manifestations of syphilis in the first year or so of life. Considering this as a case of visceral disease due to syphilis, it is most probably a mixed cirrhosis, that is, a syphilitic cirrhosis with a portal cirrhosis superadded. In St. Bartholomew's Hospital I have, at the present time, an almost identical case in a girl aged 9 years. With regard to treatment, I think it is very remarkable, if the enlargement of liver and spleen is due to syphilis, how indifferently they respond to energetic treatment. The case I mention has had weekly injections of galyl for a considerable time, as well as mercury and iodide. The child has improved in a general way, but the liver and spleen have scarcely diminished in size. I do not see what purpose would be served by removing the spleen of this child.

Dr. CAUTLEY (in reply): I strongly disagree with Dr. Parkes Weber. As I have before stated in this Section, I disagree with the attitude of assuming that because a child has got congenital syphilis, therefore every disorder it shows is due to congenital syphilis. In the next place, I do not regard a positive Wassermann reaction, when it has been tried only once, as reliable evidence of congenital syphilis. A second, or even a third, test should be made, and by different observers. Again, this is the twelfth child of a family of which eight members are living, and, as far as I could ascertain, there is no evidence of syphilis in the family: the mother died of carcinoma. Further, the size of the spleen does not help the diagnosis. In fact I should say a very large spleen in early life is contra-indicative of congenital syphilis. Of course, in severe cases of congenital syphilis one gets visceral syphilis, but these patients usually die in the first weeks of life. Taking the ordinary cases of congenital syphilis, as seen in hospital, it is very rare to see a greatly enlarged spleen, though that organ may be somewhat enlarged. In von Jaksch's disease, "pseudo-leukæmica infantum," you find the spleen as large as it is here, and a similar blood count; and in a high proportion, perhaps 75 per cent., of the cases there is no evidence of congenital syphilis. So I think we may take it that the mere association of an enlarged spleen with a positive Wassermann

reaction is not sufficient evidence that the splenic enlargement is due to syphilis, or has anything to do with it. The form of this child's nose has been referred to. I can find you plenty of children of that age, especially if they are backward children, who have just such a bridge of the nose, but no associated syphilis. I do not think infantilism is evidence of congenital syphilis. I regard the whole condition as due to malnutrition following on bad feeding and general neglect. But what the cause of the enlargement of the spleen is remains a mystery, as it does also in pseudo-leukæmica infantum. Moreover, this spleen has become definitely smaller, and the child has improved generally since he entered the hospital. When he came in, the spleen extended an inch to the right of the umbilicus, below the level of the navel, whereas now it only reaches to the middle line. The size of the liver remains the same, and he is less anæmic, in spite of the fact that he has had no anti-syphilitic treatment. I agree with what has been said in regard to operation. There is no advantage, that I can see, in removing the spleen, and operation would probably be fatal from shock. I have occasionally seen babies in the first or second year of life with spleens relatively as large as this, due to so-called von Jaksch's disease, and have seen them in later life with little or no splenic enlargement.

(*March* 23, 1917.)

(?) Juvenile Bilateral Optic Nerve Atrophy, connected with Inherited Syphilis, corresponding perhaps to the Optic Atrophy sometimes following Acquired Syphilis in Adults, with or without definite Tabes Dorsalis.

By F. Parkes Weber, M.D.

The patient, M. L., aged 7 years, is a bright intelligent boy, born in London of Russian Hebrew parents. In December, 1916, it was found that his sight was failing and this has progressed, until now he can only see enough to be able to count fingers in a good light. There is horizontal nystagmus. Both pupils are moderately dilated (the right one somewhat more than the left), and neither of them reacts to light or accommodation. Ophthalmoscopic examination shows nearly complete optic nerve atrophy in both eyes; the arteries are only moderately contracted (Dr. R. Gruber). Röntgen-ray examination furnishes no evidence of anything abnormal at the base of the skull. There is no obvious hydrocephalus nor cranial deformity, nor are there signs of disease elsewhere in the body. Excepting a doubtful history of injury to the head, there is nothing in the past history of the patient

which throws light on the case. But his blood-serum gives a positive Wassermann reaction (Dr. H. Schmidt, February 22, 1917), and so do that of his mother and of one of his sisters (A. L.); whilst another of his sisters (P. L.) has been treated at another hospital, apparently for congenital syphilis. The patient's cerebrospinal fluid, obtained by lumbar puncture, also gives a positive Wassermann reaction. The patient's father is a strong-looking man, whose blood-serum gives a negative Wassermann reaction, but who gives a history of once having had a chancre. The patient's mother has had five children and two miscarriages. The five children are all living; two of them, besides the patient himself, have been already mentioned; the other two are said to be healthy.

I wish to suggest an analogy between the optic atrophy in the present case and that which sometimes supervenes after (and as a result of) acquired syphilis in adults, with or without definite signs of tabes dorsalis. In this connexion I purposely avoid using the term "pre-ataxic optic atrophy," as that term implies that definite tabes dorsalis must ultimately develop. At the present time the patient's knee-jerks can be obtained, and he shows no signs of tabes dorsalis nor of any disease of the nervous system, excepting that of the eyes.

Dr. PARKES WEBER (in reply to a remark made): I do not mean to imply that definite signs of tabes dorsalis will necessarily develop; that is one reason why I have altered the heading of my description of the case.

(*March* 23, 1917.)

Cerebral Degeneration and Epileptiform Fits, with Amaurosis, in an Only Child.

By F. PARKES WEBER, M.D.

THE patient, T. L., aged $6\frac{3}{4}$ years, is a fairly well-grown girl, born in London, the only child of Hebrew parents. The father was born in Russia, and the mother in Russian Poland. The child is somewhat mentally deficient, subject to occasional slight epileptiform convulsions, and almost completely blind in both eyes. She can probably only distinguish light from darkness. Dr. C. Markus has examined the eyes carefully, and reports as follows: "The retinal blood-vessels are extremely small (narrow); the optic disks are uniformly pink, slightly

pale, but not definitely atrophic; the maculæ luteæ appear as small red-brown spots and are not distinctly abnormal. The vessels and optic disks resemble what one sees in cases of retinitis pigmentosa, but the characteristic pigmentary change of fully-developed retinitis pigmentosa is altogether absent."

There is no evidence of disease in the thoracic and abdominal organs, and the urine is free from albumin and sugar. Nor are there any signs in the child of congenital syphilis, excepting that the blood-serum (Dr. H. Schmidt, March, 1917) gives a *weakly* positive Wassermann reaction; the reaction was, however, apparently found to be negative on a previous occasion at another hospital. Moreover, the cerebrospinal fluid (March, 1917) gives a negative Wassermann reaction. The knee-jerks are present.

As stated above, the patient is the only child, and apparently the mother has been only once pregnant. The mother, aged 31 years, seems to be well; but her Wassermann reaction (March, 1917) is doubtful. The father, aged 33 years, also looks well, his sight is not deficient, and the ophthalmoscopic appearances in his eyes are normal (Dr. C. Markus). He claims to have enjoyed good health and never to have had any venereal disease, but his Wassermann reaction (March, 1917) is weakly positive. The patient's paternal grandfather, a well-developed man, aged 58 years, is blind in both eyes. The blindness developed eighteen years ago, and there is bilateral optic nerve atrophy (Dr. C. Markus). In other respects he has enjoyed good health, but his blood-serum gives a positive Wassermann reaction (Dr. H. Schmidt, March, 1917).

The patient is said to have been a bright and intelligent child up to the age of 5 years. Her tonsils were excised at the age of 3 years, and her bowels always tended to be confined. After the age of 5 years signs of cerebral degeneration commenced; she lost the power of memory and her speech deteriorated. About May, 1916, she commenced to suffer from transient "fits," and soon afterwards her sight was found to be failing. According to her mother she could see quite well nine months ago, but since then her visual power has gradually diminished, and for the last four months she has been almost blind. The "fits" are transient epileptiform, of the "petit mal" kind, lasting about "a couple of moments." The patient is observed to "turn her eyes," and there are convulsive movements of the body, but no involuntary passage of urine or fæces has been observed in connexion with the fits. After them she appears tired and sleepy. Ten or eleven such fits were observed up till

the end of the year 1916. Since then only one has been noted—namely, about the commencement of February. The mother attributes the diminution in the fits to medicinal treatment, which was commenced in August, 1916. Mercurial inunction is now to be tried (March 16, 1917).

Remarks.

In spite of the absence of definite macular changes and of family history, the case may be allied to F. E. Batten's second group of maculo-cerebral degeneration. The *first group* includes the cases of the Tay-Sachs type of so-called "family amaurotic idiocy," occurring in infancy and practically exclusively in Hebrew families, though E. A. Cockayne and J. Attlee have recently (1915) described an apparently typical case in an English male child, aged 1 year. Batten's *second group* is the group of "juvenile progressive cerebral degeneration with amaurosis, with or without macular and retinal changes," including the cases of "family maculo-cerebral degeneration," and of the so-called "juvenile form of family amaurotic idiocy," the various cases of Spielmeyer, Mülberger, Vogt, Bielschowsky, Mayou and Batten. The main features of Batten's second group are loss of intellectual faculties, loss of vision, and loss of motor power; but the symptoms vary in the order in which they appear, in the age at which they first appear, and in the rapidity of progress; no special racial proclivity has been observed, such as there is in the Tay-Sachs type of family amaurotic idiocy.

In regard to a possible relationship between Batten's second group of maculo-cerebral degeneration and retinitis pigmentosa, I would refer to the remarks of M. S. Mayou, R. D. Batten, and others, in the discussion on a case of "pigmented degeneration of the retina, associated with epileptic fits," shown by F. E. Batten at the Section of Ophthalmology on November 1, 1916. In retinitis pigmentosa, which may be familial, and may also be associated with idiocy or deaf-mutism, the symptoms may commence in early childhood, or possibly even congenitally. The ophthalmoscopic appearance is characterized at the commencement by narrowness of the retinal arteries and veins, and by a look of "greyness" in the retina; the characteristic spots of pigmentation in the retina are not seen at first, and in some "atypical" cases never appear at all. A certain resemblance of the ophthalmoscopic appearance in the present patient to that observed in early retinitis pigmentosa has been noted above.

In the present case, although antisyphilitic treatment is being tried,

I hesitate to attribute the condition to syphilis. The fact of the child being of Hebrew parentage has probably no connexion with the disease. The negative Wassermann reaction with the patient's cerebrospinal fluid is against the diagnosis of commencing juvenile general paralysis, or of syphilitic disease at the base of the brain.

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DISCUSSION.

Dr. E. CAUTLEY: Was the cerebrospinal fluid examined, and, if so, did it show the changes characteristic of general paralysis? The case seems to me more of the type of cerebral sclerosis occurring in a syphilitic child than one of general paralysis. As the grandfather became blind at an early age, there may be a familial history of optic atrophy.

Dr. PARKES WEBER (in reply): I am obliged to Dr. Cautley for his suggestion. I think the cerebrospinal fluid may well be examined, and perhaps in my description of the case I shall be able to include a report of the result.

(*March* 23, 1917.)

A Rare Disease in Two Brothers.

By CHARLES HUNTER, Major C.A.M.C., M.D.

R. C. AND G. C., brothers, aged 10 and 8 years, of British parentage, were admitted into Winnipeg General Hospital on May 12, 1915. Father living, aged 48 years, strong and healthy, and of normal

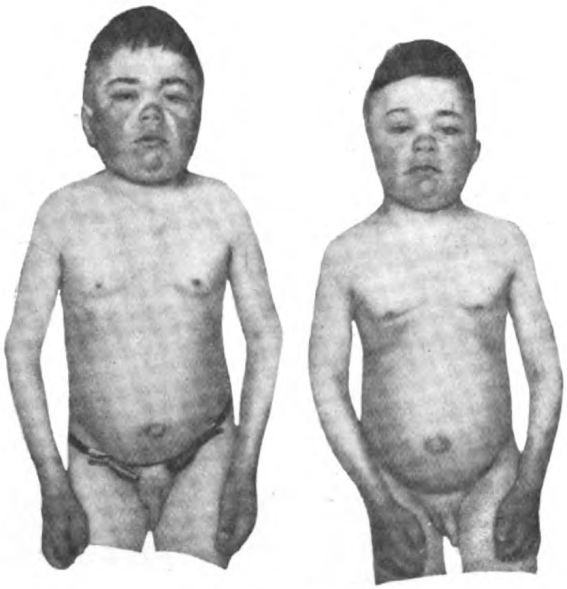

FIG. 1.

appearance. Mother died at the age of 45 years of kidney disease, while five months pregnant; had been previously a normal, healthy woman.

Their father's parents were cousins and had twelve children, one of these, when aged about 24 years, had an accident to his back and later went "insane with delusions about himself"; the others are healthy and their children are also healthy. The father knows his wife's family well; her parents, brothers and sisters were normal. She had, however, a deaf and dumb uncle.

The boys are the only living children. There was first a miscarriage at the age of 4 months; then full-term twins who died at birth—the confinement being difficult, and instrumental (these twins had, according to the father, large heads); then a miscarriage; and, lastly, death of the mother when pregnant five months.

The two children were full-term and were delivered without instruments; were both breast-fed and had no digestive disturbance in

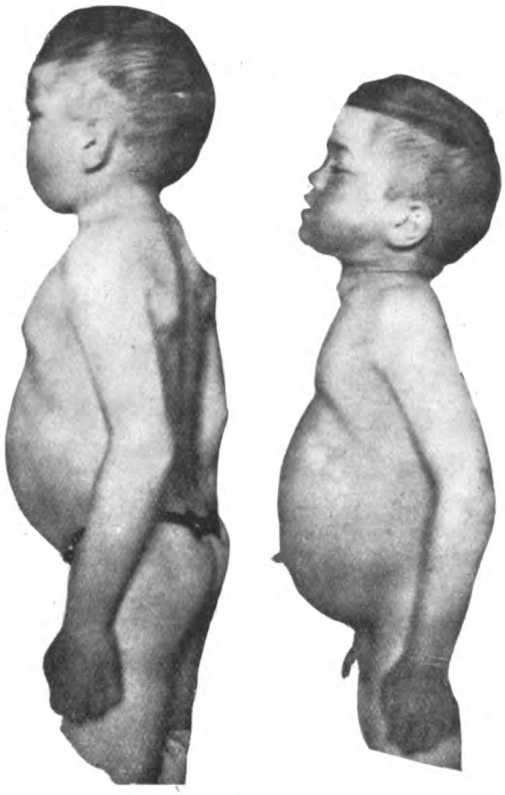

FIG. 2.

infancy; were both walking about the age of 17 months. The elder began to talk when aged about 1 year, is bright and intelligent, went to school at the age of 7 years and is in Grade 3. The younger was late in learning to talk and is still somewhat backward; he went to school a year ago and is making slow progress. They are good natured children on the whole, though the younger is at times a little "cranky"; they enjoy playing the ordinary games of childhood. They have been healthy in every way, apart from throat trouble. Both were operated

on for tonsils and adenoids; both are dull of hearing, and the father thinks this is getting slightly worse. They always get puffed when they run about. Both have had good appetites and regular bowels. Both had inguinal hernia; the younger was able to dispense with his truss three years ago, the elder still requires to wear one. They never had rheumatism nor growing pains.

Present condition: The children present an extraordinary appearance, and apart from their difference in size and one or two minor points to be

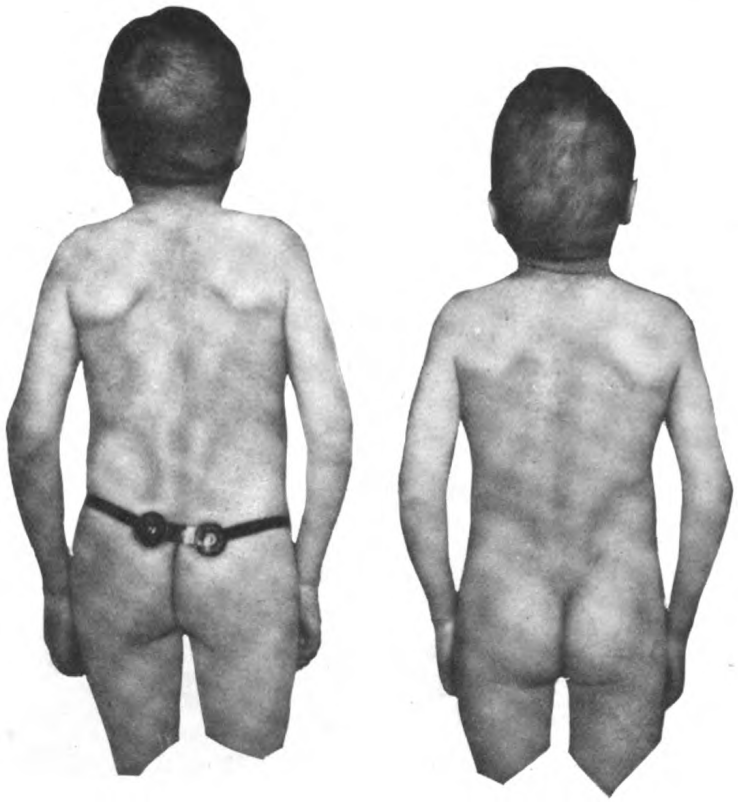

FIG. 3.

noted, they are as alike as two peas, so a common description may be given, the accompanying photographs (figs. 1 to 4), exhibiting the main features of interest. The children are undersized, 3 ft. 11 in. and 3ft. 9 in. (average, 4 ft. 4 in. and 4 ft.); weight, 56 lb. and 50 lb. (average, 66½ lb. and 54½ lb.); heads extremely large, measuring in greatest circumference 23 in. and 22 in. (average, 21 in. and 20½ in.). The head is curiously shaped, with very marked bulging of the squamous portion of the

temporal bone and of the frontal bones; the hair of the head rather thin and very harsh, especially in the younger. The face is very large, of deep burnt-red colour, as after much exposure, with a tinge of cyanosis in cheeks and lips; eyes very puffy; saddle nose, with large thick nostrils; thick lips, slightly open mouth, very large tongue; teeth good, but with irregular furrows and slightly spaced; very short neck, with slight enlargement of right lobe of thyroid in both. The chest is broad; abdomen very large and deep, greatly protruding, with small umbilical hernia; penis rather large. From behind, the scapulæ are seen to be placed extremely high, closely resembling a double Sprengel's deformity;

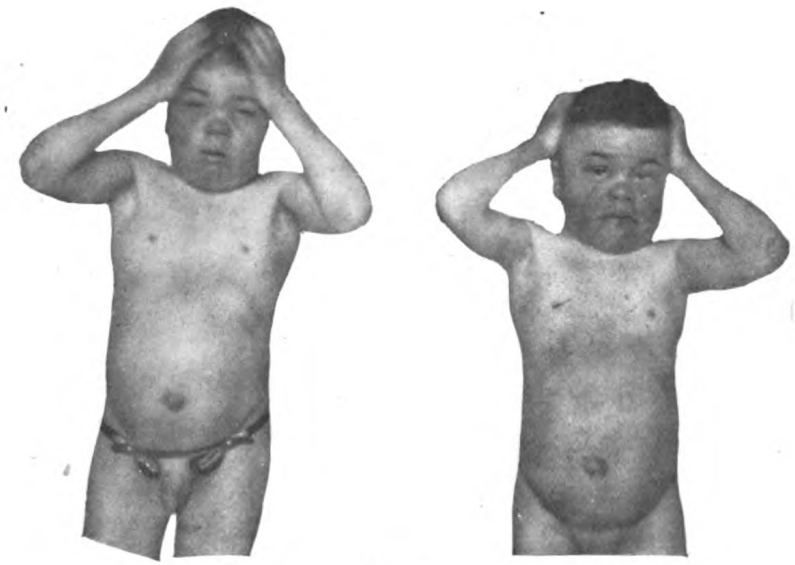

FIG. 4.

the neck is very short. The spinal column is straight, the natural curves being obliterated; the thighs are slightly bent, and the whole trunk inclines slightly forward. The arms are held somewhat abducted from the body and bent at the elbows so that the hands rest on the front of the thighs instead of on the side. The upper arm is disproportionately short in relation to the forearm, which is abnormally flat. The wrists are very thick; the hands very broad, short and thick; the fingers very short and bent. The knees are slightly flexed; both knees and ankles are thick, and the feet are broad, short and thick. The gait is very clumsy and stiff; the trunk is slightly bent forward and is held rigid. The normal extent of movement is curtailed in all

the joints of the extremities. The hands, particularly of the elder brother, have entirely lost their supple freedom of movement; they cannot be clenched; complete extension of the fingers is similarly defective, and even the movements possible are clumsy and stiff. The elbow and shoulder share in the general limitation of movement, and this is well shown in fig. 4, where the children are shown trying unsuccessfully to raise their hands above their heads. The photograph shows too the slightly greater freedom of movement possessed by the

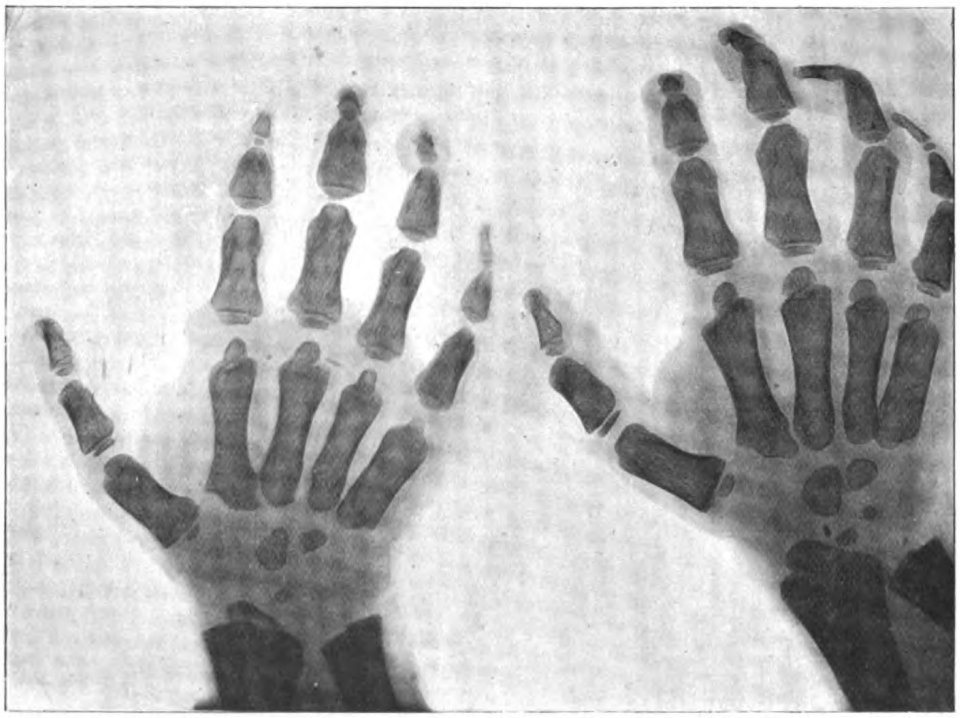

FIG. 5.

younger child. Active and passive movements of the spine are very much limited. The hip- and knee-joints have lost a little of their range of movement. The toes, while not deformed like the fingers, have completely lost the suppleness characteristic of youth. The skin of the trunk is smooth and not specially dry. The backs of the hands and fingers are deeply bronzed and the skin is there very thick and rough. In the younger child, over strips of skin $1\frac{1}{2}$ in. wide, extending from the angles of both scapulæ parallel to the ribs forward to the mid-axillary

lines, there are pinhead elevations, grouped closely and regularly, smooth of surface, normal in colour, and not unlike, though more superficial than, the lesions of cheiropompholyx. Some sixteen similar thickenings occur over an area of the size of 50 cents, in the upper part of the right arm. No pubic nor axillary hair. Nails normal, with crescents. The breathing is audible even at rest and becomes loud and puffing on exertion; the children are easily winded; in sleep, their

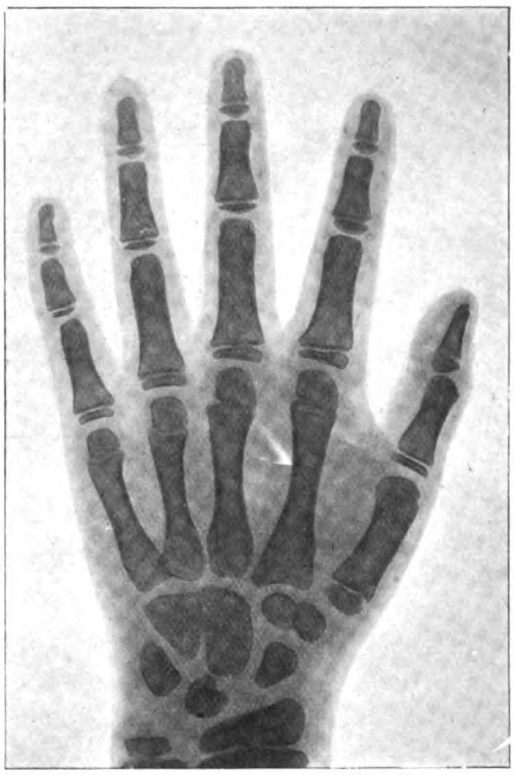

FIG. 6.

mouths remain wide open, the breathing being very laboured, uneasy and stertorous; there is an overhanging epiglottis; the lungs are normal. The heart in the younger is normal; in the elder, it is enlarged to the left, the apex beat being in fifth interspace just outside the nipple; there is a distinct diastolic murmur audible in the third and fourth left interspaces close to the sternum, the second sound at pulmonic and aortic areas being, however, clear; at the apex, a systolic murmur is conducted slightly towards the axilla. The elder seems, however, capable

of quite as much exertion as the younger, and like the younger he has only a tinge of cyanosis on cheeks and lips. Blood count in the elder: Hæmoglobin, 80 per cent.; red blood cells, 6,000,000; white cells, 7,000. The liver is very much enlarged in both, crossing in the case of the elder from the level of the right anterior superior spine to an inch above

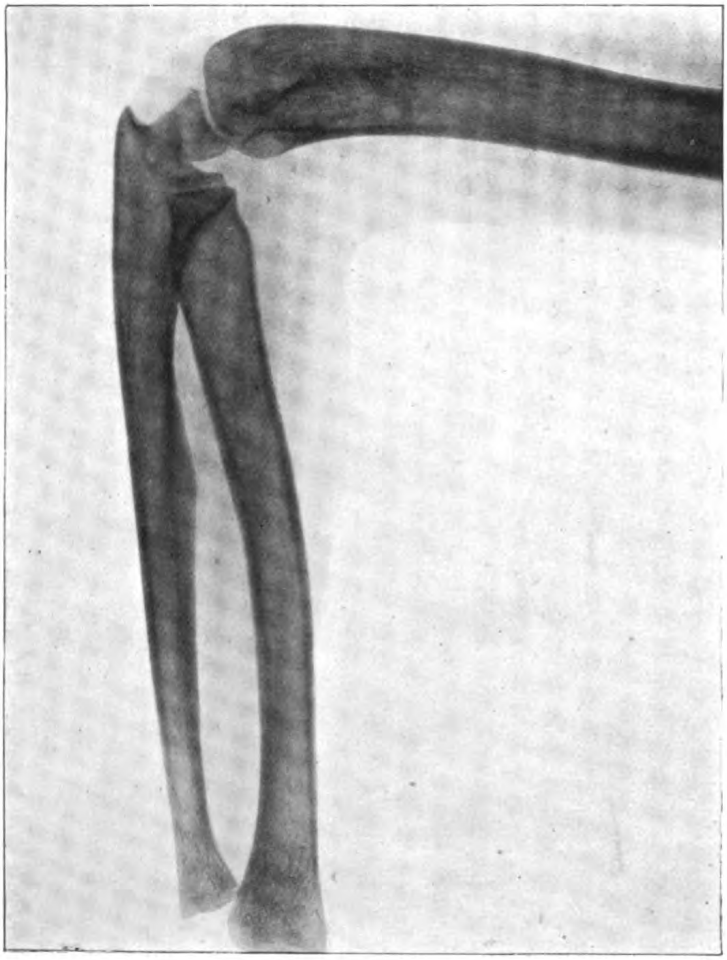

FIG 7.

the umbilicus, and in the younger, reaching a shade lower; the organ is smooth, not hard, the edge moderately thin, free from tenderness. The spleen is very much enlarged, reaching, in the elder fully two, and in the younger fully three, finger-breadths below the costal margin. The urine is normal. The testes are normal in size.

The children are bright and intelligent, particularly the elder, though both are hampered by distinct dullness of hearing. Speech is rather indistinct and they talked little, but they were under observation only two days, and during that time they were subjected to much examination. The father reported that they talked freely at home. General examination of the nervous system proved negative.

Wassermann reaction negative in both children and also in the father.

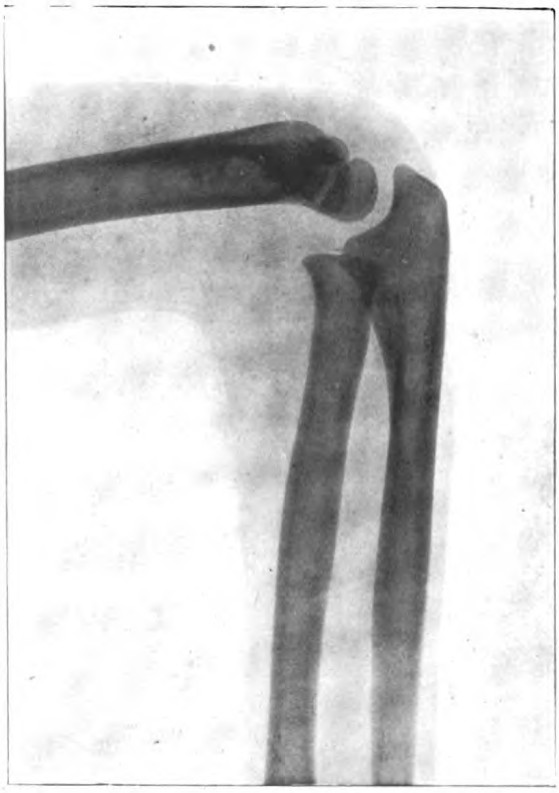

FIG. 8.

Dr. Prowse reported that both had some adenoids and that the whole of Waldeyer's ring was rather prominent; tympanic membranes retracted and somewhat hyperæmic. There were no signs of syphilitic disease about the nose and throat.

When the X-ray photographs are examined, we are struck with the abnormal thickness of all the bones and the pronounced irregular epiphyseal ossification. Fig. 5 shows the hand of the elder boy on the

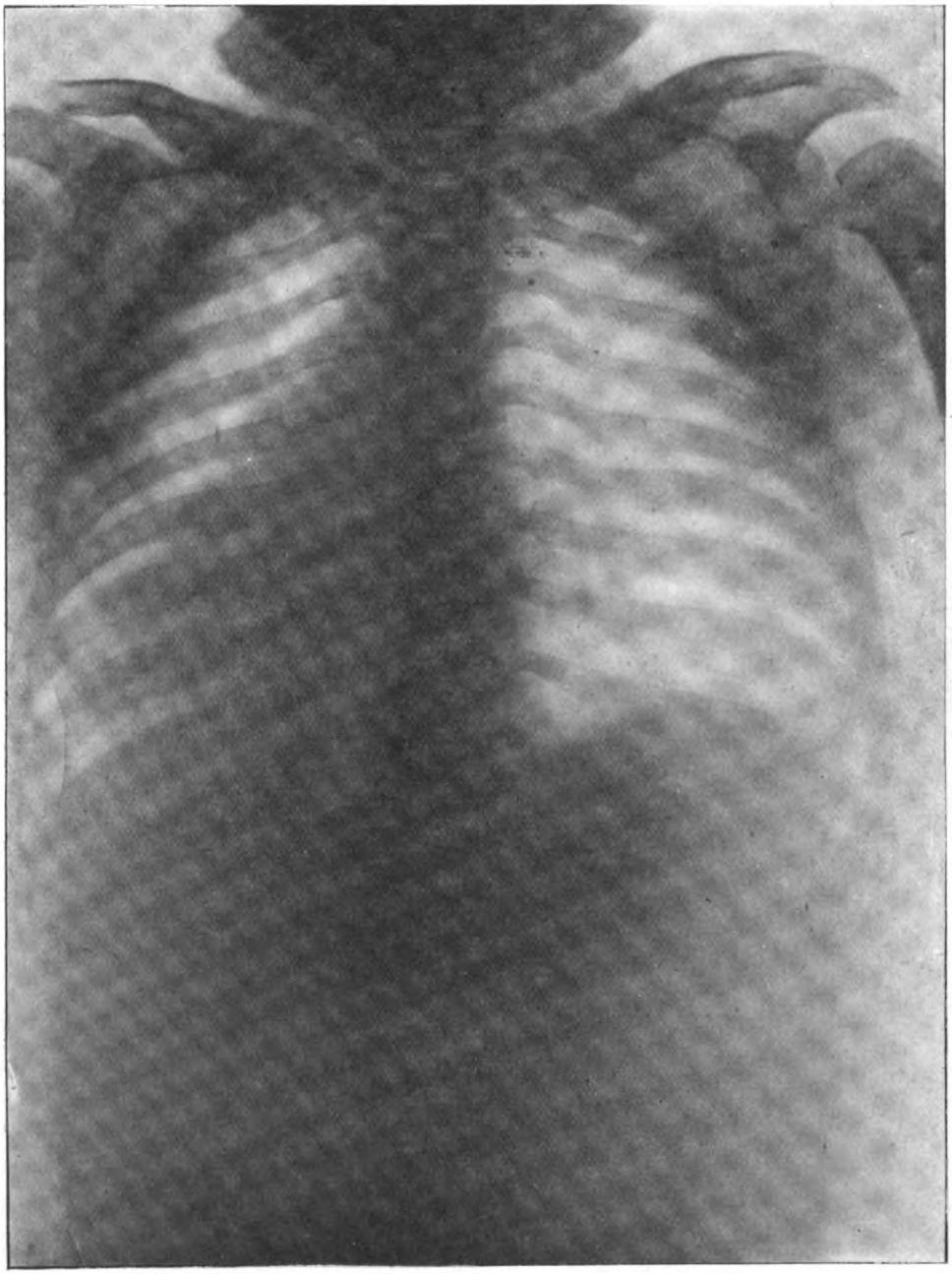

FIG. 9.

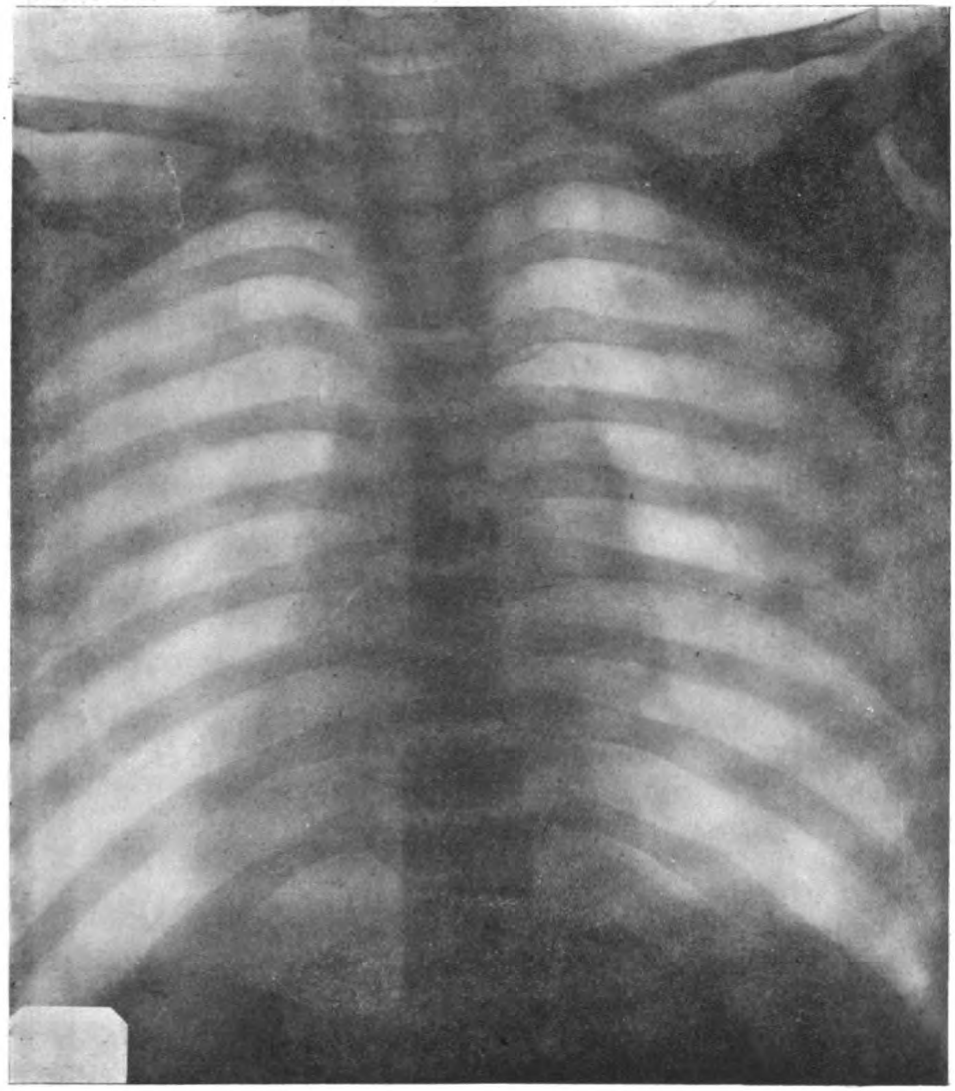

FIG. 10.

plethoric" appearance of their faces, such as is seen in some cases of hypernephroma in children. The appearance of the face and hands is well described by the author as that of a middle-aged farmer who is fond of malt liquor, and whose work naturally exposes him much to the weather.

Mr. BLUNDELL BANKART: I think that these are cases of multiple congenital defects of development. When viewed behind, these children present the appearance of bilateral Sprengel's deformity (congenital elevation of the scapula), a condition which is frequently associated with contracture of the shoulder-joint and defects of the vertebræ, ribs and other parts, as seen in these cases. The contracture of the fingers is another congenital condition which is often seen either alone or in conjunction with other contractures or defects. Sprengel's shoulder is attributed to an arrest of the normal descent of the scapula during intra-uterine development. It is difficult to see how any endocrine disturbance can be held responsible for such defects.

Section for the Study of Disease in Children.

President—Mr. SYDNEY STEPHENSON, C.M.

(*April* 27, 1917.)

Chairman—H. MORLEY FLETCHER, Major R.A.M.C., M.D.

Lipodystrophia Progressiva in a Male.

By F. PARKES WEBER, M.D.

THE patient, J. H., aged 13 years, born in London, of English parentage, was moderately fat in the face and body till the age of 8 years. He then began to look thinner in the face, though in other respects he continued to appear and feel perfectly well. The loss of subcutaneous fat gradually progressed, and for the last three years there has been practically no fat left in the face and neck excepting in the orbits. The arms, thorax, and abdomen are to some extent affected in the same way, but on the gluteal regions and lower extremities the fat covering is fairly good. The mother, indeed, thinks that the boy has lately been putting on fat in the buttocks and thighs. The illustrations (*see* figs. 1 to 3) show his appearance at the age of 1 year, at the age of 7 years, and as he now is (aged 13 years). In other respects there is not much to be said. There are no signs of disease in the heart, lungs or abdominal organs. The urine is free from albumin and sugar. He is of quite average intelligence, and presents no symptoms of disease in the nervous system. In March, 1913, he underwent a radical mastoid operation for middle-ear disease (right side), and in January, 1916, an aural polypus was removed from the same ear. There can be no doubt that the case is a typical one of lipodystrophia progressiva. The aural disease might have been supposed to have

acted as an exciting cause if it had preceded the fat atrophy in the face, but according to the mother the fat atrophy was noticed before the onset of any obvious ear disease.

It should be mentioned that the atrophy of subcutaneous fat in the upper part of the trunk has produced a condition of what is known as "elastic skin," that is to say, a fold of skin can be stretched out abnormally far from the bony and muscular wall of the thoracic cage without causing discomfort or pain. To such a condition of "elastic skin" the

FIG. 1.

FIG. 2.

FIG. 3.

Fig. 1.—The patient J. H., at age of 1 year.
Fig. 2.—The same patient, aged 7 years.
Fig. 3.—The same patient at present time, aged 13 years.

ambiguous term "dermatolysis" has sometimes been applied. It would be interesting to know whether any of the so-called "elastic-skinned men" were likewise examples of "lipodystrophia progressiva."

The boy's father and mother appear healthy. The mother has had three children and two miscarriages. Both the other children are living and healthy (aged respectively $14\frac{1}{2}$ years and 11 years).

I am indebted for the case to the kindness of Dr. C. E. Lakin and Dr. E. A. Cockayne.

Dr. E. A. Cockayne has likewise given me particulars of another case of lipodystrophia progressiva in a male. The boy, when he saw him in Chelsea in 1914, was aged about 11½ years, and felt perfectly well, but the doctor of the school had sent him up for special examination on account of the extraordinary thinness of his face. This wasting of the subcutaneous fat had commenced two or three years previously, that is to say, when he was aged about 9 years. He appeared otherwise healthy. There was no glycosuria. The trunk and limbs, though thin, did not show the extreme loss of subcutaneous fat that was noticeable in the face. He was fairly muscular and the deeper structures of the face were not wasted. Unfortunately the patient has been lost sight of, but I think the case was probably one of lipodystrophia progressiva.

In my last paper on the subject [13] I included a table of published cases of lipodystrophia progressiva in females, and I now give a table of male cases, including several cases of so-called " bilateral facial atrophy," in which the atrophy seems to have been confined to the subcutaneous

LIPODYSTROPHIA PROGRESSIVA. TABLE OF CERTAIN OR PROBABLE CASES IN MALES.

The numbers in brackets refer to the literature on the subject given at the end.

Reference	Age of patient when the affection was first noticed	Age of patient when the case was described or last seen	Parts affected by the fat atrophy
Present case	8 years	13 years	Face, neck, and trunk
E. A. Cockayne, recorded in the present paper	About 9 years	About 11½ years	Chiefly the face
Gerstmann [10]	10 years	32 years	Face, neck, upper extremities, and trunk as far as the pelvic bones (inguinal folds and the iliac crests)
Gerhartz [11]	6 years	29 years	
Husler's first case [8 and 9]*	6 years	10 years	Face
Husler's second case [8 and 9]	6½ years	9 years	Chiefly the face and neck
Hertz and Johnson, first case [5]	24 years	26 years	Face and neck
Hertz and Johnson, second case [6]	About 37½ years	38 years	Face
Batty Shaw [4]	2½ years	10 years	Face
J. S. Bury [7]	?	Youth	Face

* This patient died about three years later, in his fourteenth year, of epidemic cerebro-spinal meningitis. At the necropsy his thymus gland was found still present, but otherwise, excepting for the fatal meningitis, the result of the post-mortem examination was practically negative.

fat. As to whether lipodystrophia progressiva may occur in a unilateral form or not I made the following observation in the discussion on my last paper :—

"Since in certain cases of facial hemiatrophy the atrophic process has, I think, been supposed to be limited to the subcutaneous fat, it is just conceivable that such cases of hemiatrophy of the face (if the atrophy does not later on involve tissues other than the subcutaneous fat) may represent *minor* and *unilateral* forms of lipodystrophia progressiva, though such forms might not of course, strictly speaking, be termed progressive."

LITERATURE ON LIPODYSTROPHIA PROGRESSIVA.

Further references will be found in my last paper [13].

[1] A. SIMONS. *Zeitschr. f. d. ges. Neur. u. Psych.*, Berl., 1911 (Originalien), v, p. 29; Eugen Holländer, *Münch. med. Wochenschr.*, 1910, lvii, p. 1794. Excellent illustrations of the same case and other cases are given by C. Herrman, of New York, *Arch. Intern. Med.*, Chicago, 1916, xvii, pp. 516-524.
[2] H. CAMPBELL. *Trans. Clin. Soc. Lond.*, 1907, xl, p. 272. *See* also H. Campbell, *Proc. Roy. Soc. Med.*, 1913, vi (Sect. Neur.), p. 71.
[3] F. PARKES WEBER. *Proc. Roy. Soc. Med.*, 1913, vi (Sect. Neur.), pp. 127-133.
[4] H. BATTY SHAW. *Trans. Clin. Soc. Lond.*, 1905, xxxviii, p. 222.
[5] HERTZ and JOHNSON. *Proc. Roy. Soc. Med.*, 1913, vi (Clin. Sect.), p. 92.
[6] *Ibid.*, 1914, vii, p. 11. *See* also HERTZ and JOHNSON, "Two Cases of Bilateral Atrophy of the Face," *Guy's Hosp. Repts.*, Lond., 1913, lxvii, p. 112.
[7] JUDSON S. BURY. "Diseases of the Nervous System," Manch., 1912, p. 267, fig. 102.
[8] J. HUSLER. *Zeitschr. f. Kinderheilk.*, Berl., 1914 (Originalien), x, p. 116.
[9] A. SIMONS. "Bemerkungen zur Arbeit J. Huslers," *Zeitschr. f. Kinderheilk.*, Berl., 1914 (Originalien), xi, p. 508.
[10] J. GERSTMANN. *Wien. klin. Wochenschr.*, 1916, xxix, p. 1209.
[11] H. GERHARTZ. *Münch. med. Wochenschr.*, 1916, lxiii, p. 823.
[12] F. PARKES WEBER. "Lipodystrophia progressiva," *Quart. Journ. Med.*, Oxford, 1917, x, p. 131.
[13] *Idem.* "Lipodystrophia progressiva," *Proc. Roy. Soc. Med.*, 1917, x (Sect. for the Study of Dis. in Child.), p. 81.

DISCUSSION.

The CHAIRMAN (Major H. Morley Fletcher): To many of us this condition is a very rare one, but some of the cases may have been seen by us without our having recognized their nature. I have had a case under my observation for more than twelve years, and until three or four years ago I was always searching for a clue as to its clinical classification. At that time, however, I came across the record of one of the German cases later included in Dr. Weber's list. Having once seen a case, or a picture of one, I think the condition is comparatively easy to recognize. I ask whether Dr. Parkes Weber can tell us anything more as to the suggested pathology of the condition.

Dr. PARKES WEBER (in reply): As I mentioned in my recent paper on the subject, I think there is abundant evidence to show that lipodystrophia progressiva is a special type of morbid syndrome, and not merely a form of ordinary leanness or emaciation. Emaciation in very severe pulmonary tuberculosis seldom, if ever, leads to such complete atrophy or disappearance of subcutaneous fat as has been demonstrated by "biopsy" examination in some of the recorded cases of lipodystrophia progressiva. In the latter condition, moreover, the lower limbs are not involved in the fat-atrophy, as they are in ordinary cases of emaciation (from chronic tuberculosis, &c.). Apart from the fat-atrophy, it should also be noted that patients with lipodystrophia progressiva often appear to be in perfect health. The pathology of these cases is by no means clear, but the condition appears to be connected with some endocrine disturbance. This hypothetical endocrine disturbance cannot be one limited to the female generative organs, such as was at first suggested, because it is now clear that males may be affected as well as females.

(*April* 27, 1917.)

Bilateral Optic Nerve Atrophy in a Child, with Positive Wassermann Reaction and History of Infantile Convulsions.

By F. PARKES WEBER, M.D.

THE patient, M. P., female, aged 3½ years, was prematurely born (at seven months), but appears physically and mentally fairly normal, excepting that she is blind and presents incomplete bilateral optic nerve atrophy (Dr. R. Gruber). The mother is not sure that the child could ever see more than enough to distinguish light from darkness. There is a strong history of infantile convulsions up to the age of 1 year and 2 months. She commenced to suffer from fits when she was aged 2 months, the first one lasting about fifteen minutes. They recurred frequently for three days, and then they ceased until she was aged 6 months. From that time they appeared in the form of frequent attacks of "jerky movements" (six to eight attacks daily) until she was aged 14 months, when they ceased. The child's blood-serum and that of her mother both give a positive Wassermann reaction (Dr. H. Schmidt, April, 1917). The mother has one other child, a boy, aged 9 years, who is living and seems to be healthy, and whose blood-serum gives a negative Wassermann reaction. She had likewise one miscarriage (at three months), about 6½ years ago. The child's father, who gives a weakly positive Wassermann reaction, denies ever having had any

venereal disease. A younger brother of the father is said to have had a blind, prematurely-born, child, who lived only fifteen months.

I regard this case of bilateral optic nerve atrophy as an infantile example of a post-syphilitic change, analogous to the bilateral optic atrophy which one sometimes finds associated with tabes, sometimes without tabetic symptoms, in adults after acquired syphilis.

DISCUSSION.

The CHAIRMAN (Major H. Morley Fletcher): Dr. Weber does not mention whether there is any pigmentary change present in the fundus. Is optic atrophy the sole abnormality?

Dr. PARKES WEBER (in reply): There is no pigmentary change present by ophthalmoscopic examination in the present case.

(*April* 27, 1917.)

Congenital Word- and Letter-Blindness—Congenital Alexia, with Agraphia, without Aphasia.

By F. PARKES WEBER, M.D.

THE patient, O. H. S., aged 10 years, a bodily well-developed boy, of apparently average intelligence, has had great difficulty at school because practically he cannot read or write. He has, indeed, gradually learned to read and write a few letters of the alphabet, notably the first two or three letters, but he often makes mistakes, for instance, he often says that the letter "D" is "B." As in some other cases, it seems to make no difference whether the letters are small or capital letters, printed or written. He has learned to read and write Arabic numerals relatively well, and this corresponds to the observations of James Hinshelwood and others, that the recognition of Arabic numerals is readily acquired in cases of congenital word-blindness. When one tells him to write down his age (9 years), he at once writes down 9, as an Arabic numeral, but cannot write the word *years* after it. He can add up figures a little, but is certainly extremely backward for his age in arithmetic. He has learned to write his own name, and can recognize his name when someone else writes it. In regard to most words, however, when he tries even merely to copy them, he often makes

mistakes, and copies them without understanding what they mean. He recognizes objects and pictures of objects, and the meaning of pictures and picture-stories. There is no word-deafness and no aphasia. He pronounces words well and talks fluently, if he is not shy, and has learned to recite and sing various songs.

Dr. R. Gruber, to whom I am indebted for the case, reports that the patient's eyes (including ophthalmoscopic appearances) and eyesight are quite normal. He is not colour-blind.

The patient's mother says that she, as a child, was somewhat backward in learning to read. She has had only one other child, a boy now aged 8½ years, who is not word- or letter-blind.

I find nothing abnormal in the patient's thoracic and abdominal organs, nor in the urine, sexual organs, mouth, or nervous reflexes. The Wassermann reaction (Dr. H. Schmidt, April, 1917) in the patient is positive. In his mother and brother it is likewise positive. The bridge of the brother's nose is somewhat depressed. His father died at the age of 37 years in a lunatic asylum (general paralysis?). His mother looks healthy, and has had no miscarriages (she has only twice been pregnant).

The case seems to be very similar to Dr. T. R. Whipham's case of "Congenital Word- and Letter-Blindness," lately shown before this Section,[1] but Dr. Whipham's patient was a girl (aged 8 years), and out of sixty-four recorded cases to which he alludes only seventeen were in females. I shall not here go over all the points so recently discussed by Dr. Whipham. His case, moreover, resembled the present one in giving a positive Wassermann reaction; but it is doubtful whether there can be any direct relationship between inherited (congenital) syphilis and conditions allied to congenital word-blindness, though it is supposed by some authorities that a congenital syphilitic taint favours disorders of growth and development.

DISCUSSION.

Dr. T. R. WHIPHAM: I agree that this case seems to be in many ways identical with the one I showed. In some respects, however, this boy is a little more advanced than was the girl I showed, and is able to do certain things better. It is true he is two years older. My patient, although aged 8 when I showed her, could not, for instance, tell the time, did not know the value of

[1] T. R. Whipham, *Proc. Roy. Soc. Med.*, 1916, ix (Sect. for the Study of Dis. in Child.), p. 8; and *Brit. Journ. Child. Dis.*, Lond., 1916, xiii, p. 33.

money, and had not learned Roman numerals, all of which this boy has accomplished. What is being done to educate this boy? The girl I showed was at an ordinary school for a time, but as she did not get on well she was removed to a private school, where there were very few pupils, so that she might have more individual instruction. She improved a little in the course of a year or so, but it was nothing striking. I am not in possession of recent information about her, but I will try to ascertain further particulars. When I showed my case, Mr. Sydney Stephenson expressed the view that, with careful tuition and coaching, these children sometimes became useful members of society and capable of holding their own.

Dr. LANGMEAD: If we enlarge our view and take into consideration milder degrees of this condition, it is no longer possible to regard it as rare. There are a large number of children who, whilst being perfectly alert mentally, experience great difficulty in learning from written characters, who on seeing a new word transpose syllables and letters, who never succeed in reading even simple text with any facility, and who spell without any sense of the usual arrangement of letters. They have to learn the form of each word and studiously commit it to memory; compound words are to them inseparable into their component parts and are proportionately more difficult as they are longer. Figures, since they are fewer, are less troublesome to them, but in severe cases, provide the same difficulties as words. When taught orally the children learn as quickly as others, and show no defects of memory. With ordinary methods of education, however, they are always labouring under great difficulties, and are consequently backward as judged by educational standards; they are in danger of being classified as mentally defective. School work over, they often become very successful business men, evincing mental powers equal to or in advance of the average.

Dr. PARKES WEBER (in reply): As far as I know, the congenital condition in this boy has only just been attended to. He was sent by the school authorities to have an examination made of his sight and eyes. The most interesting feature of the present case is that, apart from the word-blindness, the boy seems intellectually almost normal, so that he is an even better example of pure word-blindness than is Dr. Whipham's case. I think these children sometimes ultimately manage to get on and earn something. Dr. G. E. Shuttleworth told me that in one of his cases the patient, a boy, was ultimately able to work for a greengrocer's shop, making himself generally useful. In the present case, though the child may seem to have wasted his time at an ordinary school, I think he may have to some extent benefited, namely, by acquiring the facility of associating with his fellows. I do not know whether any special method of teaching him will be possible, apart from oral instruction.

(*April* 27, 1917.)

Case of Syphilitic Periostitis and Epiphysitis in One of Twins, without other Marked Signs of Syphilis.

By H. C. CAMERON, M.D.

S. W., AGED 9 weeks, with twin apparently unaffected. Breast-fed. Soon after birth the thighs became swollen and tender. Thickening of both femora and tibiæ can be felt. The left leg is held motionless. Other signs of syphilis are not marked. There is a slight snuffling sound on breathing.

The following are also shown:—

(*A*) The twin unaffected.

(*B*) A radiogram of the bones around the affected knee-joints, showing thickening of the periosteal bone and a large bony mass projecting from the femur behind the knee. There is also a well-marked shadow, showing the zone of ossifying fibrous tissue, running along the epiphyseal line and separating epiphysis from diaphysis. In the case of the left femur, separation of the epiphysis has taken place at this point.

(*C*) A specimen from a child 10 weeks old from an autopsy performed by myself, showing exactly similar changes—viz, the dense yellow periosteal bone, the ossified, outlying mass in the same situation behind the knee, and the yellow line of ossifying tissue separating epiphysis from diaphysis in both femur and tibia.

(*D*) A radiogram from this specimen for purposes of comparison.

I suppose we may argue that the syphilitic infection in these full-time twins was not very virulent, because one has completely escaped, while the other has not shown very clear signs of syphilis other than epiphysitis. There is some snuffling, and the child has become somewhat anæmic, but he is taking food well and has no enlargement of the spleen. Therefore it is, perhaps, surprising to find such extensive changes as the X-rays reveal. I show the child in order to elicit the opinions of other members of the Section on this point. It has happened to me twice to light upon congenital syphilis unexpectedly by

X-ray examination. These children were fretful and suffered, evidently, from periosteal pains, and the X-rays showed a sub-periosteal deposit of bone, which yet was not of sufficient extent to be palpable. It is in keeping with this experience that, when pseudo-paresis and thickening is present in one limb, we find X-ray evidence in the other limbs as well.

DISCUSSION.

Dr. LANGMEAD: I quite agree with Dr. Cameron's contention that syphilitic bone disease, as revealed by X-rays, is far more extensive than can be suspected by ordinary methods of examination. When syphilitic epiphysitis is recognizable clinically in one position, radiograms will nearly always show that many other bones are affected to a less degree. This is so usual that in such cases I always obtain X-rays of all the long bones.

The CHAIRMAN (Major H. Morley Fletcher): I suppose the other twin was also examined by X-rays? I hope that when the full account is sent for the *Proceedings* Dr. Cameron will be able to say whether the other twin is clearly normal, both as to the Wassermann reaction and examination by the rays.[1]

Dr. F. PARKES WEBER: I think one of the points of value derived from recognizing the condition of one of the twins is, that in the other twin, though Röntgen-ray examination may show that there already is some syphilitic periostitis present, timely antisyphilitic treatment may prevent the disease from damaging the epiphyses to the extent that it has already done in the patient under consideration.

Dr. CAMERON (in reply): I have not yet had the other twin examined by the X-rays. I think that that is obviously the next thing to do.

(*April* 27, 1917.)

The Case of Osteogenesis Imperfecta shown in March, 1916, at a very Early Stage.

By H. C. CAMERON, M.D.

THE peculiar bulging of the temporal part of the skull has now become bilateral. The femur has since been twice fractured.

I have only to add that I think there have been, in all, five occasions

[1] Subsequent examination showed a positive Wassermann test in the mother and both children. X-ray examination of the other child showed nothing abnormal.—H. C. C.

on which fracture has occurred from very slight violence. The changes in the head have gone on as was anticipated; the bulging, which was unilateral, has become bilateral, and the anterior and posterior fontanelles are still patent. When I showed the case before, one fracture had occurred at birth; the others have taken place since.

(*April* 27, 1917.)

Case of Congenital Defect of the Duodenum, in which Bile was found both above and below the Absent Portion.

By E. A. COCKAYNE, R.N., D.M.

THE case occurred in a male child born at full term. There was no history of any similar condition in the family, and the mother was in good health during her pregnancy. At the confinement it was noticed by the medical attendant that the liquor amnii was excessive in quantity and bright green in colour. The child vomited liquid, which resembled the bile-stained liquor amnii, on the second day, and passed meconium of normal appearance. Slight jaundice was noticed on the third day. Vomiting continued at intervals, the vomit being invariably watery and green, but no more meconium was passed. The general condition became gradually worse until death took place on the fifth day.

At the autopsy it was seen that the child was well nourished and without any external malformation. The skin was slightly icteric. On opening the abdomen the stomach was found to be greatly dilated and the first part of the duodenum to end blindly, being greatly distended and globular in outline. The pylorus was visible and palpable as a thickened constriction between these two organs. Some fluid stained with bile was present in the stomach and distended the first part of the duodenum. The bile-duct opened directly into the narrow commencement of the lower part of the duodenum, but the pancreatic duct entered the posterior aspect of the blind sac formed by the upper part of the duodenum. The jejunum, ileum, and large intestine were of normal calibre; the cæcum and appendix lay just below the duodenum, and the ascending colon possessed a long mesocolon. There was no connexion except by peritoneum between the upper and lower portions of the duodenum; the missing part of the viscus was not even represented by a thin cord. The liver, gall-bladder, cystic duct, hepatic

duct, and common bile-duct were normal, and the gall-bladder contained a considerable amount of bile. Meconium of the usual dark green colour was present in the jejunum, ileum, and colon, the largest quantity being in the colon. A very careful search was made for a second bile-duct, or for a branch running from the common duct or hepatic duct to the upper portion of the duodenum, but none was

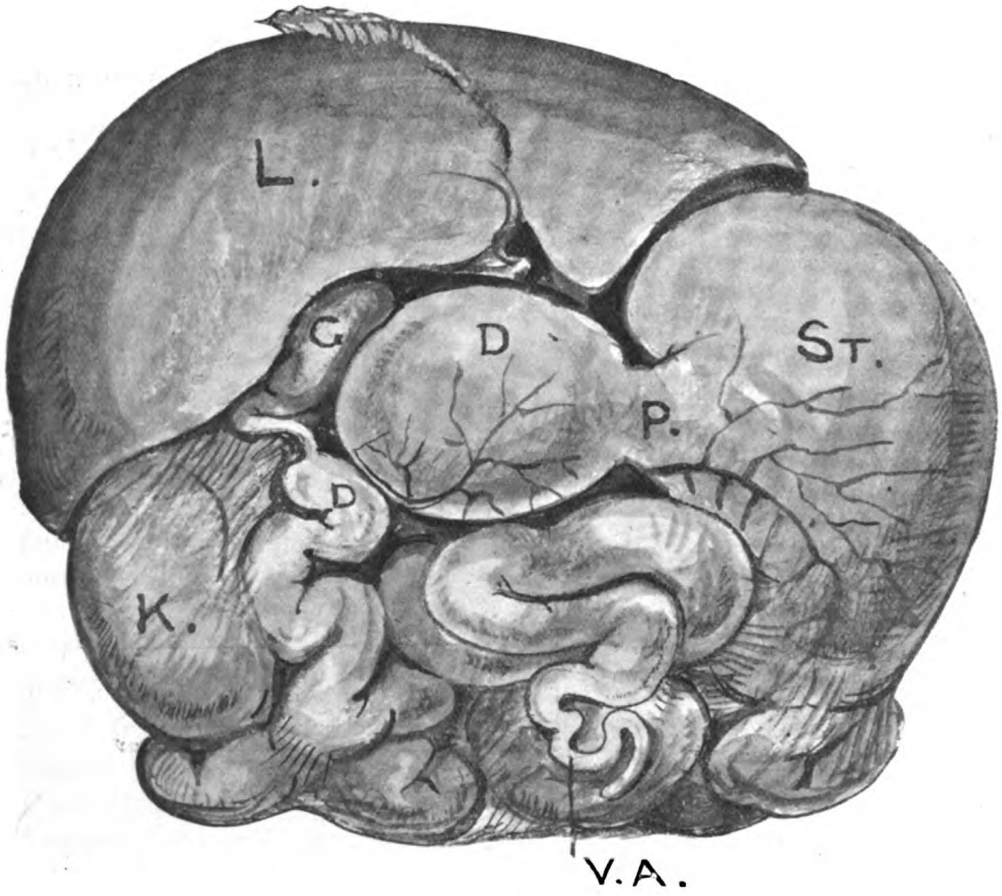

Fig. 1.

Congenital defect of the duodenum.

present. The interval between the two portions of the duodenum was occupied by a part of the head of the pancreas. The blood-vessels to the stomach, duodenum, pancreas, and neighbouring organs were large and showed no abnormality. Histologically, the structure of the duo-

denum near the entry of the bile-duct appeared normal, and numerous Brunner's glands were present.

The most interesting feature of the case and the one which made a correct diagnosis almost impossible, was the fact that a large quantity of bile-stained fluid was vomited, although the bile-duct opened into the lower part of the duodenum, and there was complete lack of continuity between it and the upper part.

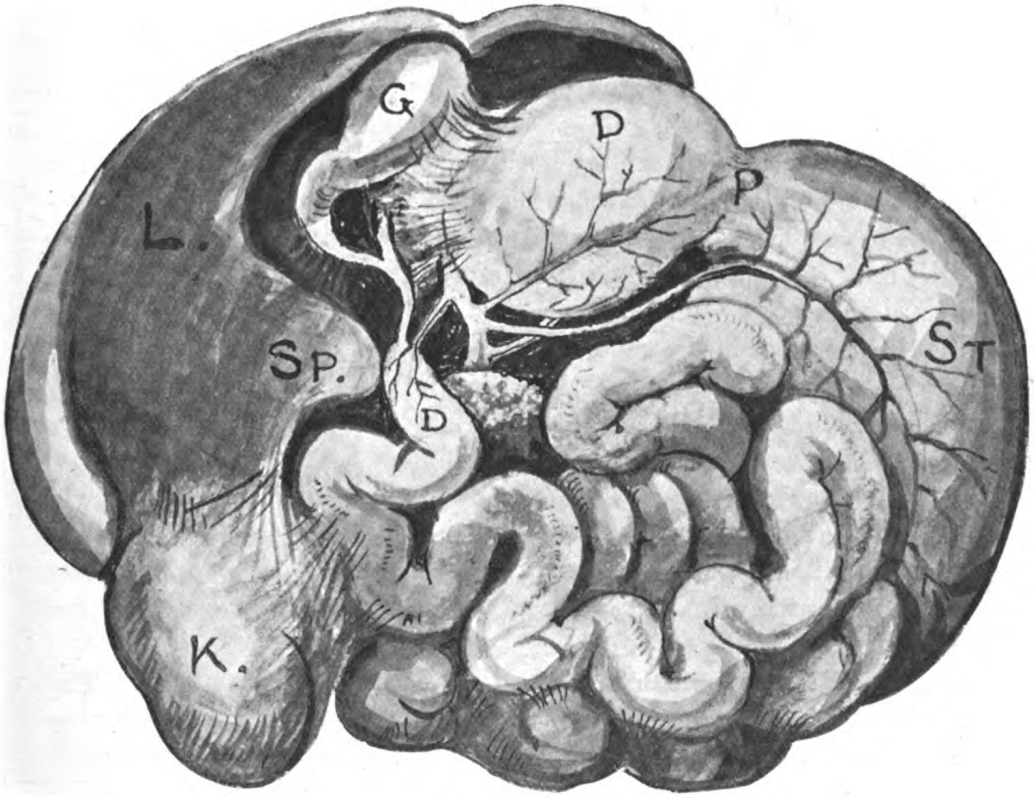

FIG. 2.

Congenital defect of the duodenum.

The earliest case in which bile was found both above and below a duodenal occlusion was described by Hirschsprung, who proved the presence of bile pigment in the stomach. He regarded the case as incomprehensible. Later cases were described by Wilks, Hobson, Wyss, Ferber, Northrup, Anderson, Cordes, and Spriggs (Case No 2).

Cordes proved conclusively that in her case the common bile-duct sent a small branch to the dilated duodenum above the occlusion, whilst the main branch opened into the part below the occlusion. In her paper she gives good reasons for believing that a similar condition was present in some of the other cases in which the same phenomenon was noticed, and even in some in which it was not, such as the two described by Thérémin. Dohrn's case also suggested an anomaly of the bile-duct, and in Serr's case two ducts opened into the stenosed portion of the duodenum.

We may reject the view of Wilks and others, that the green fluid vomited is a secretion of the stomach.

The only reasonable alternative to Cordes' explanation of the way in which bile can be vomited and passed in the meconium with a complete atresia of the duodenum, is that advanced by Spriggs in his important paper in the *Guy's Hospital Reports*. He suggests that where the bile-duct opens below the occlusion the presence of bile above it may be due to the infant having swallowed amniotic fluid containing meconium previously passed *in utero*, but regards it as unlikely. It is indeed unlikely to have been the cause in those cases in which a branched bile-duct existed, and in none of the cases reported was this possibility entirely excluded. In Anderson's case it was specially noted that the amniotic fluid was colourless.

In my case there can be no doubt that the second alternative was the correct one. The presence of a second or branching bile-duct was carefully looked for, but none was found, whereas, there was an excess of green liquor amnii, the colour of which was doubtless due to the presence of meconium.

With regard to the ætiology of the condition I will say little. The causes of atresia and stenosis of the intestine have been dealt with very ably by Cordes, Spriggs and Henneguier, all of whom have agreed that they are numerous. Atresias of the duodenum, however, stand apart from such, and almost always occur close to the opening of the common bile-duct, just above or just below it. They may be attributed, with considerable assurance, to an error of development connected with the growth of the liver and pancreas. This is not made improbable by the fact that the liver and pancreas are generally developed normally in these cases, because once their outgrowth has taken place they are little likely to participate in an anomalous growth of the duodenum from which they sprang.

In my case some of the causes which have been proved to produce

atresias of the jejunum and ileum, and occasionally of the duodenum, can be excluded. No failure of development of the arteries was present, such as has been described by Jaboulay, nor endarteritis obliterans, such as Durante discovered, nor embolus nor thrombosis, such as Kühner found. There was no fœtal peritonitis. Fiedler thinks that such a peritonitis, probably syphilitic in origin, may occur early in fœtal life, and leave no trace behind except an intestinal atresia or stenosis, and Schottelius has suggested that syphilis is a frequent cause, basing his contention on the fact that so many of the cases are met with in premature infants. The absence of any family history pointing to maternal syphilis, and the negative Wassermann reaction in the mother's blood, make it very unlikely that hereditary syphilis had any direct or indirect effect in producing the defect of the duodenum in my case.

In favour of the view that intestinal, and especially duodenal, occlusion, is due in many instances to an error of development, is the fact that other malformations commonly regarded as defects of development are sometimes associated with it. The commonest of these is imperforate anus, which, according to Spriggs, is associated with it in one case in twenty. Another is described by Veszprémi, who met with a patent septum ventriculorum in the heart, and a duodenal occlusion in the same infant.

Congenital occlusion of the duodenum is in itself a rare condition. Cowell, in 1912, was able to collect only ninety-two cases, and few have been described since. The rarity of the occurrence of bile above and below the stenosed piece of gut, a condition generally dependent on a branched bile-duct, has been discussed already. Still more infrequent is an arrangement of the pancreatic and common bile-ducts, by which one enters the duodenum above the occlusion and the other below. The only case which I have been able to discover comparable to mine is that of Hess. In this there was a duodenal occlusion and an imperforate anus, and the pancreatic duct opened into the duodenum below the constriction, the common bile-duct above, a condition the reverse of that met with in mine.

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DISCUSSION.

The CHAIRMAN (Major H. Morley Fletcher): It is a most exhaustive account of the condition, and we should be grateful to Dr. Cockayne for having recorded it so fully. One thing is not clear to me. He says: "One may reject the view of Wilks and others, that the green fluid vomited is a secretion of the stomach." I do not see that Dr. Cockayne in any way disproves this in his subsequent remarks. One wonders why he dismisses the statement off-hand, because in cases of jaundice the secretions of the mucous membranes are sometimes found to be bile-stained—for instance, the sputum in a bronchitic patient. Dr. Cockayne's suggestion that it is due to the swallowing of bile-stained amniotic fluid may be correct. Can we exclude the possibility of bile being excreted in the gastric juice? The author states that there was slight jaundice present on the third day, and the child died on the fifth day, that the vomiting continued at intervals, the vomit being invariably watery and green. If the child had swallowed amniotic fluid, one would have supposed that the fluid would have been cleared out of the stomach in two days.

Dr. F. PARKES WEBER: In regard to the history of green bilious vomiting I think the suggestion that it was due to the entry through the mouth into the stomach of bile which had been evacuated from the fœtal intestine into the amniotic fluid is a reasonable one. There may have been enough jaundice to account for *post-mortem oozing* of bilious serum from the mucous membrane of the stomach (*owing to maceration of the tissues after death*), and this may explain why green bilious fluid was found in the stomach at the necropsy.

(*April* 27, 1917.)

Status Lymphaticus from the Clinical Standpoint.

By H. C. CAMERON, M.D.

I SHALL not spend time in describing the condition of status lymphaticus as displayed in the post-mortem room. The appearances are familiar to all; their interpretation alone is in dispute. Two contrary opinions appear to have their adherents. I believe that neither sufficiently explains the known facts, and desire to suggest a third.

The condition has generally been regarded as a peculiar and somewhat rare inborn anomaly, and its existence has been frequently advanced in the coroners' courts and elsewhere as an explanation for the sudden death of a child or young person which otherwise appeared inexplicable. The condition, however, at least among the faulty children of our London poor, is no rarity. In children dying suddenly, whether, for example, as the result of street accidents or of some virulent and rapidly fatal infection, in children, that is to say, whose bodies have not been emaciated and dehydrated by prolonged illness, it is found in the post-mortem room of Guy's Hospital in a proportion of more than 40 per cent. It is possible and probably right to argue that in the case of the virulent and fatal infections the undue rapidity of death has been determined by the lowered resistance of these anomalous children, but the high proportion in which death is due to a severe trauma permits of no doubt as to the frequency of its occurrence during life.

Others, impressed by the frequency of the condition in the post-mortem room, and noting how plump and rounded the bodies of such children appear, have maintained that the large glands and the prominent lymphoid follicles represent the normal condition of health. It is said that this was the teaching of Sir Samuel Wilks. If so, we must be prepared to accept the view that adenoid vegetations, enlarged tonsils, and enlarged cervical glands also come within the category of the normal, for with hardly an exception the overgrowth of the deep-seated lymphatic apparatus is accompanied by the enlargement of these more superficial structures.

I suggest that no matter where the lymphatic glandular tissue is

hypertrophied and swollen the explanation is the same, and that the hypertrophy may be regarded as the evidence, persisting after death, of chronic irritation in the corresponding mucous membranes by persistent, though perhaps quiescent, catarrhal infection. After death the mucous membranes themselves may show no trace of catarrhal reaction; the enlarged glands remain as evidence of its presence during life.

It is not difficult, I think, to recognize during life a very common condition to which we may give the name of the "status catarrhalis,"[1] and which is the clinical analogue of the post-mortem condition, status lymphaticus. Children who show this condition suffer almost continuously from a succession of catarrhs. Skin, conjunctiva, the mucous membranes of ear, nose, nasopharynx, bronchi, intestine, are alike involved in chronic catarrhal processes, which from time to time show exacerbations, with the result that hardly a week passes without a pyrexial attack. In typical examples of this condition the children are fat and watery, with rounded, exaggeratedly infantile bodies. The feet and hands are cold and blue. The hair is sparse, dry, and irregular in its growth, so that the margin of the hairy scalp lacks definition. The skin on the cheeks and on the point of the chin is reddened and infiltrated with papular eczema. There is often intertrigo behind the ear or in the limb flexures. The upper lip is red and sore from the irritation of the chronic nasal discharge. Mouth breathing is the rule, because of the large tonsils and adenoid vegetations, with large everted open lips, which often show cracks and fissures. The chest, for the same reason, is narrow and contracted, and contrasts with the swollen and often pigmented abdomen. The bowels are apt to be loose and often contain mucus. The conjunctiva is reddened and injected. In boys preputial irritation is common, in girls vaginal catarrh. Otitis media is very frequent. The teeth decay early and show circular caries. Urticaria papulata is often a constant symptom. Tempers are usually violent, the intelligence below the normal, so that some have been sent to me as cretins, and the appetite is enormous.

The symptom, however, upon which I lay most stress is the extreme wateriness of the tissues in these children. Although they present, because of their plump aspect, a fictitious appearance of health, which commonly entirely deceives their parents as to their well being, they are in reality atrophic children who have retained an undue amount

[1] The condition has been described under various names. Our forefathers called it scrofula and struma—names which, in the course of time, came to have a more limited application. In German literature we read of "the exudative diathesis"; in French literature of "neuro-arthritis."

of fluid in the water depots of the body. The nutrition of the skin, teeth, hair, and all the mucous membranes, and their resistance to infection, has been profoundly lowered. If, however, a period of higher pyrexia supervenes, from exacerbation of the catarrh in one or more situations, the water is rapidly turned out of the body, and the true

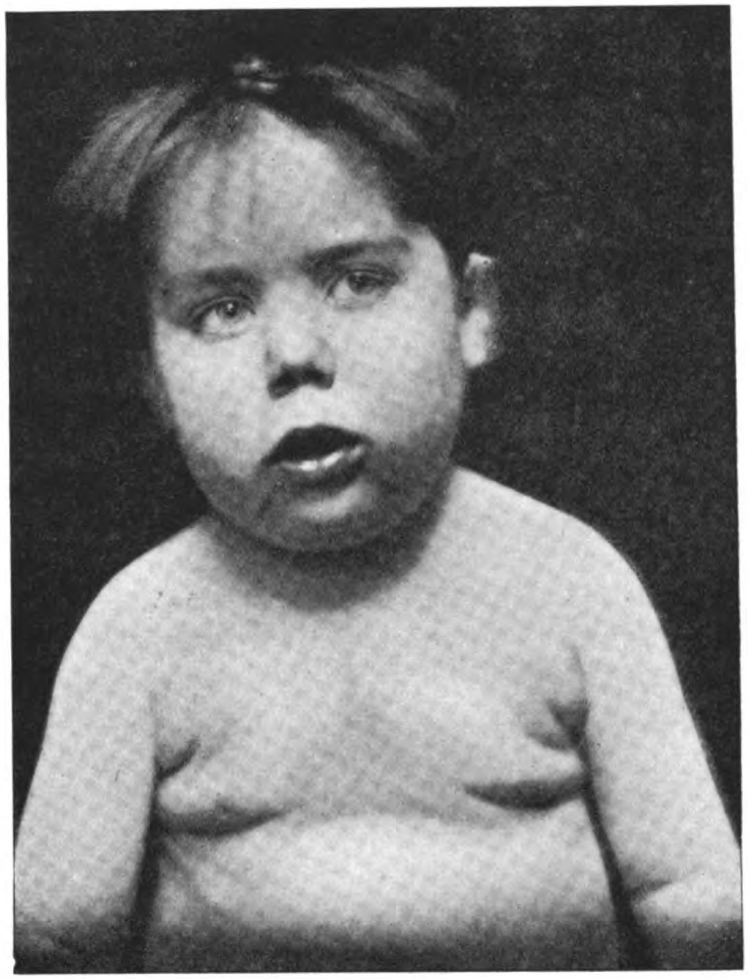

FIG. 1.

Photograph of the younger brother.

atrophy of the child is unmasked. Chart I (fig. 2) shows the weight of the elder of two boys upon thirty-one successive days. I admitted him for observation, when in his usual state of health, and on the thirty-first day his father removed him, because, he said, there was nothing the

matter with the child, and that I was experimenting on him. He had as a rule a huge appetite, but on admission he was homesick and would not eat. In the first four hours his weight fell nearly 40 oz. as a result of relative starvation, a fall due not of course to tissue loss but to loss of water. After one week his appetite returned; he began to eat 8, 10, and 12 oz. of bread in the day, and in addition took one pint of milk. In the second week he regained the water, and his weight rose 3 lb. in seven days. Thereafter it remained on the higher level, with considerable daily fluctuations. The temperature curve is placed above, showing its persistent slight irregularity even in health. I published these observations in a clinical lecture in the *Guy's Hospital Gazette* in December, 1916. Two months later the boy was admitted to Guy's Hospital moribund, and died apparently on the second day of an attack of diphtheria. Post mortem, a very extreme degree of status

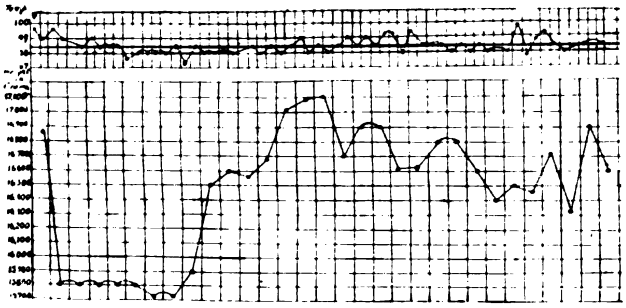

FIG. 2. (Chart I.)

lymphaticus was seen. I do not know what became of the younger brother (*see* fig. 1), but the mortality among such children from diphtheria, measles, and whooping-cough is enormous.

Clinically we meet with examples of the status catarrhalis both before and after dehydration; in the former case the children are active and lusty enough, in the latter prostrate and complaining. Persistent dehydration is, however, ultimately accompanied by disappearance of the overgrown lymphoid tissue and by a decline in the severity of the catarrhal symptoms. So that, in a sense perhaps, we may regard the higher pyrexial reaction which destroys appetite and produces dehydration as a reaction in the interests of the child. We are familiar with the fact that an acute and spreading eczema is seldom to be seen but in a fat and watery child. If eczema persists in a thin child, it is dry, chronic, and of little intensity. Mothers have observed how rapidly pyrexia clears the skin of eczema. The eczema has struck inwards,

they say, as usual observing well, but interpreting faultily. Evidence is not wanting that catarrhs of the mucous membranes behave in the same way as the catarrh of the skin. I recall a little boy, aged 6 years, admitted with a pyrexial illness which the autopsy six weeks later proved to be infective endocarditis. He showed nearly all the signs of what I have called the status catarrhalis. Yet day by day, as his body became emaciated and dehydrated by prolonged pyrexia, one could watch the nasal discharge cease, the succulent mucous membrane become dry, the tonsils and cervical glands steadily diminish, until at death no trace of enlargement could be distinguished.

In the treatment of the status catarrhalis I feel sure that we must direct our efforts towards achieving a less watery habit of body. The condition is dependent, no doubt, upon hereditary factors to some extent; but it develops unchecked only when hygiene is faulty, and when the diet is excessive and unsuitable.

It is the last point that I wish to deal with more precisely. As a result of the economic policy of the last fifty years, which has been directed towards maintaining a cheap loaf and cheap sugar, the children of our poor are fed almost entirely upon bread and sugar. Of these some eat enormously and almost continuously. A mother and six children, for example, habitually consumed 10 lb. of bread a day. Children of 6 years of age will sometimes eat 16 or 18 oz. of bread in the day. I have verified this by careful weighing in the ward. I believe that the condition which I describe is very closely dependent upon this enormous consumption of carbohydrate, so vastly in excess of the requirements of the body.

To illustrate this I have reproduced four charts, now shown.

Chart II (fig. 3) is taken from a normal child, aged 15 months, suffering from a slight and transient nasal catarrh. Note (1) that the fall in weight during pyrexia is slight, (2) that after recovery the temperature adheres closely to the normal line, (3) that the curve of the daily weighing shows a complete absence of large fluctuations.

Chart III (fig. 4) shows similar curves from a child, aged 3 years, with status catarrhalis, fat and watery, with a huge appetite. The average daily consumption of bread was 15 oz. In addition one pint of milk was given. Note in contrast to Chart I (1) their regular temperature curve, (2) the fluctuation in the line of the weight curve. On one occasion there was a sudden gain of 24 oz. in the day.

Chart IV (fig. 5) is a curve from a child, aged 2 years, so watery that the dorsum of hands and feet pitted on pressure. For the first three weeks a milk

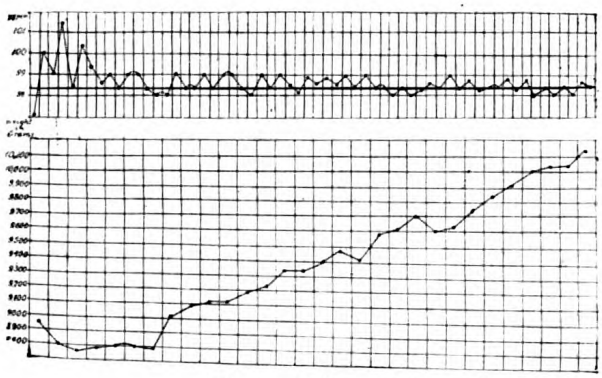

FIG. 3. (Chart II.)

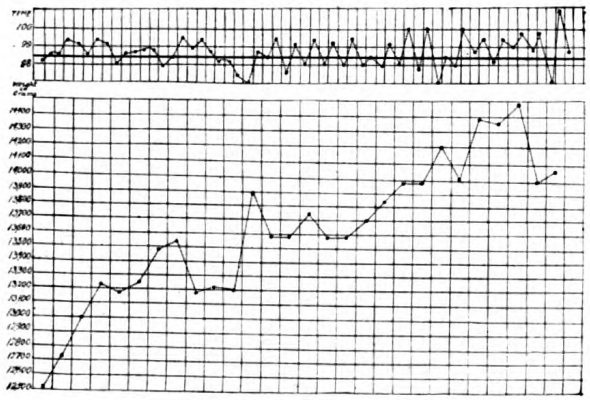

FIG. 4. (Chart III.)

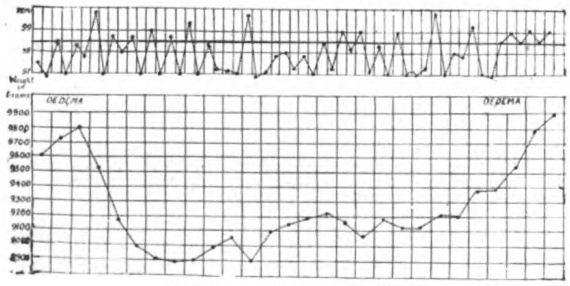

FIG. 5. (Chart IV.)

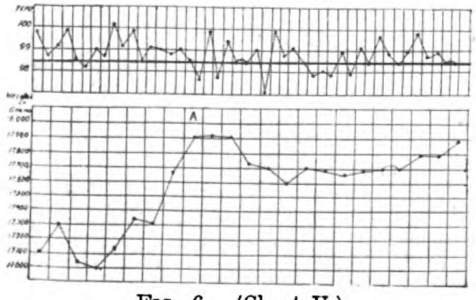

FIG. 6. (Chart V.)

diet was given, in the last week large quantities of bread in addition. Note (1) the unstable temperature, (2) the rapid fall in weight from excretion of fluid with the loss of œdema (the fall was equal to one-tenth of the body weight), (3) the slight genuine gain in weight in the next two weeks, (4) the rapid fictitious rise in the last week due to retention of water.

Chart V (fig. 6) is a curve from a child, aged 4 years, with status catarrhalis. Till the point marked A he was given as much bread as he would eat. For the first few days he was homesick and had no appetite. Later he ate very largely. At A he was given a spare diet of milk, fish, eggs, green vegetables, and fruit. Note (1) the unstable temperature, (2) the rapid rise in weight while bread was taken freely, and (3) the initial fall in weight after the change of diet.

In suitable cases I believe that the greatest good can be achieved by persisting for many months in a carefully controlled diet in which the starches and sugars are reduced to a minimum. I have had most success with a diet of skim milk, meat, fish, eggs, green vegetables, and fruit, calculated so as just to cover the physiological needs of the child and controlled by its effect upon the visible catarrhs and palpable glands.

My next point is that if, in this class of case, the vulnerability of the mucous membranes is due to a fault of nutrition such as I suggest, it follows that local treatment is little likely to be efficacious. I have collected a considerable number of cases in which local measures have been steadily pursued for a long time, sometimes for years, without improvement, which have yielded within a few months to dietetic measures on the lines indicated.

In conclusion, I wish to bring forward for criticism one further suggestion. I believe that the status catarrhalis has a very intimate relation to that somewhat indefinite disorder of later childhood which we call rheumatism ; watching many of the children from year to year I find it impossible to avoid the conclusion that the rheumatic symptoms are added at the moment when the catarrhal non-pyogenic organisms pass the barrier of the hypertrophied lymphoid tissue and infect the blood-stream. Then the child, suddenly losing his watery infantile aspect and taking on a longer and slimmer growth, is said to suffer from growing pains.

It need hardly be said that the irritated glands are more likely than not to become infected with tubercle. As a result of faults of hygiene and of diet, the children suffer from a lowered resistance to infections of all degress of severity. Prone to chronic and mild catarrhal

processes, they also fall a prey more readily to more severe infections, amongst which rheumatism and tubercle occupy the first place, while measles, diphtheria, and pneumococcal infections sometimes produce a fatal result at the very onset of the disorder, before the usual post-mortem appearances have had time to develop. Of sudden death from pressure of an enlarged thymus, the so-called mors thymica, I have not spoken. I have no knowledge of the condition, and I am in doubt whether it exists at all.

Conclusions.

To sum up I suggest:—

(1) That the lymphoid overgrowth so commonly found post mortem in children is no more than an enlargement from the irritation of chronic catarrh in the corresponding mucous membranes.

(2) That such children during life show evidence of faulty nutrition or infection of all epithelial structures, hair, skin, teeth, conjunctiva, and the mucous membranes of respiratory and intestinal tracts.

(3) That there is usually present a characteristic wateriness of the tissues, which is dependent to some extent upon excessive carbohydrate feeding, which is a main cause of the vulnerability to infection.

(4) That local treatment of the catarrhs alone is likely to be inefficacious, and must be accompanied by a systematic attempt to bring about the process of dehydration and improve the nutrition of the tissues.

(5) That the status catarrhalis in the sense defined is a predisposing cause of rheumatism and tubercle, and carries with it a liability to sudden death at the onset of virulent infections, such as pneumococcal infections, measles, or diphtheria.

DISCUSSION.

Dr. Langmead: Dr. Cameron, under the title of the "Status Catarrhalis," has given us a full and lucid description of a condition which we can scarcely fail to recognize. It is a true picture of a type of child who is by no means uncommon. The group of symptoms and the susceptibility to catarrhal infections constitute, as no doubt Dr. Cameron will admit, practically the state to which Czerny gave the name of the exudative diathesis, which we occasionally call "struma" or "scrofula," adopting a name which was formerly common to it and to tuberculosis of skin, mucous membranes, and glands. But I am not prepared to admit that it is identical with or a preliminary stage of status lymphaticus. Dr. Cameron likens the enlarged glands in the neck following

catarrhal and suppurative conditions of the mouth, nose, and pharynx to the mesenteric glands of status lymphaticus; the former are inflammatory in type, but he has not shown that the latter can be so defined. They do not show the histological changes of inflammation, but merely those of hyperplasia. He gives no explanation of the enlargement of the thymus and of the Malpighian corpuscles in status lymphaticus. I agree that the thymus seldom or never causes death by mechanical pressure, but its enlargement, nevertheless, is an integral part of the complex known as "status lymphaticus." If his conception were correct there should be a history of "status catarrhalis" in all cases of "status lymphaticus." This is not obtainable as a rule, in spite of the relative frequency of status catarrhalis. Status lymphaticus I regard as far rarer than many suppose. Without knowing that I could quote in support so eminent an authority as Sir Samuel Wilks, I have formed the opinion that most of the descriptions of the post-mortem appearances of fatal cases of "status lymphaticus" are those of normal children.

The CHAIRMAN (Major H. Morley Fletcher): We might spend the whole evening discussing this interesting point as to whether status catarrhalis is identical with status lymphaticus. Personally, I agree with Dr. Langmead that the two conditions are not necessarily the same: that status lymphaticus, when it occurs, is a definite condition. I also agree with Dr. Langmead that true status lymphaticus is much rarer than one would be led to believe from what is seen in the daily press about it.

Dr. F. PARKES WEBER: It would be interesting to know whether, in some of the cases which Dr. Cameron has investigated, there was increased carbohydrate tolerance; the large consumption of bread and the hungering after sweets suggests that there may have been. Some of the pictures of children shown by Dr. Cameron suggest the "Fröhlich type," of pituitary "dystrophia."

In regard to status lymphaticus and sudden death I remember a very fat child, a little less than 1 year old, who was shown to me by one of the out-patient department physicians at the hospital. A short time later the mother, probably to relieve a stomach-ache, put a salt poultice on the child's abdomen; it was applied too hot, and burning resulted. The child was then brought to hospital as an emergency case, and died with a convulsive seizure soon afterwards. At the post-mortem examination a persistent thymus, but nothing obviously abnormal, was found. I suppose that the case was an example of lymphatism. Whether that is the same as the condition now discussed by Dr. Cameron, though under the same heading, is doubtful.

Dr. CAMERON (in reply): I am very glad that these somewhat speculative opinions on my part have evoked some criticism, because that was my object in reading the paper and in speaking so dogmatically upon obscure matters. With regard to the histological appearance of the enlarged glands it is extremely difficult to say, where the irritant is chronic and of slight degree, what is an

inflamed gland and what is a hypertrophied gland. There are cases of enlarged glands in the neck due to adenoid vegetation or ulcerated sore throat, in which one would not hesitate to say that the inflammatory changes are very marked. But there are also cervical glands which have become enlarged and have been palpable for a long time which I do not think could be differentiated by histological examination from the glands in cases pronounced to be status lymphaticus. As to the thymus, what I said in my paper was, that I have great doubts as to the existence of any condition which suddenly kills a child by the mechanical pressure exerted by the enlarged thymus. I have no post-mortem evidence to support the suggestion that this does occur, and I have not been impressed by the clinical notes of the cases I have seen recorded. These watery children, of whom I have shown pictures, at once suggest to our minds a connexion with rickets. They tend also to suffer from laryngismus stridulus. My own view is that when sudden death occurs it is sometimes due to laryngeal spasm, and that this is a more likely explanation than that death is due to pressure on the thymus. Otherwise, I can only say that the thymus seems to me, looking at the post-mortem evidence, to be a fair index of the general degree of lymphoid hyperplasia. It is a structure which diminishes rapidly when the child becomes emaciated and the body becomes dehydrated. I am interested to hear Dr. Langmead say that he considers this overgrowth to be a normal condition of health, because that is the view which is taken by many people. I think it is a very *common* condition, just as adenoid vegetations are a common condition among poor children. But I doubt if the perfect child of good tissue *normally* shows either adenoids or general lymphoid hyperplasia. And the more one inquires into the matter the more one sees that these children who die suddenly—whether among the poor or among the well-to-do—and after death are found to have status lymphaticus, have suffered during life from repeated catarrhal infections, or have had repeated attacks of eczema. For instance, in a case which was analysed most carefully from the post-mortem side some years ago at the Section of Anæsthetics—that of a boy whose parents were well known people—and who died during an operation for the removal of adenoids, I think it was recorded without comment that as a young child he had suffered repeatedly from eczema and that he was regarded as a boy prone to catarrhs. That is the history in many of these cases. Parents commonly regard them as absolutely healthy because of their lusty appearance. The father of the boy of whom I speak in my paper, you will remember, removed him from under my care because he could see nothing the matter with him, but two months later he was returned to the hospital moribund. With regard to the carbohydrate tolerance, Dr. Ryffel has more than once found traces of sugar in the urine of children of this type who eat huge amounts of bread, and this rapidly disappears when the consumption of bread is reduced; but I have not made any real investigations as to whether these children have an abnormally high carbohydrate tolerance; indeed, I do not know that I have any figures which can be used as controls for children of various ages.

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[*Corrigendum.*—In reading this paper, on p. 46, last line, add the following sentence: "There was no amyloid change."]

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(*November* 10, 1916.)

(Chairman—Sir FREDERIC EVE, Lieutenant-Colonel, R.A.M.C.(T.).)

Thrombo-angiitis Obliterans (Non-syphilitic Arteritis Obliterans of Hebrews) affecting Three Limbs.

By F. PARKES WEBER, M.D.

M. K., AGED 39, a Russian Jew, is the patient whose earlier history I gave in my paper on "Thrombo-angiitis Obliterans," in the *Quarterly Journal of Medicine* for July, 1916 (ix, last paragraph on p. 296). In 1908, when he was aged 31, his right leg was amputated below the knee for commencing gangrene. The disease had commenced about two years previously, with pains in the right leg on walking, of the usual "intermittent claudication" kind. There was the ordinary history of cigarette smoking (fifteen to twenty cigarettes a day). Dr. E. Michels kindly allowed me to study microscopic sections from the the blood-vessels of the amputated limb, and told me that macroscopically the arteries had appeared to him to be rather hypoplastic. This has been observed, it may be mentioned, in some other cases of the disease. The posterior tibial artery showed organized thrombus, containing pigment granules (? hæmosiderin). The upper part of the posterior tibial artery showed no thrombosis, but much narrowing of the lumen from a kind of endarteritis obliterans. The lumen of the lower part of the posterior tibial artery was likewise not obliterated; about the small vessels (*vasa vasorum*) surrounding it there was considerable cell-infiltration. One of the *venæ comites* of the middle part of the anterior tibial artery was obliterated by organized thrombus, containing

pigment granules (? hæmosiderin). In this disease, it may be noted, Leo Buerger thinks that the posterior tibial co-veins are often closed, while the anterior ones are open.

About that time (1908) the patient seemed to have *true* psoriasis (not leucoplakia) of the tongue (he still has some simple cutaneous psoriasis of his trunk, limbs, and scalp). There was no evidence of disease in the thoracic or abdominal viscera. The brachial systolic blood-pressure (in both arms) was about 130 mm. Hg.

In July, 1912, owing to great and unyielding pain in the right stump, Dr. zum Busch amputated through the middle of the femur.

On September 21, 1916, patient was admitted to hospital under my care, having had for the past two years typical "intermittent claudication" on walking in the calf-muscles of his remaining (left) leg. For the last six months or so he had suffered from pain and tendency to cyanosis, of the "pseudo-erythromelalgia" type, in the left foot. There was no pulsation in the left dorsalis pedis artery. Fairly good pulsation could be felt in the femoral artery at the left groin, but none in that at the right groin. The left radial pulse could, also, not be felt, and the artery was doubtless obliterated. The patient himself was not aware of this, and said that, though he could use his left hand as well as ever, he had for some time been subject to temporary feelings of coldness in that hand. The brachial systolic blood-pressure in the right arm was 125 mm. Hg. The patient's Wassermann reaction (Dr. H. Schmidt) was negative. The knee-jerk (of the remaining—left—lower limb) was present, and the plantar reflex was of the normal (flexor) type. The patient had not quite given up his old habit of cigarette smoking.

Since then, by rest in bed, &c., there has been some improvement in regard to the turgid, erythromelalgia-like, congestion of the foot, but the patient needs morphine injections for sleep at night. He sometimes seems to obtain a sensation of relief by letting the leg hang down over the edge of the bed so that the foot becomes congested and purplish.

DISCUSSION.

Dr. BATTY SHAW: I should like to ask Dr. Parkes Weber why he uses the term "Thrombo-angiitis Obliterans" to describe the condition when, ever since 1878, Dr. Weir Mitchell introduced the term "Erythromelalgia." Dr. Parkes Weber's case conforms in all important particulars with the composite picture associated with these cases. It is true that Dr. Weir Mitchell's contention that this disorder is associated with changes in the nervous system

has not been substantiated, as was shown by Dr. F. E. Batten in a case of Dr. Parkes Weber's, published in the *British Journal of Dermatology*, 1901, p. 41 ; 1902, p. 388, and by myself in three cases of erythromelalgia, studied microscopically.[1] In these cases I was able to show that the only histological change found was thickening of the intima of the arteries, and in one case thrombosis of the veins. The term "erythromelalgia" is so expressive of the clinical findings that, despite the fact that it conveys no idea of the origin of the malady, which is the nosological ideal, I think it ought to be retained, much as we retain the term "intermittent claudication" for a kindred disorder. Clinical medicine would be the gainer by the retention of these terms, and I think it would be better to postpone the use of a histological nomenclature until we have arrived at a discovery of the actual cause of the vascular changes which underlie what we speak of as erythromelalgia.

Dr. WEBER (in reply) : I have already explained my views in regard to the term *Erythromelalgia*, in my paper on "Thrombo-angiitis Obliterans," in the *Quarterly Journal of Medicine* for July, 1916 (ix, p. 299). The symptomatic term "erythromelalgia," originally introduced by Weir Mitchell, has been employed for various conditions of vascular or nervous or trophoneurotic origin, including even some cases with cyanosis and swelling of extremities of only functional or angiospastic origin. Etymologically, the term is well adapted to be applied to the class of cases under consideration, meaning, as it does, a painful condition of an extremity associated with redness or cyanosis. Personally, I think the term would be best employed only symptomatically, as expressing the "symptom-group" of pain in an extremity, associated with redness or cyanosis, especially when the limb is allowed to hang down, or is kept in a dependent position, favouring venous and capillary congestion. Nothing would be gained by introducing the term "pseudo-erythromelalgia" or "spurious erythromelalgia." Some of the cases met with in persons not of Hebrew origin, which have been labelled as "erythromelalgia" or "pseudo-erythromelalgia" of a foot, have been examples of tertiary syphilitic arterial disease. Sir Frederic Eve's cases are very interesting in connexion with the present one which I have shown to-night.

[1] See *Trans. Path. Soc. Lond.*, 1903, liv, p. 16

(*November* 10, 1916.)

Progressive Spinal Muscular Atrophy (Duchenne-Aran) following Electric Shock; Positive Wassermann Reaction.

By F. PARKES WEBER, M.D.

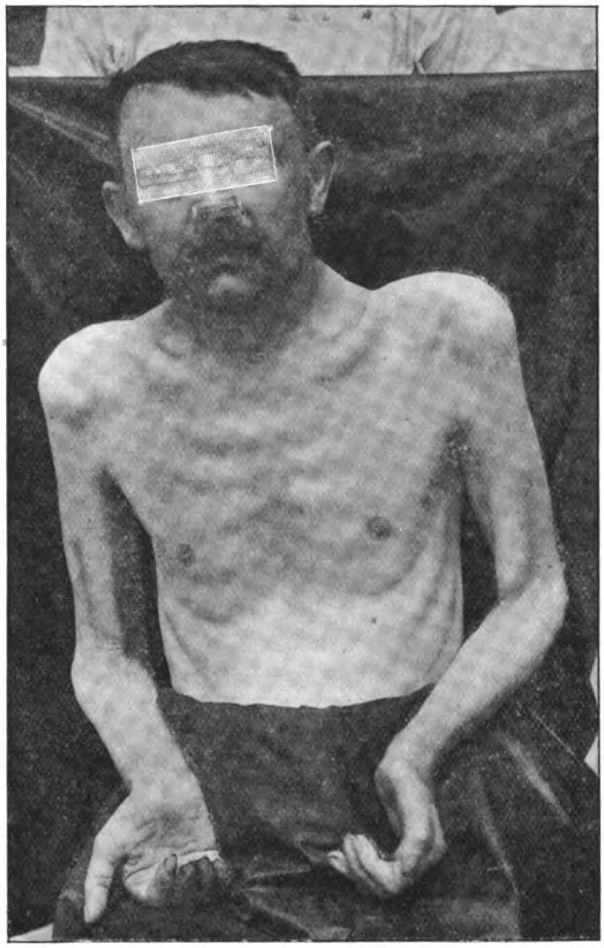
THE patient, K. W., aged 48, an electrician, presents the appearance (*see* figure) of great muscular atrophy of both upper extremities and of the muscles connected with the shoulder-girdle and thorax. There is great loss of power in the shoulders and arms. He can raise his left hand to his mouth, but can hardly raise his right hand at all. The wasting is particularly noticeable in the intrinsic muscles of the hands (where it was first noticed)—i.e., in the thenar and hypothenar eminences and in the metacarpal interosseous spaces. In both hands there is some contracture, more in the left than in the right hand. The atrophied muscles of the hands react very badly to electrical stimulation, and in the thenar muscles I have obtained no definite reaction at all. His knee-jerks are exaggerated, as they mostly are in cases of progressive spinal muscular atrophy, and, though he walks well, his gait is slightly spastic. There is no ankle clonus. The plantar reflexes are of the extensor type (Babinski's sign). The pupils react to light and accommodation. There is very slight (scarcely any) nystagmus. There is no paralysis of the external eye muscles or of the eyelids. There is no Romberg's sign. Sensation appears to be normal. Lately there has been occasional nocturnal incontinence of urine.

The patient is said to have been rather of a "nervous" disposition since the age of 20. About March, 1910, he accidentally, in the course of his regular employment, received a severe electric shock across the upper part of his body "from his left to his right hand" (750 volts, direct current,[1] he says). At first he seemed to suffer no ill effects from it, but about sixteen months afterwards he noticed that there was considerable wasting in his hands. The muscular atrophy slowly progressed until the present condition was reached, as he believes, a few years ago. He thinks, in fact, that the disease has made no progress

[1] Direct currents are much less dangerous to life than alternating currents. Prevost and Battelli, experimenting with rabbits, found that direct currents of from 50 to 550 volts threw the heart into ventricular fibrillation, from which the rabbit might or might not recover spontaneously. *Vide* A. J. Jex-Blake, *Brit. Med. Journ.*, 1913, i, p. 429.

since about the year 1913. There is no history of any nervous disease in other members of his family, excepting that his father and one brother both died as the "result of a fit," and one of his grandfathers was paralysed in the legs.

There is no suspicion of any saturnism in the case, and no history of syphilis can be obtained, but the patient's Wassermann reaction has on



Progressive spinal muscular atrophy following electric shock.

two occasions (Dr. H. Schmidt, September 27 and October 11, 1916) been found positive. However, the patient is married, and has four children, all living and healthy. No children have died, and his wife has had no miscarriages

The disease is clearly progressive spinal muscular atrophy, and not any form of primary muscular dystrophy, or of syringomyelia. As usual, the patient is a male, who was of middle age (at least 42 years of age) when the first symptom was observed, and, as in many cases, the hands seem to have been the first parts affected. Though I have never before heard of the disease following an electric shock, it is acknowledged occasionally to follow various kinds of traumata and shock, and I have been informed that in the present "Great European War" it has been known to occur after "shell shock." It is possible that a syphilitic taint may occasionally act as a predisposing cause by diminishing the resistance of the central nervous system, as it is supposed to act occasionally with regard to the onset of some other non-syphilitic diseases of the nervous system. The cases which have been published under the heading, "syphilitic anterior poliomyelitis," are of course of a nature different from that of the present case.

Dr. PARKES WEBER also remarked: I quite admit that there need not necessarily be any causal relation between the electric shock and the progressive spinal disease. However, the disease has, in several other cases, been known to commence after shocks of various kinds. The electric shock in the present case was certainly a severe one. The wasting in the hands was not noticed till about sixteen months after the electric shock, but the wasting proceeds slowly, and a considerable degree of wasting (which must have needed a considerable lapse of time at the slow rate of progress) was already present when it first attracted attention in the hands.

(*November* 10, 1916.)

Chorea Rhythmica in a Man.

By F. PARKES WEBER, M.D.

THE patient, S. V., aged 38, of Polish Hebrew origin, has rhythmic movements of the neck and both arms which, under observation, become increased in rate and amplitude and force. They quiet down somewhat when he is left to himself, and cease altogether during sleep. Their rate is usually about 100 per minute, but, as stated, it varies a little from time to time. The movements become more violent when anyone tries to restrain them by force in any way, or when the patient himself catches hold of a rail in endeavouring to walk. He says that

he cannot walk, but he can move his lower extremities when he is sitting or lying down. He gives one to understand that he can speak only in a very slow and broken (jerky) manner, as if battling against some obstruction in articulation. On the other hand he can eat, drink, and dress himself fairly well when left alone without any assistance. He is not losing weight, and is apparently free from any visceral disease. His knee-jerks are exaggerated; no ankle clonus can be obtained; his plantar reflexes are difficult to obtain, but when obtained at all they are of the flexor type. According to what he tells me the speech difficulty commenced in December, 1915, and about February, 1916, he gradually became unable to walk. The chorea rhythmica apparently began about July, 1916. The patient himself seems to think that the loss of several teeth in 1915 had something to do with the commencement of the speech trouble. Obviously psychical factors (indirectly connected with the War), which need not be discussed, play an important part in the case, which is entirely "functional" in nature. In fact, the use of the term *chorea rhythmica* for a case implies that the case in question is one of *chorea hysterica;* all cases of rhythmic "chorea" are of "functional" origin.

(*November* 10, 1916.)

Case of Enlargement of the Lower Jaw (? Leontiasis Ossea).

By Paul Bernard Roth, F.R.C.S.

Mrs. H., aged 56, was first seen in September of this year, complaining of pain in the lower jaw. She stated that in July she "had several teeth out because of abscesses, and since then the gums seem to have swollen." She complains at times of a shooting pain like a hot needle on the left side of her chin. She has never had any illness. She has three children alive and well; she also had one child born dead prematurely, and three miscarriages. She attributed these four mishaps at the time to being violently frightened on four separate occasions. Ten years ago, while carrying a heavy flower pot in both arms, she stumbled, and fell with her chin against the pot. Her chin was badly bruised, and since then her chin has been getting big.

Examination shows a remarkable enlargement of the chin and lower jaw; the enlargement is more or less uniform, though the left side is

rather more prominent than the right. All the lower teeth except a molar at the back have been removed. The alveolus is double or treble its normal size. A radiogram taken by Dr. W. Ironside Bruce shows a general enlargement of the horizontal ramus on each side.

(*November* 10, 1916.)

Case of Pulmonary Hypertrophic Osteo-arthropathy occurring in a Case of Congenital Heart Disease.

By H. Batty Shaw, M.D., and Stanley Melville, M.D.

E. H., a male, aged 32, was admitted to the Brompton Hospital with the following history: All his life he had had some cough, with scanty white expectoration, and so far as he could remember he has always been short of breath. His complexion has always been very blue, and of recent years he has noticed swellings of the ends of his fingers and his toes, and although he has not had definite pains in his wrists and ankles, he is liable to pains along the whole length of his arms and legs. He has been liable to severe attacks of bronchitis, and on several occasions has brought up small quantities of blood after coughing, the last time two weeks before admission to the hospital. He has noticed that both legs are swollen: this is due, however, in part to ichthyosis, but also to enlargement of the bones of the legs. There is no dropsy. There is no tuberculosis in his family.

Physical signs: He is somewhat under-sized, is clearly cyanosed, and shows a tendency to pigmentation, both localized and general. There is some bulbosity of the nose, and there is marked clubbing of the fingers; the phalangeal joints, especially the last ones, readily over-extend. The same remarks apply to the toes. On looking at the wrists and ankles there is obvious enlargement, which appears to be due to enlargement of the bones. There is well-marked emphysema and slight bronchitis. There is no evidence of tuberculosis of the lungs on physical examination, and the sputum is free from tubercle bacilli. Examination of the heart reveals the presence of a murmur, systolic in time, heard at its maximum over the sternum on the level of the fourth rib cartilage: it conducts in every direction, and would appear to be due to a patent inter-ventricular septum associated with occlusion of

the pulmonary artery. In all other systems the patient seems to be normal. The Wassermann reaction is negative.

Radioscopic examination: There is increased translucency of the lungs, due to emphysema; the heart is irregular in shape, but not increased in size. The bones are increased in size, giving the appearance of general expansion both in regard to length and breadth. There are, however, none of the characteristic osteophytes, and only in one phalanx is there a faint shadow of periosteal thickening to be seen. The terminal phalanx of both thumbs is irregular and thickened. The distal ends of both radius and ulna appears to be irregular in outline, suggesting some sclerosis. Both tibiæ are curved, with the convexity forwards: the bone is denser than normal, and this is in marked contrast with a "control" radiogram (shown at the meeting). The bone is uniformly opaque, the contrast between the compact and the cancellous bone being absent. This is particularly evident at the head of the bone, where it has a felt-like appearance, suggestive of sclerosis.

Comment.

So far as we are able to ascertain, this case, which conforms so well clinically with the description given by Pierre Marie of the symptom-complex known as pulmonary hypertrophic osteo-arthropathy, is independent of any of the accepted causes of this symptom-complex, such as lung disease, including tuberculosis of the lung, bronchiectasis, empyema, mediastinal neoplasm, chronic pneumonia, &c. It is also independent of acquired heart disease, or of the rarer associations of cirrhosis of the liver and chronic jaundice. So far as we know, mere emphysema does not cause this symptom-complex. We venture to connect the osteo-arthropathy in this case with congenital heart disease, making the second case of its kind in the experience of one of us. An identical case, A. C., was shown before the Clinical Society[1] by one of us (H. Batty Shaw) and Mr. R. Higham Cooper in 1907, the two cases constituting, so far as we know, the only two reported in the literature. The weakness of our contention is of course that the evidence is purely clinical, and that there may be some hidden pulmonary disease. That tuberculosis, however, was not the cause in the case shown in 1907 is supported by the fact that at the present moment she is free from that disease.

Very considerable interest attaches to the radiographic examination

[1] *Clin. Soc. Trans.*, 1897, xl, p. 259.

of these two cases. As Dr. Stanley Melville has shown in the present case, there are no developments of loose-textured new bone under the periosteum of the long bones: indeed the only definite change is met with in the tibia, which is enlarged, and shows increased condensation of the compact and cancellous tissue. A similar, though less marked change is noted at the lower end of the fibula. Obviously these radiographic appearances, though definite and visible at the present day, also in the case A. C., shown in 1907, are not those met with in the more acutely developed osteo-arthropathy seen in cases where the lung is rapidly involved in disease—e.g., by rapidly growing sarcoma of the lung. The clinical manifestations admit of no contradiction that these two cases are examples of Pierre Marie's symptom-complex occurring in the unusual association of congenital morbus cordis. It remains, therefore, for us to give an explanation of the apparent want of newly-formed light-textured subperiosteal bone. The first explanation is the one offered by Dr. F. Parkes Weber, who sees in these two cases a special variant of Pierre Marie's symptom-complex as usually seen in lung cases, the formation of denser bone and the absence of light-textured bone being associated with the *long duration of the cause;* the patient in our first case being now aged 30, and this second patient being aged 32.

Thanks to the observations made by Dr. Claude Gouldesbrough on the case A. C., in the year 1913, that is six years later than our first radiographic observations,[1] Dr. Parkes Weber's view is possibly confirmed, for in the earlier pictures less condensed new bone could clearly be seen beneath the periosteum, whereas Dr. Gouldesbrough was only able in 1913 to establish radiographic particulars identical with the present case. It is possible, though not very probable, as a second explanation of the radiographic appearances of these two cases at the present day, that in their earliest stages they did show the light textured subperiosteal deposit so well seen in the more familiar cases of acute lung disease, associated with Marie's symptom-complex. This, however, is a mere speculation, and we would prefer to adopt Dr. Parkes Weber's opinion, which would lead to the conclusion that when hypertrophic osteo-arthropathy develops relatively quickly, light-textured bone is thrown out under the periosteum of the long bones; whereas in cases like our own, where the condition develops during a much longer period, the bone changes are characterized *ab initio* by greater condensation,

[1] *Arch. of the Röntgen Ray*, 1913-14, xviii p. 208.

both of new bone and of old bone. The occurrence of this second case encourages the introduction of the term "cardiac hypertrophic osteo-arthropathy" as opposed to "pulmonary hypertrophic osteo-arthropathy" to describe kindred cases.

Dr. F. PARKES WEBER: In both Dr. Batty Shaw's cases, the one shown to-night and the one described by Mr. Higham Cooper and himself in the *Transactions of the Clinical Society of London* (1907, xl, p. 259), the bone changes (as far as they can be revealed by Röntgen rays) are so unlike those which occur in typical cases of "Pulmonary Hypertrophic Osteo-arthropathy" that, in spite of Dr. Batty Shaw's very clear explanation of his views, I would not admit either of the cases under that heading. I venture to suggest that both the cases are examples of a previously undescribed bony change (an "osteopathy"), in some way causally connected with congenital malformation of the heart and the secondary circulatory conditions and polycythæmia associated with it. I have, however, seen several adult patients with congenital malformation of the heart and chronic cyanosis (as in Dr. Batty Shaw's two patients) in whom no obvious changes in their bones were noted. It would be, perhaps, also advisable to take the Wassermann reaction in the patient shown to-night, because the appearance of his legs somewhat suggests the symmetrical change in the tibiæ which sometimes (though rarely) occurs as a late phenomenon in cases of congenital syphilis and which has been termed the "osteitis deformans" of inherited syphilis on account of its resemblance to Paget's osteitis deformans.[1]

(*November* 10, 1916.)

Case of Indirect Fracture of the Right Patella and Direct Fracture of the Left Patella.

By PAUL BERNARD ROTH, F.R.C.S.

MRS. B., aged 41, presented herself at hospital on October 4, 1916, stating that on the previous day she had slipped on the curb and that, while trying to save herself, her right knee had suddenly given way under her. On examination there was found a transverse fracture of the right patella. On being questioned as to any previous accidents, she replied that she broke her left knee-cap eight years previously, but had never had any treatment for it; she stumbled when going upstairs

[1] Cf. F. Parkes Weber, "A Note on Congenital Syphilitic Osteitis Deformans," *Brit. Journ. Child. Dis.*, 1908, v, p. 83.

and fell with the left knee against the edge of one step; the knee swelled up very much and she was two months in bed, but did not get any medical advice. Examination showed a Y-shaped fracture of the left patella, with very wide separation of the upper and inner fragment from the lower and outer ones. In the gap between them, quite 3 in. in extent, could be felt the trochlear surface of the femur. The quadriceps muscle was shrunken to one-third of its normal size. Patient was admitted, and the right patella wired through a vertical incision on October 9, 1916.

Remarks.—The chief interest of the case lies in the fact that the fragments of the left patella, though fractured by direct violence, have not united. With regard to the upper fragment, this cannot be explained by the wide separation of it from the other two, but in the case of the lower fragments which lie side by side, in actual contact, the failure to unite is unaccountable. It is worthy of note that there is no contraction of the hamstring muscles, although their opponent, the quadriceps extensor muscle, has not been in action for eight years.

Clinical Section.

President—Surgeon-General H. D. Rolleston, C.B., M.D.

(*February* 9, 1917.)

Congenital (Non-familial) Jaundice, without Splenomegaly, in an otherwise Healthy Man, aged 50.

By F. Parkes Weber, M.D.

The case, for which I am indebted to the kindness of Dr. O. May, is that of an umbrella-handle maker, G. T. D., aged 50, an Englishman, born in London, who presents a moderate degree of icteric coloration of the skin and conjunctivæ. He is an active, well-built man, of average general nutrition, and (according to his mother) he was yellow on birth, and has remained more or less jaundiced ever since then. About seven years ago he suffered from multiple ulcers of some kind on his left leg, which left pigmented scars. Two years later he had a bad carbuncle on the back of his neck. Otherwise he seems to have enjoyed unusually good health, and has not been subject to headaches, bilious attacks, or cutaneous pruritus. He is sure that his fæces and urine have been of ordinary colour, like those of normal persons. He has had no xanthoma, not even xanthelasma palpebrarum. Friends have told him that his yellow coloration is more marked at some times than at others, but this may be merely a question of illumination.

Family history: His father died at the age of 67 with cancer of the mouth. His mother died at the age of 76 from "senile decay." None of his relatives are known to have suffered from jaundice. The patient himself has had four children, two of whom are living; one died at the age of $1\frac{3}{4}$ from "meningitis" after a fall; the other, aged 24, was killed recently on the Continent in the great European war.

Present condition: I find nothing abnormal by ordinary examination of the thoracic and abdominal viscera. There is no enlargement of the spleen or liver or superficial lymphatic glands. As already stated, the

ulcers he suffered from on the left leg have left pigmented scars. His urine (January 25, 1917) is of specific gravity 1020, clear, of pale yellow colour and acid reaction; the ordinary chemical reactions are negative for albumin, sugar, and bilirubin, and for excess of urobilin, urobilinogen and indican.

Examination of the blood and blood-serum: The hæmoglobin is 105 per cent., estimated by Sahli's method. Red cells, 6,400,000 to the cubic millimetre of blood; white cells, 5,710 (of which about 80 per cent. are polymorphonuclear neutrophiles). Microscopic examination of stained blood-films shows nothing special: no nucleated red cells, no poikilocytosis, no polychromatophilia, and no marked anisocytosis. The ordinary chemical tests are negative for bilirubin,[1] urobilin, and urobilinogen, in the blood-serum, which is slightly deeper coloured than that of most persons. In regard to these examinations of the blood and blood-serum, I am greatly indebted to Dr. H. Schmidt, and he likewise estimated the so-called "fragility" of the erythrocytes for me, or rather, their resistance to hæmolysis in graduated hypotonic saline solutions. For this purpose he did not employ the erythrocytes after washing them in physiological saline solution, but employed a specimen of the patient's defibrinated blood, which after defibrination was found to contain 6,350,000 erythrocytes to the cubic millimetre. Of this defibrinated blood he added one drop to 2 c.c. of each saline solution. By this method hæmolysis was found to commence with a 0·48 per cent. watery solution of sodium chloride and to be complete with a 0·34 per cent. solution. Reckoning hæmolysis by this method to commence in average normal cases with a 0·42 per cent. solution, the resistance of the erythrocytes in the present case must be regarded as scarcely outside normal limits. There was no evidence of the occurrence of specific auto-iso-hæmolysins in the patient's blood-serum. The blood-serum (January 25, 1917) gave a negative Wassermann reaction for syphilis.

Remarks.

This case does not fall into the class of familial splenomegalic (hæmolytic) acholuric jaundice.[2] Clinically, the case is one of "simple"

[1] In regard to the absence of excess of bilirubin from the blood-serum one must speak with some reserve, as the possibility of error is considerable.

[2] Cf. F. P. Weber and G. Dorner, "Four Cases of Congenital Acholuric (so-called Hæmolytic) Jaundice in one Family," *Lancet*, Lond., 1910, i, pp. 227-232. This paper contains references to the previous literature on the subject. In regard to the various classes of persistent jaundice in children, see also F. P. Weber, *Edin. Med. Journ.*, 1903, N.S. xiv, p. 111.

acholuric jaundice without even any excess of urobilin in the urine, without enlargement of spleen or liver, and without any family history of persistent jaundice, or of tendency to attacks of jaundice.[1] Two cases, published in England, somewhat resemble it, though, strictly speaking, they were not acholuric, as a faint Gmelin's reaction for bilirubin in the urine could be obtained in both of them. The first was described by H. A. Mason[2] in 1902. The patient, a girl, aged 13, with congenital jaundice, was fairly well-grown, though somewhat backward for her years, and was without physical signs of disease in the thoracic or abdominal organs. The liver and spleen seemed not to be enlarged. The fæces were said never to have been clay-coloured. The urine gave a slightly positive Gmelin's reaction. Her conjunctivæ, according to her mother, were noticed to be yellow when she was three days old. The second case, described by W. T. Cocking[3] in 1903, was that of a woman aged 50, in whom jaundice was first noticed when she was aged 3 weeks. The spleen was not obviously enlarged, but the liver was slightly enlarged and a dilated gall-bladder could be felt. There was no pruritus nor xanthoma. The fæces were little if at all paler than natural. The urine was high-coloured and gave a faint Gmelin's reaction. A child of Cocking's patient developed jaundice four weeks after birth and died at the age of 15 weeks.

A possible pathogenic explanation of my present case is to suppose that the jaundice is due to congenital obliteration of one or more of the smaller intra-hepatic bile ducts, but in that case one ought to obtain an abnormal reaction for bilirubin in the blood-serum. Stenosis or partial obstruction of the common bile-duct was suggested by Cocking as an explanation of his case.[4] The present case is of course to be distinguished from the ordinary ones in which the conjunctivæ have a variable subicteric tinge in connexion with constipation or so-called "biliousness."

[1] For cases of *familial* acholuric jaundice or "simple cholæmia" without splenomegaly, cf. P. Lérébouillet, "Les Cirrhoses Biliares," Par., 1902, pp. 200-208; also G. R. Ward, "Congenital Familial Cholæmia without Splenomegaly," *Brit. Journ. Child. Dis.*, Lond., 1914, xi, p. 214.

[2] H. A. Mason, *Quart. Med. Journ.*, Sheffield, 1902, xi, p. 40.

[3] W. T. Cocking, *ibid.*, 1903, xi, p. 104.

[4] In regard to the question of possible survival in cases of congenital stenosis or obstruction of bile-ducts, cf. remarks of F. J. Poynton, "Some Cases of Jaundice in Childhood," *Brit. Journ. Child. Dis.*, Lond., 1913, x, pp. 145-154.

(*February* 9, 1917.)

The Acrocyanotic Type of Sclerodactylia (Early Stage), with Commencing Generalized Sclerodermia of Face and Chest.

By F. Parkes Weber, M.D.

The patient, B. D., aged 30, unmarried, a tailoress, was born in Holland, of Hebrew parents. Her fingers and toes when she is not keeping to her bed, are generally more or less cyanosed and turgid; they feel cold to the touch and the patient herself has a subjective sensation of "numbness" in them. The condition is worse in cold weather, and is likewise troublesome in warm weather, but in great part subsides when she remains in bed; though even then the fingers retain a swollen appearance, and on exposure to cold the fingers and toes rapidly become red or livid again. The cyanosis, which is always symmetrical and more marked in the hands than in the feet, extends to the wrists and ankles, when at its worst. No bony changes can be detected in the hands and feet by Röntgen-ray skiagrams. Skiagrams of the patient's neck show absence of the cervical ribs. There is some "shiny skin" over the upper part of the sternum and below the clavicles, indicating the commencement of generalized sclerodermia, and the facial skin is likewise already slightly involved, as evidenced by its tenseness and glossiness. (The skin of various parts of the body is scarred, it should be stated, owing to the results of burns at the age of 12.)

The thyroid gland appears to be small, but there are no obvious signs of myxœdema or hypothyroidism, unless the above described condition be regarded as in itself related in some way to hypothyroidism. The patient complains of occasional dyspeptic troubles, and says she "always has to take strong aperients" to overcome her habitual constipation. Menstruation commenced at the age of 18, and has always been scanty. The pulse is about 80 per minute, and the brachial systolic blood-pressure (January 17, 1917) is 120 mm. Hg. By ordinary examination of the thoracic and abdominal viscera, urine, knee-jerks, &c., I find nothing abnormal, but a Röntgen-ray skiagram of the thorax (Dr. James Metcalfe) reveals many enlarged lymphatic glands and some small calcareous hilus glands. There may therefore be an element of quiescent

or obsolete tuberculosis of thoracic lymphatic glands in the case. The Wassermann reaction is negative. A blood-count shows very slight anæmia. There is no pyorrhœa alveolaris.

The patient herself says that her illness commenced three and a half years ago with a tendency of her fingers and toes frequently to "go white and numb." Such attacks used to last a long time unless she put the numb parts into hot water; the attack could by that means be made to pass off in fifteen minutes or so. Three years ago, however (that is to say, half a year after the first symptoms), the fingers and toes commenced to turn purple ("local asphyxia") instead of white ("local syncope"). Since then the tendency to lividity has continued, though the exacerbations have varied in degree from time to time. The slight glossiness of the skin of hér face was first noticed three years ago. From childhood she had been subject to "festering" on her fingers, but not to "painless whitlows" or to symptoms suggesting the "Morvan type" of syringomyelia. She has never had ordinary chilblains either on the hands or feet. Lately the patient has been treated by rest in bed and thyroid tabloids (5 gr. daily) and the condition of the hands and feet has improved, but this improvement may be merely temporary and due to the evenly warm temperature and rest in bed; she herself says that the lividity always disappears as soon as she becomes warm in bed.

Remarks.

Cases resembling the present one are frequently described as mixtures of Raynaud's disease and sclerodermia; but by inquiry into the past medical history of patients with typical sclerodactylia I have come to the conclusion that in many cases there is a definite "turgid, acrocyanotic stage" of sclerodactylia (whether associated with sclerodermatous changes in the face and other parts or not)—a stage which should not be confused with genuine Raynaud's attacks of "local asphyxia of the extremities." This stage is not rarely preceded by a still earlier stage characterized by the fingers and toes tending to "go white and numb" ("local syncope")—and in such cases the attacks of local syncope and the condition of local asphyxia of the extremities should be regarded as the first symptoms of the commencement of the sclerodactylia. It should likewise be noted that the tendency to "local syncope" in the extremities may overlap the tendency to "local asphyxia," and this has to some extent happened in the present patient, for her fingers still occasionally "go pale" or "whitish." An important point in regard to

prognosis is that not all cases of the turgid (swollen) acrocyanotic stage of sclerodactylia progress onwards so as to reach the atrophic, "hide-bound," stage, with its contraction-deformities and troublesome ulcers. In the present case there are as yet no true sclerodermatous changes (that is to say, organic, fibrotic, changes) in either the hands or the feet. This "acrocyanotic condition" of early sclerodactylia is, I believe, not usually accompanied by any special tendency to suffer from chilblains —a feature which helps to differentiate it from the ordinary acrocyanosis of the hands (commonly known as "bad circulation") of "overgrown" (tall and thin) adolescents and young adults.

(*February* 9, 1917.)

Intermittent Claudication of the Right Leg in an Early Case of Thrombo-angiitis Obliterans (Non-syphilitic Arteritis Obliterans of Hebrews).

By F. Parkes Weber, M.D.

The patient, J. G., a male, aged 45, a Russian Polish Hebrew cap-maker, furnishes a typical illustration of the early stage of thrombo-angiitis obliterans,[1] as it occurs in London amongst the Hebrew immigrants from Poland and the neighbouring parts of Europe. The intermittent claudication commenced seven months ago in the usual way. A painful stiffness in the calf muscles of the affected extremity (the right leg in the present case) came on whenever the patient walked for any considerable distance, and obliged him to rest for two or three minutes until it passed off. Thus, if he wished to continue his walk for a long time, he had to rest every twenty or thirty minutes owing to the pain in the calf muscles. Afterwards the intermittent claudication somewhat increased, so that the pain occurred sooner, and the pauses (that is to say, the "claudications") were repeated more frequently—i.e., with rather shorter intervals. For the last two months, however, he has been troubled by pain of another kind (which has almost prevented his walking at all), a more continuous pain—namely, the so-called "ischæmic pain," in the distal portion of the right foot, which, for about the

[1] Cf. F. P. Weber, "Thrombo-angiitis Obliterans (Non-syphilitic Arteritis Obliterans of Hebrews)," *Quart. Journ. of Med.*, Oxf., 1916, ix, p. 289.

same period, has been red or cyanotic when in a dependent position —for instance, when allowed to hang down over the edge of the bed. This second kind of pain is, as usual, worse at night, and prevents the patient from sleeping without the aid of drugs.

The right foot presents the group of symptoms known as "erythromelalgia," but I have explained elsewhere[1] why, in my opinion, the whole diseased condition from which the patient is suffering should not be spoken of as "erythromelalgia." The latter term may, however, be reasonably applied to the symptom-group (symptom-complex, syndrome) in question — a symptom-group consisting (as the derivation of the word "erythromelalgia" implies) of pain in an extremity accompanied by redness or lividity (whenever the limb is allowed to hang down). This erythromelalgic symptom-group occurs in conditions of arterial obstruction of various kinds—for instance, in syphilitic, traumatic, and degenerative arterio-sclerotic obstructions.

The patient in the present instance is a rather nervous-looking man, of moderate general nutrition. The distal part of the right foot is intensely cyanosed unless it is raised and carefully kept warm. The redness and cyanosis is temporarily diminished if he forcibly flexes and extends his ankle-joint several times. Good pulsation can be felt in the left arteria dorsalis pedis, but none in the right one. Good pulsation can be felt in the femoral artery at the groin on both sides. There is slight wasting (doubtless from disuse) in the calf muscles of the right side. There has as yet been no formation of ("ischæmic") ulcers on the affected foot.

I can find no evidence of any other disease, except some pyorrhœa alveolaris. The brachial systolic blood-pressure is rather high, however—namely, about 160 mm. Hg. The patient had previously enjoyed fairly good health, and says he has never had any venereal disease. His blood-serum (January 31, 1917), gives a negative Wassermann reaction for syphilis. Like all other patients with his disease, he is a cigarette smoker, but he says he has been in the habit of smoking only about ten cigarettes daily.

He is to be treated by rest in bed, local warmth (local hot air baths, &c.), the induction of passive hyperæmia in the affected limb by Professor Bier's apparatus, moderate doses of iodide of potassium; and also opiates, according to requirement, for the pain and insomnia at night.

[1] F. P. Weber, loc. cit.

(*February* 9, 1917.)

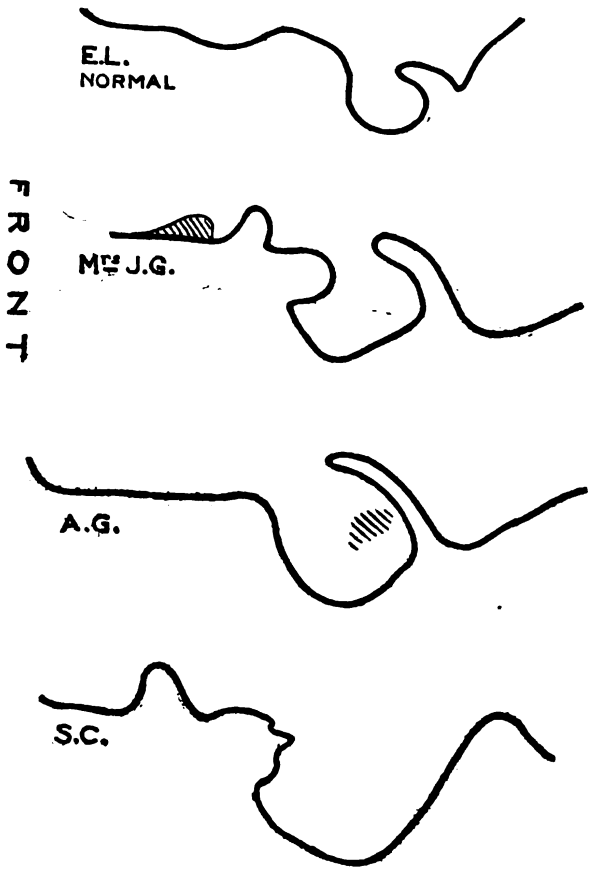
Cases of Acromegaly.

By F. PARKES WEBER, M.D.

Case I.—Mrs. J. G., aged 40, an open air market stall-keeper, a large, strongly built woman of Russian Hebrew origin. Has typical acromegalic changes in her face (lips, nose, and chin) hands (thick, "spade-like"), and feet. She complains of occasional headache, but has not sufficient pain or discomfort to make her think that she has any illness. The acromegalic changes were first noticed in her hands, which commenced to increase in size (in the thickness of her fingers) about eight years ago. Premature menopause occurred when she was aged 30, following the birth of her last child (ten years ago). She has had four children, all of whom are living, and no miscarriages. Her blood-serum (Dr. H. Schmidt, January 29, 1917) gives a negative Wassermann reaction. Her urine is free from albumin and sugar. There is no spinal curvature. Röntgen skiagrams of the base of the skull (Dr. James Metcalfe) show the pituitary fossa a little enlarged and irregular in outline. Skiagrams of the hands and feet show exostoses and "tufts" in the terminal phalanges of the great toes, and indications of "tufts" in the terminal phalanges of the thumbs. In regard to the patient's fields of vision, Dr. R. Gruber reports that perimeter tracings (January 29, 1917) show nothing abnormal except appreciable contraction in the temporal portion of the field of vision of the left eye. No nystagmus. Nothing abnormal in regard to the external eye muscles, the pupils, or the ophthalmoscopic appearances.

Case II.—A. G., aged 46, a big, active man, born in Russian Poland, of Hebrew origin. He complains of nothing except occasional "rheumatic" pains, for which he was once treated by balneotherapeutic means at Bath, in England. But he has the thick nose, large lower jaw, rather "fleshy" lips, and big, "spade-like" hands of acromegaly. These changes seem to have commenced long ago; at all events, the patient does not know how long they have been present. There is no spinal curvature, excepting slight kyphosis. He is married and has five children, all living. His blood serum (Dr. H. Schmidt, January 31,

1917) gives a negative Wassermann reaction. The urine is free from albumin and sugar. In regard to the fields of vision, Dr. R. Gruber reports that the perimeter tracings (January 31, 1917) show some retraction on the temporal side for both eyes. There is no nystagmus and there is nothing abnormal in either eye in regard to the external eye muscles, the pupils, or the ophthalmoscopic appearances. A Röntgen skiagram of the base of the skull (Dr. James Metcalfe's report, September, 1916) shows that the pituitary fossa is distinctly enlarged. It



Dr. F. Parkes Weber's cases of acromegaly. Tracings of the pituitary fossa outline in the three patients and in a normal case (E. L., aged 38), for comparison.

measures 2 cm. both in the antero-posterior direction and in the depth (normal measurements being respectively 1·5 cm. and 0·9 cm.), and there is an opacity in its posterior portion. Skiagrams of the hands show

" tufts " at the ends of the terminal phalanges; the distal ends of the other phalanges are thickened.

Case III.—S. C., aged 53, a big man, born in Russian Poland of Hebrew parentage, came to the hospital out-patient department with diabetes mellitus and complaining of general debility. Dr. H. Schmidt thought that his face had a slightly acromegaly-like appearance. His fingers and toes are, perhaps, likewise somewhat thickened. There is no spinal curvature. But though the appearance of the face is doubtful, the pituitary fossa is certainly greatly enlarged. Dr. J. Metcalfe reports on a Röentgen skiagram of the base of the skull, taken on February 5, 1917: " The pituitary fossa is very large; it is $2\frac{3}{4}$ cm. in length and about $1\frac{1}{2}$ cm. in depth." The *dorsum sellæ* appears to me to have been mostly destroyed (*see* figure). In the skiagrams of the feet the terminal phalanges of the great toes show slight exostoses. There does not appear to be any hemianopsia, though it has not been possible to take accurate tracings of the visual fields with the perimeter. There is no nystagmus, and there is nothing abnormal in regard to the external eye muscles, the pupils, or the ophthalmoscopic appearances (Dr. R. Gruber). The urine (February, 1917) contains about 5 to 8 per cent. sugar, and acetone and diacetic acid have sometimes been present. The blood-serum gives a negative Wassermann reaction for syphilis. The brachial systolic blood-pressure is 140 mm. Hg. A blood-count shows nothing special.

The accompanying illustration (*see* figure) shows tracings of the pituitary fossa outline in these three patients, and in a normal case (E. L., aged 38), all of them drawn to the same scale for comparison.

Dr. R. O. Moon: In two cases of acromegaly which came before me some years ago I found sweating to be an accompaniment of the disease, which is an interesting fact in connexion with the dryness of the skin which obtains in myxœdema, to which acromegaly bears a superficial resemblance. Both patients in my cases were women and aged about 33; in the one case an ovarian cyst had been removed at the age of 26, and since then she had had amenorrhœa. In the other the woman had had five children, the last at the age of 27, and since then the catamenia had disappeared. The case before us this evening exemplifies the fact that symptoms of acromegaly in women develop after a decidedly premature menopause.

(*February* 9, 1917.)

Case of Cancer (Epithelioma) of the Tongue in Process of Cure by Shaw-Mackenzie's Method.

By ALBERT WILSON, M.D.

P. K., MALE, October 17, 1916. The right half of the patient's tongue was occupied by a raised ($\frac{3}{8}$ in.) fungating ulcerating growth which overlapped the middle line. A large mass, soft in the centre, 5 in. across, occupied the posterior triangle of the neck. The glands in the left side of the neck were swollen and hard. He spoke and swallowed with difficulty and could not masticate. Salivation was profuse. Fœtor was very offensive. He was so weak and emaciated that no treatment seemed worth trying. He had had syphilis.

On October 24 he was injected subcutaneously with 3 c.c. of his own serum. I had prescribed him hydr. iod. vir. His Wassermann reaction was clearly positive. The serum made him hot and sweat for a week.

November 7: 2 c.c. again injected. Mr. Hey tapped the neck. The material was débris and not pus.

November 23: $2\frac{1}{2}$ c.c. injected.

December 29: Steady improvement had occurred. Scabs formed on the ulcer, which dropped off leaving healed cicatrix underneath.

January 30, 1917: $3\frac{1}{2}$ c.c. injected. The mass had disappeared from the right neck. The glands were smaller in the left side of the neck, but suppurating. The tongue was healing rapidly.

The patient's tongue which is now nearly healed is very much smaller than the tongue was before attacked by epithelioma. It appears to me not more than one-third the size. Nor can he protrude it, as it seems held down by adhesions or contractions, whereas before it tended to protrude.

I show this case now *en route* to cure, but for this purpose it is unfortunate that the tongue is almost healed. However, the suppurating cervical glands will be a severe test as to the value of the treatment. I hope to show him later in a more satisfactory condition with another similar case which is rapidly healing.

So far back as 1889 I adopted serum treatment in cancer, using goat serum because the goat is not liable to cancer. I obtained a cure of carcinoma uteri in a case sent to me by Dr. Robert Barnes, and this was by one intravenous injection of 6 oz. of goat serum. Since then I have treated a few cases with varying success, but even where a fatal issue was unavoidable the pain and the growths as well were distinctly diminished. Dr. Shaw-Mackenzie has justified the claims of this *a priori* method as the goat has a serum of greater accelerating fat-splitting power than normal human serum—approximately in the ratio of 14 to 7. With the use of auto-serum, such as Dr. Shaw-Mackenzie has devised, there can be no risk of hæmolysis. There are many chemical problems and phenomena upon which Dr. Shaw-Mackenzie is still engaged, and one of the most curious is as to why the blood does not liberate this accelerator. Why does it only appear after clotting?

DISCUSSION.

Dr. J. A. SHAW-MACKENZIE: Dr. Wilson has kindly associated the treatment of inoperable cancer by auto-serum injections with my name. The method was first suggested and used by Dr. C. Mackay, on clinical grounds. He had under his care a case of carcinoma of the breast with double pleuritic effusion. The fluid became spontaneously absorbed, and coincidently with this the carcinomatous masses retrogressed. He inferred, therefore, that the fluid contained protective substances. Since then treatment with ascitic fluid, apparently with some success, has been reported from time to time by observers abroad. Independently, however, I suggested and brought forward the method on physiological and chemical grounds, at another Section of this Society in 1912.[1] In previous communications I had shown that carcinomatous serum and serous fluids clearly accelerated the action of lipase (steapsin) contained in glycerine pancreatic extracts. Later it was found that normal serum possessed the same property, and that the action could also be demonstrated on pancreatic juice itself. In progressive and advanced carcinoma and sarcoma, however, this power of the serum is decreased; while the normal antitryptic action of serum is increased. On the other hand, in mice which proved "negative" to inoculation with mouse cancer or after their spontaneous cure, and in improvement or after recovery (in man) the converse obtains—namely, the accelerating fat-splitting action is high or increased, while the antitryptic power falls to normal, or subnormal. The same holds good in the acute and convalescent stages, respectively, of infectious diseases, so far as I have examined them; and I regard the increased accelerating power of serum on fat-splitting, found in cases of improvement or recovery in cancer, and other conditions, as part of the protective mechanism of the body. Further-

[1] *Proceedings*, 1912-13, vi (Sect. Therap.), p. 114.

more, the lipase or fat-splitting enzyme contained in glycerine extracts of the pancreas can be separated by filtration into two parts, each inactive in itself. On mixing together the mixture again becomes active. The residue on the filter (inactive lipase) is destroyed by heat, but the other component in the filtrate (co-enzyme) is thermostable. If carcinomatous serum, heated or not, is substituted for the filtrate, the residue is activated in the same way. The activating effect was so pronounced, that I was led tentatively to commence treatment in cases of inoperable cancer by subcutaneous injections of the patient's own serum, for it was hoped the protective mechanism and fat-splitting response might in this way be induced *in vivo*. This is what actually did occur in two cases of recovery, reported at the time and subsequently, in which I examined the blood from time to time, during some months' treatment by this method; bile salts being also prescribed, in view of their accelerating action on lipase *in vitro* and *in vivo*. In contrast to the striking results in the above two cases, improvement locally and in general health has been noticeable in several cases over considerable periods of time, under similar treatment; but in two cases seen last year—recurrent uterine, and obscure abdominal growth with ascites, neither serum nor ascitic fluid injections proved of any use. The result, so far, in the case Dr. Wilson has obtained is an encouragement for further trial of this method, and my best thanks are due to him for bringing the case forward.

Dr. PARKES WEBER: I should like to ask Dr. Shaw-Mackenzie whether, in cases of malignant disease accompanied by ascites or pleural effusion, he prefers to use the ascitic or pleural fluid for injection in preference to blood-serum?

Dr. R. MURRAY LESLIE: Dr. Wilson's case is an interesting one from the therapeutic point of view. The ulcerating growth on the tongue has practically disappeared and the epithelium has grown over the previously diseased area. It is difficult to understand the rationale of the treatment, which seems to consist in the removal of a certain number of cubic centimetres of blood and the immediate re-introduction by subcutaneous injection of the patient's own serum, unless it be that the liberated blood-serum has in the course of coagulation acquired properties which were not present in the original blood plasma. It would be interesting to hear Dr. Shaw-Mackenzie's explanation of the rationale. I would suggest in view of Dr. Shaw-Mackenzie's successful cases of serum treatment in inoperable carcinoma, that the treatment might be carried out in a series of cancer cases in one of the Hospitals for the Dying, instead of, as at present, simply permitting all these inoperable cases to die quietly and as comfortably as possible, more particularly, as Dr. Shaw-Mackenzie assures us that the serum injections cause little or no discomfort and that there are no bad after-effects. The fact of something definite being done is always a great comfort to these poor patients, quite apart from its success or failure as a therapeutic measure. A percentage of successes in a series of cases would be much more convincing than isolated cures, particularly as cases of spontaneous cure of cancer do occur from time to time.

Dr. J. A. SHAW-MACKENZIE: In reply to Dr. Parkes Weber, ascitic and pleuritic fluids from cases of malignant disease give similar reactions to the serum in such cases. My clinical experience is not sufficient to enable me to express any preference or comparative value. I think, however, larger doses of the serum are indicated than hitherto employed, and in this respect the fluids have the advantage of being available in quantity. The good effect of withdrawal of fluid in simple pleuritic effusions, and at the same time reinjection of 8 to 10 c.c. of the fluid into the subcutaneous tissue has been recorded by others. The question raised by Dr. Murray Leslie as to the utility of taking something already in the circulation and putting it back arose at the outset of my investigations. But many examinations of the blood compared with serum showed that, whereas serum has an accelerating action on fat-splitting, the blood (unclotted) has not. In the blood-stream, therefore, the accelerating material is not available for the purpose, or to sufficient extent, and in pathological conditions the accelerating property of the serum itself is diminished, whereas in improvement or recovery it is increased. Inoculation of animals with normal tissues or with cancer tissue, and, as I have shown with auto-serum in man, is followed by a similar increase in this property of the serum. In this way the introduction of a normal or of a particular activator into the blood or tissues induces the protective fat-splitting response. The same principle seems to me to underlie treatment by prepared autogenous vaccines and their injection into the tissues. It is not precisely analogous, but, as I have shown, vaccines contain also an activator which, as in serum, is not destroyed by heat, even to boiling-point. Part of the value of vaccines therefore, I suggest, must be due to this material, with its power to increase fat-splitting. With regard to auto-serum injections, I may say I have never seen any inconvenience or bad effect, and the method may, as I have suggested on previous occasions, be useful in septic and other conditions.

(*February* 9, 1917.)

Case of Toxic Jaundice due to "T.N.T." (Tri-Nitro-Toluene) Poisoning.

By R. MURRAY LESLIE, M.D.

A. G., A SINGLE woman, aged 26, was admitted under my care at the Prince of Wales's General Hospital on November 10, 1916. Previously a domestic servant, she started munition work in August, 1916, as an "examiner" in the "T.N.T." (tri-nitro-toluene) Department. Her duties consisted in testing the gauge of calico bags filled with "T.N.T." powder. She would handle as many as a hundred bags of the powder *per diem*. She stated that respirators and certain other pre-

cautions since introduced were not then in use at that particular factory. After being engaged in this work for about fourteen days, she noticed that her hair, which was originally fair, had become of a "ginger" colour, but her general health did not suffer in any way, and she continued at her work for a fortnight after the change in the colour of the hair had been noticed. She gave up the work about the middle of September (i.e., one month after commencing munition work), being discharged from the firm not for reasons of health, but simply because the staff was being reduced in that particular department.

It is interesting to note that the patient remained quite well for one month after leaving her employment, although the ginger colour of the hair persisted. At the end of the month, however, she noticed that the skin of the face became yellow, and in about one week the skin of the whole body was similarly affected. This yellow colour gradually deepened, and she states that the whites of the eyes became tinged later.

A fortnight after the appearance of the jaundice she felt a peculiar taste in the mouth after meals, which she described as a "cankery taste," lasting for about an hour after taking food. She had occasional vomiting, which seemed to relieve the disagreeable taste, and also suffered from diarrhœa—three or four loose and offensive motions daily, very pale in colour. The urine became very dark—something like the colour of "strong tea." A week before admission a rash broke out over the body. She thought she had lost weight.

Condition on admission: The patient was a well nourished and well developed young woman. The hair was of a peculiar ginger-yellow hue, while the skin of the face and body was markedly jaundiced, with similar icteric tingeing of the conjunctivæ. There was also a raised erythematous rash—a sort of superficial dermatitis—affecting the skin of the arms, chest, back, abdomen, buttocks, thighs and legs, producing, in association with the jaundice, a curious bronzed appearance. This erythema was accompanied by some irritation. The bowels tended to be relaxed and the motions were of a pale pipeclay colour, but there was no actual diarrhœa, which had been present during the previous fortnight. The urine was of a dark brownish-green colour, and contained bile salts and bile pigments, and also a slight amount of albumin. Acetone was also present during the first ten days, but was not found on subsequent examinations. The specific gravity was 1020 and the reaction acid. There were neither blood nor tube casts and neither leucin nor tyrosin crystals were found on microscopic examination. The

tongue was moist and fairly clean. There was no sore throat. The liver dullness seemed slightly reduced and did not extend quite so far down as the costal margin, but there was no definite pain nor tenderness on palpation. The temperature on admission was 99·4° F. and the pulse 100. Her weight was 8 st. 6¼ lb.

Progress: For the first three days the patient remained *in statu quo* and was not obviously ill or distressed. On the fourth day after admission, however, she got much worse, and her condition gave rise to considerable anxiety. The temperature rose to 102·4° F., and there was remittent pyrexia for the next five days, the evening temperature on the sixth day after admission being 103·8° F. She was bright and cheerful throughout. There was no drowsiness, nor were there convulsions, or other alarming nervous symptoms, or actual distress. Acetone at this time was present in the urine. After a week's pyrexia the temperature fell to normal, and with the exception of occasional rises of temperature in the evening to 99·4° F., and on one occasion to 100° F., there was no pyrexia during the rest of the patient's stay in hospital. The erythema disappeared within the first fourteen days. The jaundice persisted unchanged for the first three weeks and then gradually diminished. The albumin disappeared from the urine on December 1, when the urine was no longer bile-stained. During the first three weeks the patient lost 6 lb. in weight, which she regained in the next fortnight. There was complete amenorrhœa for three months—October, November and December. On January 3 she weighed 8 st. 11 lb. and left the hospital for a Convalescent Home. She returned three weeks later feeling quite well and took up her old occupation as a domestic servant. Menstruation returned. On February 4, 1917—a week after her return from the convalescent home—I had a note from her employer—a medical man—stating that she was quite well until February 3, when she had an attack of diarrhœa with epistaxis, the diarrhœa continuing throughout the following day, February 4. She had recovered next day, February 5, and has remained well up to the present. I saw her on February 7, and found nothing abnormal with the exception of the slight jaundice, which had not entirely disappeared, and just a little tenderness on deep palpation over the liver.

Treatment: The treatment adopted was simple but effective. The presence of acidosis, in association with pyrexia, during the first ten days suggested the administration of alkalies. Half-drachm doses of bicarbonate of soda were given every two hours during the day from

November 10 to December 29, and after that date the same doses were given every four hours. When the pyrexia subsided, the patient was put upon ordinary diet, with an excess of carbohydrates. The alkaline treatment was suspended during the past month, but since the recent attack of diarrhœa and hepatic pain, it has been resumed in drachm doses three times daily.

DISCUSSION.

Dr. PARKES WEBER: In view of the recent Discussion on tri-nitro-toluene poisoning it is exceedingly probable that, after the young woman gave up work, she continued to absorb poison from dust on her hairy scalp, since she says that she did not wash her hair. In regard to the ultimate prognosis in her case I think one must be very reserved. The poison probably gave rise to a toxic necrosis of considerable portions of the parenchyma of the liver (hepatic secreting cells), and a "substitution-fibrosis" of the necrotic parts probably has taken place, and is still taking place. In consequence of the newly-formed fibrous tissue in the liver contracting, the circulation may become so interfered with as to lead to enlargement of the veins of the stomach and lower part of the œsophagus (similar to the venous enlargement met with in ordinary cases of hepatic cirrhosis); and fatal hæmorrhage (hæmatemesis) may possibly be the ultimate result. In January, 1916, I was shown a young woman at a London hospital dying of *aplastic anæmia*, the fatal illness having followed an attack of vomiting and jaundice. Both the aplastic anæmia and the jaundice may have been a toxic result of T.N.T. In Dr. Leslie's case there have, apparently, been no anæmic complications whatever.

Dr. R. MURRAY LESLIE (in reply): The entrance of the poison in this case was probably by way of the skin and scalp. The patient was constantly handling the bags of T.N.T. powder, and she states that during the month she was employed at the factory, and the month following, she had not washed her head once. The noteworthy points in the case were: (1) The fact of the jaundice not appearing until one month after the patient had left the factory; (2) the presence of pyrexia lasting for one week and associated with acidosis; (3) the amenorrhœa lasting three months, the menstruation re-appearing in the fourth month when the jaundice had almost gone; (4) the albuminuria lasting for fourteen days; and (5) the success of the administration of alkalies in large and frequently repeated doses. As regards the ultimate prognosis one would be inclined to hope for more or less complete recovery, although there may be some grounds for Dr. Parkes Weber's view that there has occurred, or will occur, sufficient fibrotic deposit in the liver to cause dilatation of œsophageal and other veins, with a corresponding tendency to hæmatemesis and other outward symptoms, which may at any time endanger the patient's life. The case will be kept under careful observation.

(*February* 9, 1917.)

Two Cases of Primary Carcinoma in the Liver, in one of which Thrombosis of the Inferior Vena Cava occurred.

By F. Parkes Weber, M.D.

Case I.—Primary Carcinoma in a Cirrhotic Liver.

The patient, J. T., a shoemaker, aged 66, was admitted to hospital on November 17, 1916, with ascites of some four weeks' duration, during which time he had been too ill to follow his employment. He had been ailing for the last four months. On admission he seemed extremely feeble, and there was marked mental hebetude. He was not, however, emaciated, the subcutaneous fat being fairly abundant. Paracentesis abdominis, on the day of admission, yielded 6,000 c.c. clear ascitic fluid, of rather deeper yellow colour than usual, and of specific gravity 1004. After tapping the peritoneum a hard tumour, connected with the liver, could be felt in the abdomen below the ribs on the right side. The ascites rapidly re-accumulated, and by a second paracentesis (on November 29) 6,400 c.c. of similar ascitic fluid (specific gravity 1005) was withdrawn. There was never any fever. The pulse was about 74 to 88, and the respiration about 20, per minute. The urine, when tested on November 17, was of specific gravity 1015, acid, free from albumin and sugar. The conjunctivæ had a subicteric tinge. There was great loss of strength. Death occurred on December 7, 1916.

Necropsy and Microscopical Examination.

Except in regard to the liver there was very little to note. The lungs showed hypostatic congestion and old pleuritic adhesions on both sides. The heart (weight 11½ oz.) was not macroscopically diseased. There was moderate ascites. The spleen (weight 11 oz.) was slightly enlarged. The kidneys (weight together 10 oz.) appeared normal to the naked eye. Nothing special was found in the pancreas, suprarenal glands, prostate gland, or alimentary canal.

The *liver* (weight 48 oz.) was an example of typical hob-nail cirrhosis. But in addition to the usual hypertrophic nodules of hepatic parenchyma (probably indicating an attempt at compensatory hypertrophy) there was a hard, dirty-looking, yellowish-white tumour in the

right lobe about the size of a large orange, which had undergone a necrotic change at some parts. Scattered throughout the liver were smaller tumour nodules showing softening, some of them doubtless involving large blood-vessels. The gall-bladder was not diseased. No tumours were found in any other viscera than the liver, nor in the body elsewhere. The case seemed to be one of primary carcinoma in a cirrhotic liver.

This was confirmed by microscopical examination of the liver, which showed, in addition to old multilobular cirrhosis of the ordinary type, cancerous, partly necrotic, new growth, probably carcinoma originating in one of the adenoma-like, hypertrophic nodules of the hepatic parenchyma in the cirrhotic liver. Mr. S. G. Shattock, who kindly looked at the microscopical sections, expressed his opinion that the disease was carcinoma, arising from the hepatic cells in the cirrhotic organ. I would, however, specially mention that the cancer cells appeared to me rather small, and that they had a less decidedly "trabecular" arrangement in rows than they ought to have to be quite typical of this type of primary carcinoma of the liver—which H. D. Rolleston terms " cirrhosis carcinomatosa."

I am greatly indebted to Dr. H. Schmidt and to Mr. S. G. Shattock for their help in the pathological examination of the case.

Remarks.

A case of primary hepatic carcinoma of this " cirrhosis carcinomatosa " type, which I described in the *Lancet* in 1915,[1] was interesting as well illustrating the origin of the carcinoma on the basis of adenoma-like regenerative changes in the liver-cells in hepatic cirrhosis. But to my mind the chief interest connected with this type of hepatic tumour is the fact that in some cases, and in some portions of the growth, the lumen formed by the tubular (alveolar) arrangement of the cancer cells can be seen to contain either bile or, if not actually bile, a bile-like substance. This was well shown by a specimen, which I exhibited at the Pathological Section in 1910,[2] and which illustrated a pathological point quite generally admitted—namely, that cells of malignant tumours may retain some of the metabolic or other functional characteristics of the cell-type from which they are derived. In this connexion one may call

[1] F. P. Weber, *Lancet*, 1915, ii, p. 68.

[2] F. P. Weber, "A Case of Bile-producing primary Malignant Tumour of the Liver," *Proc. Roy. Soc. Med.*, 1910, iii (Sect. Path.), p. 147.

to mind that some of the primary tumours of the bone-marrow termed "multiple myeloma" have been found to consist of cells whose cytoplasm contains granules more or less resembling those in normal myelocytes.[1] One may further instance the well-known production of "cell-nests" ("epithelial pearls") in some of the metastases from squamous-celled carcinomata of the skin and tongue, as well as in the primary growths. I need scarcely refer to the rare metastatic tumours (in bones, &c.) of typical thyroid structure. Then there is the mucus-like secretion seen in some of the tubules of alveolar carcinomata. From the same point of view it is likewise interesting that certain tumours of the hypernephroma type in children have apparently given rise to a "precocious" plethoric type of obesity (or to excessive growth of the skeletal muscles) and premature sexual development.[2] So also, in regard to the functioning of tumour-tissue, S. G. Shattock instances observations which have been recorded of adenomata of the female mamma enlarging with pregnancy.

Amongst the many examples of primary hepatic-cell carcinoma which have been published one of the most remarkable is the case recorded by P. Prym.[3] In his case there was a metastatic tumour in the patient's skull, in which he observed not only a bile-like secretion produced by the tumour-cells, but likewise a fatty infiltration of the tumour-cells, recalling the fatty infiltration of normal secretory liver-cells, part of whose function is, of course, to store up fat, as well as to secrete bile.

Case II.—Primary "Massive" Carcinoma in the Liver, with (Terminal) Thrombosis of the whole Vena Cava Inferior.

The patient, E. B., aged 62, had been previously in the hospital under my care during part of the winter 1913-14, suffering from bronchitis. He was admitted again with bronchitic symptoms on October 24, 1916. Soon after admission, however, we noticed some œdema of the legs and a subicteric tinge of the conjunctivæ. His urine, which was free from albumin and sugar, contained excess of urobilin. The Wassermann reaction (October 25, 1916) was negative. In

[1] Cf. some of the references given by Weber and Ledingham, *Proc. Roy. Soc. Med.*, 1909, ii (Sect. Path.), p. 206.

[2] Cf. Bulloch and Sequeira, *Trans. Path. Soc. Lond.*, 1905, lvi, p. 189, and Guthrie and Emery, *Trans. Clin. Soc. Lond.*, 1907, xl, p. 175.

[3] *Frankfurter Zeitschr. f. Path.*, Wiesb., 1912, x, p. 170.

November there were signs of cardiac failure. The radial pulse, it may be mentioned, could be felt better at the left than at the right wrist. By the Riva-Rocci apparatus the brachial systolic blood-pressure measured 100 mm. Hg. on the left side, and only 85 mm. Hg. on the right side (November 10, 1916). Nothing abnormal was noted upon ophthalmoscopic examination (Dr. R. Gruber). In spite of treatment by digitalis and strophanthin, the œdema of the legs greatly increased, and on November 14 I inserted a Southey's capillary tube into the œdematous subcutaneous tissue of each leg, and drained away about 8,000 c.c. clear, pale golden-coloured, serous fluid, of specific gravity 1006. The urine (November 11, 1916) was of specific gravity 1020, acid, free from albumin and sugar. On November 18 the patient had a severe attack of hæmatemesis in the evening; this continued on the following morning (November 19), and he died about 3 p.m. in the afternoon.

Necropsy and Microscopical Examination.

Besides great subcutaneous œdema of the lower extremities there was some serous effusion in both pleural cavities and in the peritoneum. The main disease was in the *liver*, which was of moderate size, nutmeggy, and with several bosses of tumour projecting on its surface, most of which were directly connected with a large mass of new growth, about the size of a man's fist, situated in the upper posterior part of the organ. This main tumour-mass had apparently slightly infiltrated the neighbouring wall of the right auricle. From the auricular wall a fibrinous, more or less laminated, thrombus, of about the size of a very large chestnut, projected into the auricular cavity; this had led to recent, terminal, thrombosis (black clot) of the whole of the inferior vena cava and the iliac veins; the veins in the lower extremities were not examined. On cutting into the liver some veins were seen to be occluded by recent (black) thrombus; these were doubtless tributaries of the hepatic veins. There was no thrombosis in the portal vein and its tributaries. Besides the main tumour-mass in the liver, part of which had already undergone a necrotic change, there were smaller whitish detached growths in the same organ. The gall-bladder was not involved and showed nothing special. About the hilus of the liver were some considerably enlarged lymphatic glands, infiltrated with whitish new growth; but no tumour was discovered anywhere else in the body.

There were sclerotic changes and calcification at the root of the aorta and considerable atheromatous changes further on. The

difference between the two radial pulses during life was accounted for by calcification in the radial arteries. The heart itself was small, weighing only 8½ oz., and showed nothing of importance beyond what I have already mentioned. The spleen (weighing 3½ oz.) was small and rather hard, as if from chronic passive congestion. The kidneys, pancreas, suprarenal glands, and prostate gland showed nothing special. There were some enlarged veins in the stomach and lower part of the œsophagus, from which probably, as in cases of hepatic cirrhosis, the fatal bleeding (hæmatemesis) had taken place; no actual ulcerated spot in the stomach or œsophagus could be detected by ordinary inspection.

On microscopical examination the hepatic tumour was found to consist of rather small, more or less spheroidal, cells, presenting in some parts a slightly duct-like arrangement in columns. On the whole it seems most probable that the tumour is a primary "massive" carcinoma originating from the epithelial cells of small intra-hepatic bile-ducts.

In the pathological examination of this case, I am again greatly indebted to Dr. H. Schmidt and to Mr. S. G. Shattock. Mr. Shattock, who examined microscopic sections of the liver, kindly wrote to me: "I should regard the specimen as a carcinoma arising in bile-ducts. The latter are in places the seat of proliferative inflammation, which may have led to the carcinomatous change."

Remarks.

In this connexion I have the permission of my surgical colleague, Mr. A. Compton, to refer to a recent case of primary carcinoma in the liver arising from the cystic duct. The patient was a woman, aged 48, who died in the hospital at the commencement of January, 1917, after an illness (accompanied by ascites, but without any jaundice) of only a few weeks' duration. The necropsy and microscopical examination showed the peritoneal surface of the intestines, mesentery, and omentum to be diffusely infiltrated with the carcinoma. This process was accompanied by much inflammatory small-cell infiltration. At one part of the parietal peritoneum there were very definite newly-formed blood-vessels to be seen (with the naked eye) on the surface, doubtless as a result of the mixture of diffuse carcinomatous involvement and true inflammatory infiltration of the serous covering—a condition which may aptly be described as one of "peritonitis carcinomatosa." As a result of this process the outer walls of the intestines were thickened, hardened, and somewhat contracted. The great omentum and the

mesentery were also hardened and contracted in the same way. There was not, however, a so-called "leather-bottle stomach," such as is not rarely met with in cases of diffuse (general) cancerous infection of the peritoneum of the "carcinomatous peritonitis" type.[1]

The neck of the gall-bladder was occluded by the malignant tumor, and the gall-bladder itself was filled with innumerable small (lentil-like) gall-stones. The tumour likewise infiltrated the proximal portion of the gall-bladder and spread out into the adjoining parts of the liver; in some parts of the tumour a process of softening had taken place. There were likewise some secondary tumour-nodules in other parts of the liver. But no metastatic tumour-nodules were found by naked eye inspection in other viscera.

In regard to the terminal thrombosis of the inferior vena cava in my patient, E. B., an interesting reference is given by H. D. Rolleston (in his work on "Diseases of the Liver") to an analysis by J. Hall Pleasants,[2] who (amongst obstructions of the inferior vena cava from all causes) collected three cases in which malignant disease of the liver gave rise to so-called "new-growth thrombosis" of the inferior vena cava. Rolleston himself, in the same work,[3] records the case of a man, aged 20, with a metastatic malignant tumour of the liver and thrombosis of the inferior vena cava close to its bifurcation; but the primary tumour was in the left kidney.

DISCUSSION.

Surgeon-General ROLLESTON, R.N., C.B.: The adjective "massive" was applied by Hanot and Gilbert[4] to the form of primary carcinoma of the liver with a large white growth expanding the liver and compressing the parenchyma. Thrombosis of the inferior vena cava might be due to pressure of the hepatic growth on the inferior vena cava, to the pressure of secondarily infiltrated aortic glands on the vein, or to extension of growth via the hepatic veins into the inferior vena cava. The last event is especially likely to occur in cirrhosis carcinomatosa. An interesting question arises as to the prolongation of life after complete thrombosis of the inferior vena cava above the level of the renal veins. For such cases occur in spite of the *a priori* probability that

[1] Cf. A. W Nuthall and J. G. Emanuel, "Diffuse Carcinomatosis of the Stomach and Intestines," *Lancet*, Lond., 1903, i, p. 159. In all their three cases the so-called "leather-bottle stomach" was present, in whole or in part.

[2] J. Hall Pleasants, "Obstructions of the Inferior Vena Cava," *Bull. of Johns Hopkins Hosp.*, Baltimore, 1909, xx, p. 292.

[3] H. D. Rolleston, "Diseases of the Liver," 2nd ed., Lond., 1912, pp. 522, 523.

[4] Hanot et Gilbert, "Études sur les maladies du foie," Par., 1888, p. 30.

fatal uræmia may rapidly result. Primary carcinoma of the cystic duct is much the same clinically as primary carcinoma of the gall-bladder. Histologically, primary carcinoma of the cystic and other extra-hepatic bile-ducts is columnar-celled and thus differs from the primary carcinoma of the small intrahepatic bile-ducts which are lined with cubical epithelium. The difficulty of distinguishing between carcinoma derived from this epithelium and from the liver cells probably accounts for the varying estimates given as to the relative frequency of these starting points for primary carcinoma of the liver.

Dr. DAVID FORSYTH: Referring to the thrombosis of the inferior vena cava in the second case, I should like to call attention to the point that, while this obstruction commonly begins below and spreads upwards, it practically never ascends beyond the entry of the hepatic veins—this, no doubt, because of the vast inflow of blood from the liver into the vena cava. In Dr. Weber's case the extent of the thrombus was exceptional. The reason for this, it may be supposed, is that the branches of the hepatic vein in the liver were themselves thrombosed, and, therefore, the current of blood into the vena cava was restricted. It seems further worthy of comment that, again unlike most cases of this thrombosis, Dr. Weber's case presented none of the urinary changes (albuminuria or hæmaturia) which usually occur when the thrombus, spreading along the vena cava, blocks the renal veins.

Dr. F. PARKES WEBER (in reply): I think that in the second case of this paper the *complete* thrombosis of the inferior vena cava was only a *terminal* complication. In the case of thrombosis of the inferior vena cava secondary to malignant hypernephroma, which I described at the meeting of the Medical Section of this Society on February 23, 1915,[1] the vein was blocked throughout its whole length, and both the hepatic veins and both the renal veins were also blocked. It is remarkable that in that case the urine was passed in fair quantity and contained very little albumin till a few days before the patient's death. The *complete* venous thrombosis of his better (the right) kidney doubtless brought about the final suppression of urine preceding his death. In *traumatic thrombosis* of the inferior vena cava, when followed by recovery, the collateral enlargement of the superficial veins in front of the abdomen is a most striking feature. In a particularly favourable case, some years after the patient had recovered, I ventured to recommend his life for insurance *with an extra;* ten years after the assurance I heard that the life assurance policy was still in force.[2]

[1] F. Parkes Weber, *Proc. Roy. Soc. Med.*, 1915, viii (Sect. Med.), p. 6.

[2] F. Parkes Weber, "Ueber die traumatische Thrombose der Vena cava inferior," *Münch. med. Wochenschr.*, 1913, lx, p. 1434; also *Trans. Life Assur. Med. Officers' Assoc. (London) for the years* 1912-13, Lond., 1914, p. 254.

Clinical Section.

President—Surgeon-General H. D. Rolleston, R.N., C.B.

(*May* 11, 1917.)

(Chairman—G. Newton Pitt, Major R.A.M.C., M.D.)

Intermittent Claudication of the Left Lower Extremity.

By F. Parkes Weber, M.D.

The patient, I. D., aged 66, had a severe fall (in running away from an ox) about the middle of February, 1917, and since then he has had typical "intermittent claudication" in the left lower extremity. Whenever he walks he commences, after two or three minutes, to feel pain in the calf muscles of that leg, which causes him to stop and rest the limb for a few moments before proceeding. If he tries to walk on without resting in spite of the pain, he feels as if he had to limp or "drag the leg." It seems, however, that he experienced similar symptoms, though in a lesser degree, for some little time before the above-mentioned fall. Otherwise, with the exception of bronchitic attacks during the last three winters, the patient has generally enjoyed good health. He has never had a venereal disease and has not indulged in any alcoholic excess. He has been accustomed to smoke ten to fifteen cigarettes daily. During the last three years or so he has had to get up two or three times at night to pass urine. The urine (April 5, 1917) is of specific gravity 1014, clear, of medium yellow colour, acid, and free from albumin and sugar. Pulse, 64 per minute, regular. The radial arteries are somewhat thickened, and the brachial systolic blood-pressure (April 5, 1917) is 190 mm. Hg. His blood serum (Dr. H. Schmidt, April 5, 1917) gives a negative Wassermann reaction. There

is nothing special to be noted in regard to ordinary examination of the heart and lungs and abdominal viscera. The pupils react to light. The knee-jerks are present. There is no œdema. On examining the left lower extremity nothing abnormal in the colour or superficial temperature is noted—that is to say, there is no erythromelalgia-like appearance; but pulsation cannot be felt in the left dorsalis pedis artery, though the pulsation in the right dorsalis pedis artery is well felt. Pulsation can be felt in the posterior tibial artery at both right and left ankles.

Remarks.

I think that the intermittent claudication in the present case is connected with arteriosclerotic disease and belongs to the class of symptoms described by Allan Burns and Sir Benjamin Brodie (before Charcot took the subject up) as sometimes premonitory of the onset of senile gangrene. Both of these authors[1] compared the condition to what they supposed to occur in the heart in cases of angina pectoris; and in this connexion it is worth mentioning that the patient, J. M., whose case I described in 1910,[2] but who first suffered from intermittent claudication on walking in 1904, died in March, 1917 (there was no necropsy) after a very severe attack of typical angina pectoris. Some other cases of intermittent claudication (Charcot,[3] Erb,[4] &c.) are known to have, later on, suffered from angina pectoris. In the present case, though the patient is a Russian Hebrew, I do not regard the arterial disease as an example of the special condition, which I prefer to call "Non-syphilitic Arteritis Obliterans of Hebrews."[5]

[1] Allan Burns, "Observations on Some of the Most Frequent and Important Diseases of the Heart," Edinb., 1809, p. 138; Sir Benjamin Brodie, "Lectures on Pathology and Surgery," Lond., 1846, p. 360.

[2] F. Parkes Weber, *Trans. Med. Soc. Lond.*, 1910, xxxiii, p. 394.

[3] The term "claudication intermittente" was first used by H. Bouley (jun.) in 1831, in regard to a rare affection of the extremities (mostly the hinder extremities) in horses. *See* H. Bouley, jun., *Arch. gén. de Méd.*, Par., 1831, xxvii, p. 425. Charcot's writings on the affection in human beings date from 1858 (*Compt. rend. de la Soc. de Biol.*, Par., 1858, v, pp. 225 *et seq.*).

[4] It was Erb, of Heidelberg, who, in 1898, suggested the term "dysbasia intermittens angiosclerotica" for the affection, when (as it usually does) it affects one of the lower extremities, but of course this term is only a name (like "intermittent claudication") for the symptom-complex in question; the symptoms may be caused by various arterial diseases.

[5] Cf. F. Parkes Weber, *Quart. Journ. of Med.*, Oxf., 1916, ix, pp. 289-300.

(*May* 11, 1917.)

Persistent Hereditary Œdema of the Legs (Milroy's Disease) in Mother and Daughter.

By J. D. ROLLESTON, M.D.

THE mother, aged 45, shows a brawny, painless œdema of the right leg from the knee downwards. The œdema is not very obvious over the foot and ankle because it is reduced by her boots. The left leg shows a similar condition, but in a less degree.

The maximum circumference measurements are :—

	Right leg	Left leg
Knee	13 in. ...	13 in.
Calf	15¾ ,, ...	12 ,,
Instep	10 ,, ...	9 ,,

Her brother and her mother's sister are said to be similarly affected.

The patient says that the œdema becomes less after a night's rest, and almost disappears if, from illness, she is compelled to keep to her bed for a week or more.

The daughter, aged 22, shows a similar condition to that of her mother, except that the left leg is more affected than the right. The maximum circumference measurements are :—

	Right leg	Left leg
Knee	12 in. ...	12¾ in.
Calf	12 ,, ...	14 ,,
Instep	9½ ,, ...	10 ,,

Her two brothers are normal as regards their legs, as was also her only child, who died in infancy.

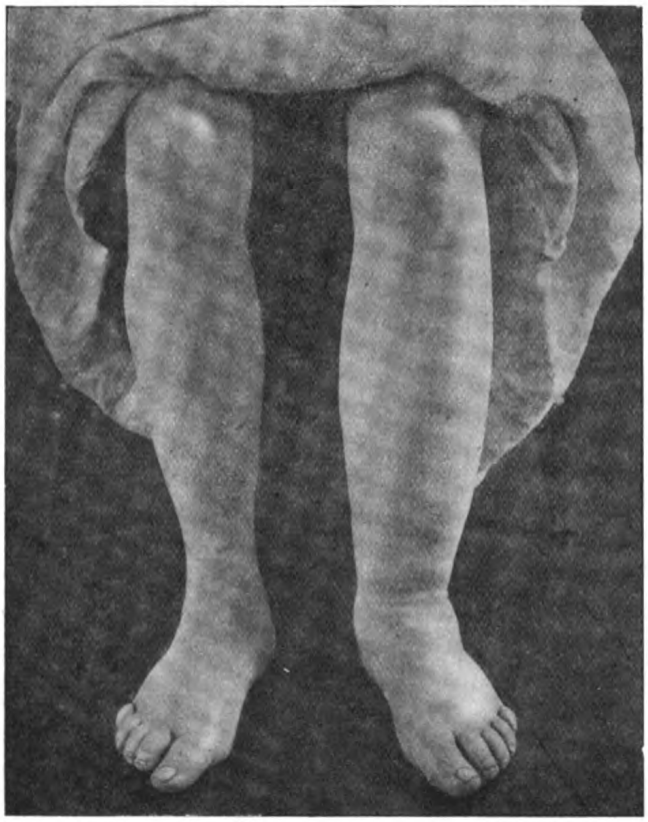
Neither the mother nor the daughter suffer much inconvenience from the œdema, which has been present in both since birth and has not been affected by pregnancy or menstruation.

There is no history of acute exacerbations. The heart and urine are normal in both. The mother's systolic blood-pressure is 128, and the daughter's systolic blood-pressure 118 mm. Hg.

These cases present the four cardinal symptoms of the condition

described by Milroy[1] in 1892: (1) Congenital character; (2) limitation of the œdema to the lower limbs; (3) permanence of the œdema; (4) entire absence of constitutional symptoms.

A special feature in the two cases is the unilateral predominance of the œdema, the right leg in the mother and the left leg in the daughter (*vide* figure) being chiefly affected.



Milroy's disease.

As regards the occurrence of nervous diseases in the family to which Hope and French[2] had drawn attention in connexion with Milroy's disease, it may be mentioned that the daughter has had chorea in childhood, and one of her brothers is of a very nervous disposition.

[1] *New York Med. Journ.*, 1892, lvi, p. 505.

[2] *Quart. Journ. Med.*, 1907-8, i, p. 326.

DISCUSSION.

Dr. F. PARKES WEBER: Non-familial examples of this form of segmental œdema are, I believe, not of extreme rarity. I have shown two cases,[1] and several others have been described at the various London medical societies during the last ten years. Familial (hereditary) cases, that is to say, cases of "Milroy's disease," such as those shown to-night by Dr. J. D. Rolleston, are extremely rare. So also non-familial cases of von Recklinghausen's disease are much less rare than familial cases, and the same may perhaps be said in regard to some other diseases, such as multiple exostoses.

Mr. W. J. MIDDLETON: I had recently a case of the non-familial type under my care. The patient was a girl aged about 23. Over three years ago she noticed some pain and swelling in both legs. With rest and treatment this subsided sufficiently to admit of her resuming work as a domestic servant. Within a few months, however, the legs again swelled more than before and she gave up work. On examination, the legs were found to be bluish in colour and mottled, there was a patch on each about 3 in. in diameter, which was red and more painful than any other part. Both legs were much larger than normal and felt brawny. There was little pitting on pressure. The patient's general health was not good, but there were no serious symptoms and nothing was found seriously wrong with any important organ. Before coming under my care the patient had been treated for over two years at a general hospital and by her own doctor without success. I treated her by means of multiple acupuncture and irritants, as in cases shown at previous meetings of this Section. Within a few weeks the œdema lessened and became progressively less as time went on. The treatment was continued for over three months and the patient's general health improved. The method is well worth trying in cases of the non-familial type such as I have described, but I do not advocate it in such cases as Dr. Rolleston's where there is little discomfort or interference with daily duties.

[1] F. P. Weber, *Proc. Roy. Soc. Med.*, 1909, ii (Clin. Sect.), p. 52; and *Trans. Med. Soc. Lond.*, 1912, xxxv, p. 370.

(*May* 11, 1917.)

The Pel-Ebstein Recurrent Pyrexial Type of Hodgkin's Disease (Lymphogranulomatosis Maligna).

By F. Parkes Weber, M.D.

The patient, C. B., aged 46, a baker, was admitted to hospital on July 5, 1916, with a history of having had repeated febrile attacks since early in November, 1915. These pyrexial periods had lasted four or five days, and on the average had recurred twice a month, so that he had already had fifteen such attacks. Each attack had made him feel very weak, and had been associated with profuse sweating. He thought that in the apyrexial intervals between the attacks he did not regain his ordinary strength, though otherwise he felt well. There appeared to be nothing of special importance in regard to family or previous history, excepting that, since being hit by a motor-car ten years ago, he had been subject to occasional pain in the lumbar region of his vertebral column. He had had two children, both of whom died of bronchitis in infancy. His wife by a previous husband had had six children.

After admission, during an apyrexial interval, no definite signs of disease could at first be made out. By ordinary examination the thoracic and abdominal organs and the mouth appeared normal. The testes were very small. No enlargement of the liver or spleen or superficial lymphatic glands was detected. There was no expectoration. The urine was of specific gravity 1020, acid, and free from albumin and sugar. No bony changes were shown in Röntgen skiagrams of the lumbar spinal column and the sacro-iliac joints. The knee-jerks were present. The pupils reacted to light and accommodation.

The first pyrexial attack in the hospital commenced on July 13, 1916. This was probably about his sixteenth period of pyrexia and lasted ten days, but after an apyrexial interval of only four days it was succeeded by another pyrexial period lasting nine days. The next attack followed after an interval of only three days, and similar attacks recurred till the patient's death on November 21, 1916. During the height of the attacks the temperature usually reached about 104° F. On the whole, the attacks increased in severity, and each attack left the patient weaker

than he was before. At first there were two attacks per month, but the seventh attack in the hospital lasted fifteen days (from October 9 to October 23), and the next attack lasted twenty-one days (October 29 to November 18), almost till the patient's death (November 21), which seemed to be due to general exhaustion. Thus from the first febrile attack in November, 1915, to his death in November, 1916, the patient had altogether about twenty-three pyrexial attacks. Those which occurred in the hospital are well illustrated by the accompanying twenty weeks' temperature chart (*see* figure, p. 45).

In regard to the *diagnosis*, I noted on July 15, 1916, that there was no sign to suggest that the fever was due to Hodgkin's disease, that is to say, that the disease was the Pel-Ebstein recurrent pyrexial type of lymphogranulomatosis maligna. But on July 20, during the same pyrexial period, the spleen seemed already to be enlarged (by percussion note). On September 29, during another pyrexial period, moderate enlargement of the lymphatic glands in the right axilla, together with slight enlargement of those in the left axilla, was observed. The inguinal glands were not enlarged. The spleen was then obviously enlarged to percussion, though by palpation the edge could not yet be felt. On October 20, during the seventh pyrexial period in the hospital, the lower edge of the enlarged spleen could be felt about two finger-breadths below the left costal margin. The liver was then likewise obviously enlarged, the hepatic dullness in the right nipple line commencing above at the sixth rib and the lower edge of the organ reaching about 1 in. below the costal margin. The lymphatic glands were felt in both axillæ, but were apparently not larger than before. The inguinal and cervical lymphatic glands seemed not to be swollen. With the enlargement of the axillary glands the diagnosis of the case became of course fairly obvious. In regard to the changes in the retro-peritoneal lymphatic glands, and in the liver and spleen, subsequently found at the post-mortem examination, it may be noted that the patient himself insisted on there being something wrong in his abdomen.

In regard to *treatment*, arsenic by the mouth, tincture of perchloride of iron, and sulphate of quinine were tried. Repeated small intravenous injections of the "Kharsivan" brand of salvarsan were likewise employed, but unfortunately without any obviously good result. Röntgen ray therapy appears not to be of service in severe pyrexial types of abdominal lymphogranulomatosis maligna and was not tried in the present case. Aspirin, when given symptomatically, tended to increase the sweating.

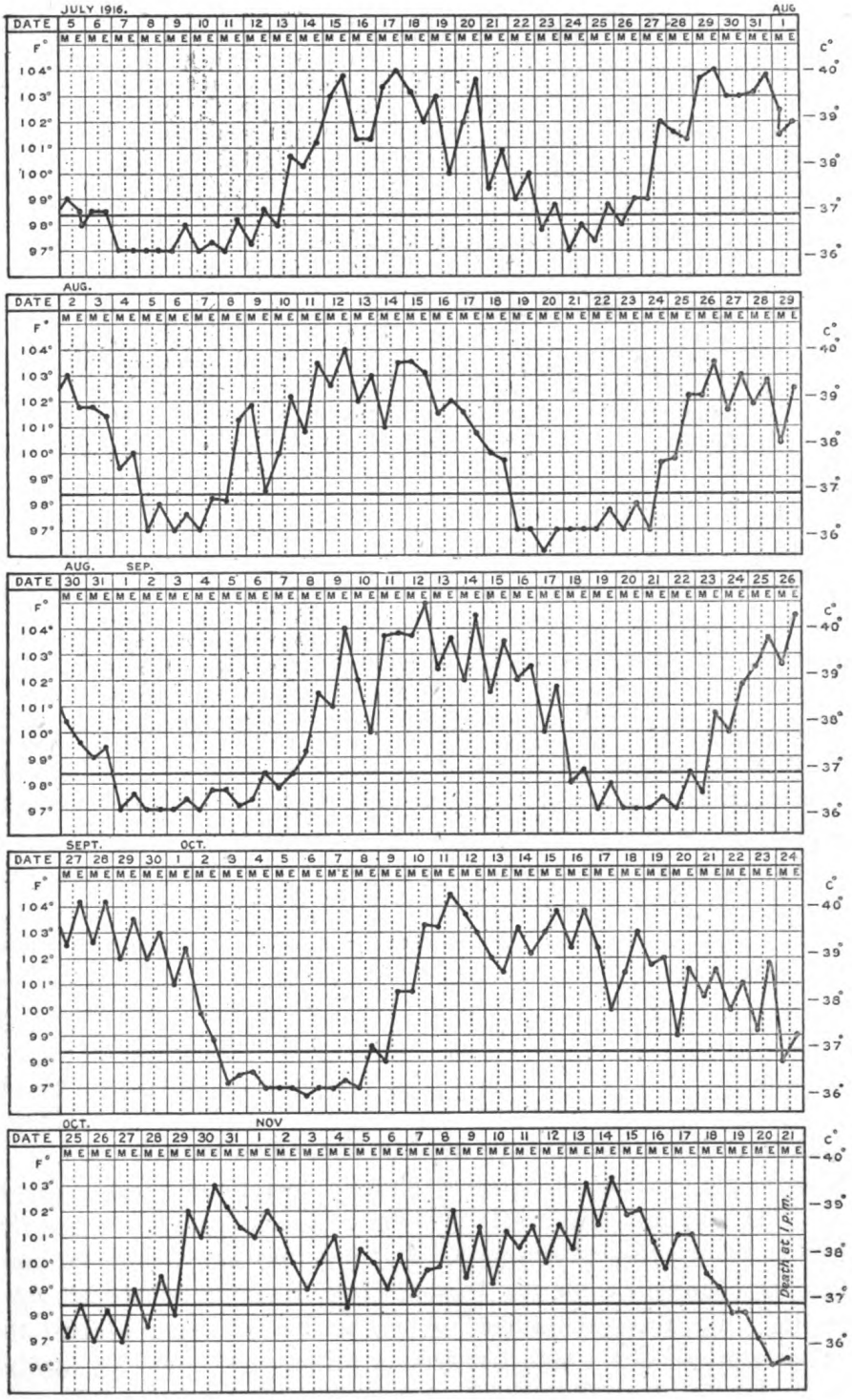
In this case the Wassermann reaction for syphilis (tried twice) and Pirquet's cuti-reaction for tuberculosis were both negative. Nothing abnormal was found in the eyes by ophthalmoscopic examination. In November, 1916, there was subicterus; during the last days of life there was extreme debility, with tendency to low delirium, and there was subcutaneous œdema, notably of the left hand and both feet. During the illness there was occasionally epistaxis, and on one occasion (October 4, 1916) a small hæmatoma formed in the left upper eyelid. The urine at the end (November 16, 1916) was of specific gravity 1015, acid, containing a trace of albumin; the ordinary reactions were negative for sugar, bilirubin, indican, and acetone, but were positive for urobilin and urobilinogen.

Blood-counts were made from time to time, but (as I think in most advanced cases of lymphogranulomatosis maligna) showed nothing of importance beyond increasing anæmia of a leucopenic type. On July 16, 1916, there was as yet little abnormal to be seen. The red cells numbered 5,000,000 to the cubic millimetre of blood; the white cells were 5,350; and nothing special was noted by microscopic examination of a stained blood-film. Microscopic examination was likewise negative on July 30. On October 7, 1916, a blood-count gave 4,200,000 red cells and 2,500 white cells (leucopenia) to the cubic millimetre of blood; hæmoglobin, 85 per cent. On the last day of life (November 21) a blood-count gave 1,900,000 red cells and 2,500 white cells (of which about 62 per cent. were small lymphocytes) to the cubic millimetre of blood; hæmoglobin 35 per cent.; colour index 0·92; the erythrocytes appeared normal and no erythroblasts were seen.

Necropsy: Microscopic and Bacteriological Examinations.

The *brain* (weight, 41 oz.) showed nothing special; there was some œdema of the pia mater. The spinal cord was not examined. There was hypostatic œdema of the *lungs*, and at the apex of the left lung there was an old calcified nodule. There was no pleural effusion on either side. The *heart* weighed 12 oz., and showed nothing special. The *aorta* was somewhat hypoplastic. In the peritoneal cavity there were about 1½ litres of yellowish serous ascitic fluid.

The *spleen* was much enlarged, weighing 27 oz. Its substance was rather soft and contained, scattered throughout it, many white or yellowish-white foci, of about the size of a large pea or smaller, some of them showing through the capsule. Microscopic examination of



Temperature chart illustrating the Pel-Ebstein recurrent pyrexial type of Hodgkin's disease. The last twenty weeks in the case of Dr. Weber's patient, C. B.

films from the splenic pulp showed erythrocytes, small lymphocytes, and larger "splenic cells" or "splenocytes;" no micro-organisms were seen.

The *liver* was enlarged, weighing 71½ oz., and had a nutmeggy appearance; it was of rather soft consistence. Though the *pancreas* macroscopically seemed normal, a piece was removed for microscopic examination. The *kidneys* (weight together, 11½ oz.) did not appear affected; they both contained some small hard pale nodules in the medullary portion, which microscopical examination showed to be fibromatous in nature, such as are often found in kidneys at post-mortem examinations. The *testicles* were (as already mentioned) small. Nothing special was noted in the alimentary canal, suprarenal capsules, or thyroid gland. No remnant of the thymus gland was found.

In front of the vertebral column, on both sides of the abdominal aorta, the *retroperitoneal lymphatic glands* were enlarged, forming conglomerate chains. They were mostly rather hard and on section had a reddish-white appearance, as if injected with blood. The mesenteric, like the superficial, lymphatic glands were not much enlarged.

Microscopic examination of enlarged retroperitoneal lymphatic glands from the sides of the abdominal aorta showed areas of necrosis, and also hæmorrhagic areas (possibly as a result of hæmorrhage into necrotic foci); considerable fibrosis; a great increase of large endothelial-like cells apparently at the expense of the small lymphocytes. Some vessels or spaces contained hyaline material (probably coagulated lymph); others contained endothelial-like cells with much clear cytoplasm and small deeply-staining nucleus, somewhat suggesting the cells characteristic of the Gaucher type of primary splenomegaly. Numerous giant-cells of the kinds characteristic of Hodgkin's disease were likewise present. Though the mesenteric lymphatic glands appeared macroscopically normal, one of them was likewise examined microscopically, but no marked pathological changes were found in it.

Microscopic sections of the *spleen* showed necrotic and hæmorrhagic areas. The lymph-follicles (Malpighian corpuscles) appeared greatly reduced at the expense of the pulp. In the pulp were endothelial-lined sinuses or channels more or less filled with endothelial-like cells, suggesting (like those mentioned above in the lymphatic glands) the cells characteristic of the Gaucher type of primary splenomegaly (having a small, mostly centrally-placed, deeply-staining nucleus and much clear cytoplasm).

Microscopical examination of the *liver* showed a few definite foci of lymphogranulomatosis maligna (Hodgkin's disease), but the most striking change was one of centro-acinous necrosis, such as is found in various acute atrophic conditions of the liver (probably of toxic origin). In some parts of the liver there were larger (probably necrotic) areas, full of red blood cells. A microscopic section of the *pancreas* likewise showed necrotic areas, apparently analogous to those in the liver. Microscopic sections of kidney, suprarenal gland, thyroid gland, and pituitary gland showed nothing specially noteworthy (beyond the fibromata already mentioned in the kidneys).

Bacteriological Examination.—Cultivations (Dr. H. Schmidt, with help from the Lister Institute) were attempted on glucose-ascites-agar with: (1) blood serum obtained post mortem from the patient's heart; (2) splenic pulp; (3) the enlarged retroperitoneal lymphatic glands. The only positive result was that growths of *Bacillus coli* were obtained from the retroperitoneal lymphatic glands, probably due to contamination of the cultivation media (? air of the post-mortem room).

In regard to the pathological examination of the case I am greatly indebted to Dr. H. Schmidt.

Remarks.

The patient in the present instance was affected with recurrent pyrexial attacks for just over a year before he succumbed, but I consider it highly probable that this active stage of the disease was preceded by a much longer, though latent, one during which the lymphogranulomatosis in the retroperitoneal lymphatic glands only gave rise to occasional lumbar pain. When the primary change is located, as it more frequently is, in one of the groups (for instance, the right or left axillary or cervical group) of superficial lymphatic glands, a local glandular enlargement has generally been observed before the *pyrexial stage* of the lymphogranulomatosis commenced. It is because the retroperitoneal lymphatic glands are so deeply hidden away in the body that the diagnosis of Hodgkin's disease is at first so difficult in cases in which this group of glands is primarily affected. I know of one case of the Pel-Ebstein recurrent pyrexial type of Hodgkin's disease in which the correct diagnosis was suggested by a surgeon after an exploratory laparotomy at which a (retroperitoneal?) mass was felt behind the stomach and liver.

The pyrexial stage of Hodgkin's disease may be regarded, I think, as the stage of dissemination or generalization of the disease (a kind of

"septicæmia of Hodgkin's disease," as I have elsewhere[1] suggested), during which the abdominal viscera (in especial) are becoming more and more involved.

The abdominal viscera, notably the spleen and liver, are affected (often simultaneously) in two ways. The first is by the formation of lymphogranulomatous foci in the viscus in question, similar to those in the lymphatic glands. Such foci may be termed metastatic, whether the lymphogranulomatous material is actually carried by the blood or lymph-stream from the primary seat of the disease, or whether only the (microbic ?) cause of the lymphogranulomatous process is disseminated.[2] The second way in which the abdominal viscera (spleen and liver) are affected is by the formation of necrotic foci, not merely in the lymphogranulomatous areas, but sometimes likewise in portions of the parenchyma of the viscus or viscera in question in which no lymphogranulomatous change can be detected. In the present case, for instance, I think that the centro-acinous necrotic change in the liver was not merely due to passive congestion ("nutmeg liver") but was probably toxic in origin. I think that some localized foci of necrosis in the liver, as well as in the spleen and pancreas, were likewise of toxic origin, if not due to blocking of blood-vessels by the lymphogranulomatous process. Moreover, as I would mention by the way, it seems that in Hodgkin's disease necrotic changes in the viscera are altogether commoner and more numerous, and play a more important part in the clinical and pathological picture than is generally supposed.

The collections of "glassy" endothelial-like cells in the affected lymphatic glands and spleen constituted a striking feature in the present case. These cells, as previously mentioned, had a small, mostly centrally-placed, deeply-staining nucleus, and, relatively, much clear cytoplasm; in appearance they suggested the cells characteristic of the Gaucher type of primary splenomegaly. C. H. Bunting and J. L. Yates[3]

[1] F. Parkes Weber, "Acute Cases of Hodgkin's Disease," *St. Bart.'s Hosp. Reports*, Lond. (for year 1907), xliii, pp. 81-92.

[2] Cf. F. Parkes Weber, loc. cit., p. 82: "The acute dissemination of the disease throughout the body should, I think, be regarded as a 'septicæmia of Hodgkin's disease,' using the word septicæmia in the broadest sense of the term, as it is used in 'gonococcal septicæmia,' 'pneumococcal septicæmia,' 'influenzal septicæmia,' and as it might justly be used in reference to the occurrence of fatal acute miliary tuberculosis, as a result of injury to some old tuberculous focus. According to this view the lymphadenomatous nodules in the viscera are, of course, not metastatic growths in the ordinary sense of the term (that is to say, in the sense in which secondary carcinomatous nodules are metastatic), but are due to metastasis or generalization of the exciting cause of the disease; that is to say, of the hypothetical microbe."

[3] Bunting and Yates, *Johns Hopkins Hosp. Bull.*, Balt., 1917, xxviii, p. 152.

recognize three terminal pathological-anatomical pictures in Hodgkin's disease: (1) Almost complete sclerosis; (2) the "sarcomatoid" picture; (3) the "endotheliomatoid" picture. The collections of "glassy" endothelial-like cells in the present case must, I suppose, be regarded as an unusual part of the so-called endotheliomatoid picture.

The leucopenia and leucopenic anæmia of late stages of Hodgkin's disease[1] (as observed in the present case) are probably nearly always associated in some way with grave involvement of the abdominal viscera; and a leucopenia may accompany many other chronic enlargements of the spleen, such as those due to malaria, kala-azar, Banti's disease, chronic malignant endocarditis,[2] and chronic thrombo-phlebitis of the splenic and portal veins.[3] In all chronic splenomegaly cases in adults, when the count of white corpuscles in the blood is moderately increased instead of being diminished, the possibility of the case being one of (atypical, "aleukæmic," or "aleucocythæmic") leukæmia should always be kept in mind.

An infective origin of Hodgkin's disease (lymphogranulomatosis maligna) is generally regarded as probable, and in recent years a diphtheroid bacillus has been claimed as the microbic agent in question, especially by American writers, since C. H. Bunting and J. L. Yates first published their work on the subject in 1913.[4] Their organism is apparently the same as that to which E. de Negri and Mieremet[5] gave the name, *Corynebacterium* (κορύνη, a club) of malignant granuloma, a Gram-positive, and non-acid-fast, granular rod, with rounded ends and central constriction, similar to that previously described by E. Fraenkel and H. Much.[6] The whole question of the ætiological relation of the "corynebacterium" to Hodgkin's disease, &c., has however been called

[1] Cf. F. Parkes Weber, "A Case of Late Hodgkin's Disease," *Trans. Med. Soc. Lond.*, 1911, xxxiv, p. 295, and *Amer. Journ. Med. Sci.*, Philad., 1911, cxlii, p. 508.

[2] F. Parkes Weber, *Trans. Med. Soc. Lond.*, 1910, xxxiii, p. 83.

[3] F. Parkes Weber, "Sequel to a Case of Chronic Splenomegaly with Persistent Leucopenia," *Proc. Roy. Soc. Med.*, 1916, ix (Clin. Sect.), p. 1.

[4] Bunting and Yates, "Culture Results in Hodgkin's Disease," *Arch. Internat. Med.*, Chicago, 1913, xii, p. 236.

[5] Negri and Mieremet, "Zur Aetiologie des malignen Granuloms," *Centralbl. f. Bakt.*, Jena, 1913, lxviii (Originale), p. 292.

[6] *See* Eugen Fraenkel and H. Much, "Bemerkungen zur Aetiologie der Hodgkinschen Krankheit," *Münch. med. Wochenschr.*, 1910, lvii, p. 685, also "Ueber die Hodgkinsche Krankheit," *Zeitschr. f. Hyg.*, Leipz., 1910, lxvii, pp. 159-199. Cf. also O. Meyer, "Beiträge zur Klinik, Pathogenese und pathologischen Anatomie des malignen Granuloms," *Frankfurter Zeitschr. f. Path.*, 1911, viii, p. 343.

in question, notably (1917) by W. F. Cunningham,[1] who gives his reasons for not believing that the organism in question bears any relation to the cause of Hodgkin's disease. In the present case the post-mortem search for a microbic cause of the disease gave a practically negative result.

Pel-Ebstein Pyrexia.—The fever of Hodgkin's disease is mostly of an irregular kind, with a moderate evening rise, but occasionally a long, regularly recurrent, periodic type of fever is met with. This "chronic relapsing pyrexia of Hodgkin's disease" has sometimes been termed the "Pel-Ebstein symptom," or the "Pel-Ebstein pyrexia," because both Pel[2] and Ebstein[3] (independently) described instances of it in 1887. Of this, perhaps the most typical published example in existence is an eight months' chart reproduced to illustrate a paper (1911) by C. H. Melland.[4] Articles on the subject have been written by F. de Havilland Hall,[5] L. Hofbauer,[6] J. H. Musser,[7] Frederick Taylor,[8] A. S. MacNalty,[9] B. Schick,[10] T. H. Whittington,[11] and others. Whittington's case was a clinically obscure one in an adult, in whom (as in the present instance) the retroperitoneal glands and spleen were specially affected. MacNalty argued that there was a definite type of lymphadenoma (that is to say, Hodgkin's disease) associated with relapsing pyrexia, and that certain cases of tuberculous adenitis and of chronic pulmonary tuberculosis with relapsing pyrexia bore a close resemblance to it. He included an analysis of the earlier literature on the subject, and gave several references to English writings which appeared before the publications of Pel and Ebstein. Having regard to the difficulty of the whole matter it is not surprising that on the Continent such recurring pyrexial cases of Hodgkin's disease have occasionally been labelled as instances of a separate disease: the "Pel-Ebstein disease" or the "Ebstein disease."

[1] W. F. Cunningham, "The Status of Diphtheroids with special reference to Hodgkin's Disease," *Amer. Journ. Med. Sci.*, Philad., 1917, cliii, p. 406.

[2] Pel, *Berl. klin. Wochenschr.*, 1887, xxiv, p. 644.

[3] Ebstein, *Berl. klin. Wochenschr.*, 1887, xxiv, p. 565.

[4] Melland, *Edinb. Med. Journ.*, 1911, n.s., vi, pp. 156-164, Chart I.

[5] Hall, *Practitioner*, Lond., 1911, lxxxvi, p. 473.

[6] Hofbauer, *Wien. med. Wochenschr.*, 1905, lv, p. 86.

[7] Musser, *Trans. Assoc. Amer. Phys.*, 1901, xvi, p. 638.

[8] Taylor, *Guy's Hosp. Reports*, Lond., 1906, lx, p. 1.

[9] MacNalty, *Quart. Journ. Med.*, Oxf., 1911, v, pp. 58-108.

[10] Schick, *Zeitschr. f. Kinderheilk.*, Berl., 1913, v, p. 493.

[11] Whittington, *Quart. Journ. Med.*, Oxf., 1916, ix, p. 83.

Even now it is not clear why certain exceptional cases of Hodgkin's disease show this type of pyrexia, whereas in the generality of pyrexial cases the pyrexia is of a quite different type.

DISCUSSION.

Dr. DE HAVILLAND HALL: At times the diagnosis of the retroperitoneal form of this disease is most difficult; indeed, the diagnosis is usually founded upon the presence of temperature of a recurrent type. In a paper I communicated to the *Practitioner* in April, 1911, I gave notes of five cases of Hodgkin's disease. In one, a man aged 48, the diagnosis was only made at the necropsy. The patient had lived for many years in South America. In June, 1897, his temperature was found to be high. In the autumn he came to England and a diagnosis of malarial fever was made by the physician whom he consulted. He returned to South America in the following November. In April, 1898, he again came to England and placed himself under my care, and he died three weeks later. Though I had the advantage of a consultation with Sir Patrick Manson no diagnosis was arrived at, but looking at the characteristic chart, extending over eight weeks, which is printed in my paper, in the light of present knowledge I should at once suggest the probability of Hodgkin's disease. At the necropsy, with the exception of a few very small glands in the inguinal regions, the lymphadenomatous growth was almost entirely retroperitoneal.

Dr. A. S. MACNALTY: Since the publication of my paper in the *Quarterly Journal of Medicine* for 1911, from which Dr. Parkes Weber has quoted, I have investigated ten additional cases of the disease. I will refer briefly to these cases. They are all examples of what I have termed one of the two main forms of the disease, that is, a form in which the external lymphatic glands exhibit enlargement with or without enlargement of the internal lymphatic glands. In every case, pathological proof of the lymphadenomatous nature of the cases was obtained, either by excision of one of the affected glands during life and subjecting it to microscopical examination, or by post-mortem evidence. Three of the cases came to autopsy.

Sex.—Five of the cases were in males and five in females.

Age.—The youngest case was in a male child aged 3. This, so far as I am aware, is the youngest case of the disease on record. Murchison's[1] case was that of a girl aged 6. The oldest case was in a woman aged 54, who was under observation for some length of time in both the London and the Brompton Hospitals. Klein[2] has reported a case in a woman aged 51. Of the other cases, six occurred in the decennial period 20 to 30, and the remaining two were in a boy aged 8 and a man aged 36.

[1] Murchison, *Trans. Path. Soc. Lond.*, 1870, xxi, p. 372.

[2] Klein, *Berl. klin. Wochenschr.*, 1890, xxvii, p. 712.

Onset.—The history of onset varied from three years to two months.

The Lymphatic Glands.—In every case the cervical glands were affected. Usually, also some glands were palpable in the axillæ and groins. One acute case of six months' duration exhibited general glandular enlargement.

I think it is possible to recognize in these external glandular forms two distinct clinical types. In the first type, the glands may or may not enlarge during pyrexia. If they enlarge, they may be painful, soft and tender, but they do not become attached to the skin. Nine of the cases belong to this type. The second type is much rarer. Dr. Batty Shaw[1] has described a typical case. In the apyrexial stage the glands may be small, freely movable and unattached to one another or to the skin; with the advent of pyrexia, the glands swell up to the size of a cricket ball; they are hot, painful and tender, apparently adherent to the skin, and the skin over them is red or purple and sometimes œdematous. They resemble so closely suppurative glands on the point of discharging pus that in several instances they have been incised. As lysis occurs the glands shrink down to their original size and the untoward symptoms are in abeyance until the advent of the next pyrexial period. One of these ten cases comes under this category.

The Temperature.—All the cases exhibited well-marked relapsing pyrexia, an afebrile period or a period of low pyrexia intervening between the bouts of pyrexia. The temperature charts in these cases confirmed previous observations that the duration both of the pyrexial periods and of the apyrexial periods is not a constant one and they do not bear any relation to one another.

The *blood* showed a progressive anæmia, extremely marked in certain of the cases. A progressive anæmia is a marked feature of the disease; in one case in the later stages of the malady, the red corpuscles dropped from 4,700,000 per cubic millimetre to 2,788,000 per cubic millimetre. The hæmoglobin is reduced in amount. One case, a child aged 8, showed an extreme instance of the anæmia—only 1½ million red corpuscles per cubic millimetre were present and only 10 per cent. hæmoglobin. The leucocytes showed no distinctive changes, either as regards morphology or proportion, but a polymorphonuclear leucocytosis may occur.

The Heart.—Transient hæmic murmurs were noted in one case. These, associated with the pyrexia, sometimes give rise to the diagnosis of malignant endocarditis.

Respiratory System.—Cough, slight expectoration and dyspnœa were frequently encountered. The shortness of breath seems brought about by the anæmia or by pressure of the enlarged glands. An interesting feature shown by one of my reported cases is that the pulmonary physical signs may be relapsing in character. In such instances, probably the internal glands enlarge in a pyrexial period, occlude a bronchus and produce temporary collapse of the lung; in an afebrile period the pressure is removed and the lung returns to its normal condition.

[1] Batty Shaw, *Edin. Med. Journ.*, 1901, x, p. 501.

The Skin.—The peculiar grey-yellow or icteroid tint of the skin, described by Pel,[1] was recognizable in all the cases.

According to Musser,[2] icterus is a usual terminal feature. I saw this in one case—the acute case—where general jaundice developed and persisted for the last eleven days of life. Bronzing of the skin and pigmentation were marked in another fatal case.

Nervous System.—Delirium and coma were seen as terminal events in the fatal cases. Transient delirium is sometimes observed in the pyrexial periods in earlier stages of the disease.

Prognosis.—Eight out of the ten cases proved fatal. Of the two remaining cases, one patient was discharged from hospital, slightly improved; the other reacted well to arsenic and when last seen in 1914 was able to do light work. Recovery is, however, very exceptional.

Treatment.—All the cases were treated with various preparations of arsenic. The acute case was given 0·6 grm. of neo-salvarsan intravenously, without beneficial effect.

Even from this brief account, it will be seen that these cases confirm and amplify previous conclusions as to this disease being a definite clinical entity.

Internal Glands Alone Affected.—The second distinct clinical type is that in which the internal glands are alone affected. I have reported two cases of this type, one with post-mortem. The other case subsequently died at St. Thomas's Hospital and the then Medical Registrar, Dr. O. L. V. de Wesselow, informed me that the post-mortem confirmed the diagnosis of lymphadenoma.

Diagnosis.—In conclusion, I should like to say a few words about the diagnosis. The only infallible method of diagnosis is to excise an external lymphatic gland and then to examine a stained section of the gland under the microscope. If this procedure were carried out as part of the routine examination of a case, the disease would be more speedily recognized and not so often confounded with tuberculous adenitis and pulmonary tuberculosis. As I have shown elsewhere, certain cases of tuberculous adenitis and of pulmonary tuberculosis display relapsing pyrexia, so that this feature alone will not settle the diagnosis. In the type in which the internal glands are alone involved this touchstone of diagnosis (examination of an excised gland) fails and a process of elimination of other diseases has to be gone through. What diseases are simulated depends to a certain extent upon which of the two forms—the external or internal—are present, but not entirely, a notable exception being that of tuberculosis. All cases of lymphadenoma with relapsing pyrexia present certain clinical features, upon which a diagnosis may be based. I would lay stress upon: (1) The relapsing character of the pyrexia; (2) the periodic enlargement of the lymphatic glands (external, or internal, or both); (3) the periodic enlargement of the spleen; (4) the progressive anæmia and emaciation; (5) the characteristic grey-yellow tint of the skin.

[1] Pel, *Berl. klin. Wochenschr.*, 1885, xxii, p. 3, and 1887, xxvi, p. 644.

[2] Musser, *Trans. Assoc. Amer. Phys.*, 1901, xvi, p. 638.

Dr. PARKES WEBER (in reply): A case mentioned by Dr. Newton Pitt is one of extreme rarity, being an example of Hodgkin's disease with both undulatory pyrexia and cutaneous manifestations. But the cutaneous symptoms did not disappear or diminish during the apyrexial intervals, as the cutaneous eruption in rat-bite fever does. In regard to the remarks by Dr. Gordon Ward on the latter disease, I may mention that I have seen a patient with recurrent pyrexial periods, each period of fever being accompanied by a cutaneous eruption, as in rat-bite fever; but there was no evidence that the patient had been bitten by a rat or by any other animal; recovery took place. With regard to what Dr. MacNalty said about tuberculous cases, I am convinced that cases of Hodgkin's disease in children are sometimes accompanied by tuberculosis, as various authors have affirmed. I am glad that Dr. Hall has pointed out how difficult the diagnosis of Hodgkin's disease may be when the localization is mainly in the retroperitoneal glands.

Note.—Dr. Irwin Moore was prevented from giving his epidiascopic demonstration on pharyngeal pouches and strictures of the œsophagus.

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(*October* 19, 1916.)

Case of Leucocythæmia Cutis.

By H. BATTY SHAW, M.D., and D. LOUGHLIN.

J. B., FARM labourer, aged 37, was admitted into University College Hospital under the care of Dr. Batty Shaw. His history is as follows: After being in the Army for fifteen years, having served in India, Burma and Aden, he had returned to England and become a farm labourer. He had had pneumonia and frequent attacks of malaria. Although his wife had had two miscarriages he gave no history of syphilitic infection.

The first abnormality in his condition was the development of pains in his joints and in his back, which began eight months ago. This was followed in a few days by the development of purple-coloured patches on his body. About five months ago ulceration developed over the sacrum, and four months ago small lumps developed in the skin of his body, limbs and face. These lumps progressively increased in number and size.

He was originally admitted into the West Kent General Hospital, Maidstone, under the care of Dr. A. Shaw, who suspected some change in the blood, and discovered an abnormality.

When the patient was admitted into University College Hospital on August 22 of this year he was found to be febrile, the temperature reaching 101° F. to 102° F.; the pulse-rate was increased, and the patient was obviously very ill. The striking point about his features was that they were leonine, and the first impression was that he was suffering from leprosy. Scattered about his face were soft, fleshy

tumours, involving the skin of the forehead and face; they were present also in the neck, the front of the body, the arms and forearms, and the fronts of the thighs and legs; in some parts of the body they were absent—e.g., the ears and the eyelids, the elbows, knees, hands and feet. Some of them were purple in colour, others red or pale pink. They were painless, were not deeply attached, involving the skin, and being movable; they were soft and free from ulceration. There was a shallow ulceration of the skin over the sacrum, and there was penile ulceration. The skin of the ears and eyelids and mucous membrane was distinctly pale, but the skin generally of the body showed a brownish pigmentation, and the legs especially showed patches of purpura. The nodules at the beginning were described as being much flatter than they are at the present moment. There were subconjunctival hæmorrhages in both eyes; only a few deposits were found on the back; the feet were œdematous; the skin was rather hyperæsthetic, but there was no pruritus. The voice was distinctly hoarse. On looking into the mouth it was seen to be pale, but the tonsils were enlarged and showed purplish patches of discoloration. The only glands that felt enlarged at all were those of the groin; their enlargement appeared to be due to the ulceration above-mentioned. Neither spleen nor liver could be felt. The patient's memory was found to be impaired, but no physical signs of disease of the nervous system could be made out.

Mr. J. Herbert Parsons reported the presence of small hæmorrhages in the neighbourhood of the maculæ, and some, very minute, in the periphery of the fundi; the disks were pale, but otherwise normal. Mr. Gwynne Williams expressed the view that the penile ulceration and the ulceration of the buttocks were non-specific in nature. The Wassermann reaction was also negative. During his stay in the hospital the patches have increased in size, especially on the face, so that there is very little uninvaded skin visible. Even the eyelids have become invaded, and there are deposits beneath the conjunctiva. The temperature has persisted, and there is some trace of periodicity. The purpura in the legs disappeared, and the patches on the face lost their purple colour. Recently, however, this has recurred.

Examination of throat and larynx (October 18) (Mr. Tilley's report): The palate is abnormally pale. The upper end of right tonsil is swollen and of a reddish colour, but there is no definite or circumscribed tumour. In the region of the left lingual tonsil is a reddish-purple swelling the size of a hazel nut, the base is broader than the fore portion, so that it resembles the tumours seen elsewhere.

Larynx: The vocal cords are normal in movement and appearance, but the right is largely hidden by a reddish-purple swelling which occupies the anterior half of the right ventricular band; the swelling is again about the size of a hazel-nut.

Blood count: This has been carried out on five occasions. The total red cells have increased since admission from 830,000 to 1,800,000 per cubic millimetre. The hæmoglobin has also increased from 15 per cent. to 35 per cent., the colour index has varied from 0·65 to 0·98. The red cells have shown vacuolation and poikilocytosis. Macrocytes were numerous on two occasions, absent on three occasions. Microcytes were always present. On two occasions only were nucleated red cells seen. The white cells varied from a minimum of 3,500 to a maximum of 6,200. The analysis of the five counts is as follows :—

Total number of white cells per cubic millimetre	Percentage of lymphocytes		Percentage of polymorphonuclear cells	Date
	Small	Large		
6,000	73	2	25	August 25, 1916
3,000	60	10	30	September 1, 1916
3,500	50	6	44	,, 12, ,,
3,400	60	8	32	,, 30, ,,
6,200	38	6	56	October 4, 1916.
4,420	56·2	6·4	37·4	Average

Mr. T. W. P. Lawrence has been good enough to examine a microscopical section of one of the nodules removed under local anæsthetic, and has reported as follows :—

"Stratum reticulare: The superficial zone is densely infiltrated with cells, in the main resembling lymphocytes. Many of the cells are, however, rather larger than normal lymphocytes; the nuclei are less uniform in size, and many are slightly oval. A specially wide and dense tract of infiltration follows the course of a hair-follicle, and elsewhere similar infiltration is present, though much smaller in amount. In certain areas the lymphatic clefts of the stratum reticulare are markedly dilated, and the intervening connective tissue is increased in amount and density. In other areas the endothelium of the clefts is hyperplasic; in places the cells are swollen, highly protoplasmic, cubical and arranged around a central lumen, in other places they are flattened, fusiform, polyhedral and arranged in narrow, solid columns or masses. Scattered through the reticulare are small areas of red cells.

"Stratum papillare: The papillæ are swollen from œdema. The cell infiltrate of the reticulare encroaches very slightly on this layer, except in certain of the papillæ, where a central column of cells extends

almost to the epithelium. A few red blood corpuscles have been extravasated in places.

"Epithelium: This forms a very thin superficial stratum, and the inter-papillary processes are short and narrow.

"Diagnosis: Leucocytic infiltration of lymphocytic type with chronic reticular lymphangitis."

Comment.—The clinical features of this case are extraordinary enough, but greater interest centres round the problem of diagnosis. The diagnosis of leucocythæmia cutis is made on the blood picture, which shows severe secondary anæmia without the classical signs of pernicious anæmia, and a qualitative change in the leucocyte picture. So far as the number of leucocytes is concerned there is little to support the contention that the case is leucocythæmia. It may be thought that an average total lymphocyte count of 62·6 per cent. is met with in lymphadenoma, and some writers have insisted upon this possibility, but most are agreed that high lymphocytosis of this degree indicates the leucocythæmic nature of the malady. Mr. Lawrence's report on the microscopic appearance of the nodules shows cells like lymphocytes accumulated in the skin. To get over the difficulty of speaking of a case of leucocythæmia or leukæmia with only qualitative and not quantitative changes in the blood the term "aleukæmia" has been introduced, but for simplicity's sake this case has been shown under the title of "leucocythæmia cutis." The extraordinary development in the skin in this case is not unfamiliar to dermatologists. A case very similar to the present, including the anomalous blood count, has been described by Pfeiffer under the name of pseudo-leukæmia, but Pinkus, in describing the conditions met with in the skin in leucocythæmia, rightly regards Pfeiffer's case as one really of leucocythæmia cutis.

DISCUSSION.

Dr. F. PARKES WEBER: In October, 1894, I had an old man admitted to hospital under my care, whose "leonine" facies much resembled that of this man. I was then on the point of going for a holiday, and during my absence the man died. The resident medical officer at the time, Dr. J. P. zum Busch, made a very careful post-mortem examination, and published his results, with a photograph, under the title "granuloma fungoides."[1] Unfortunately the

[1] *Dermat. Zeitschr.*, 1895, ii, p. 204. Dr. Colcott Fox was much interested in the case and, from the photograph, he had an enlarged drawing made of the face for his collection, which now belongs to University College Hospital, London.

blood was not examined but a microscopic section of the liver (still preserved) showed me when I last examined it, a condition which I believe would now be described as one of *leukæmic infiltration.* I believe that the cases described by Kaposi under the heading "Lymphodermia perniciosa" (in which Kaposi claimed the presence of leukæmic blood-changes) belonged to the same class, though formerly by many authorities they were grouped together with cases of mycosis fungoides. The "leonine facies" in such cases of lymphodermia perniciosa might be as striking, as in true cases of tubercular leprosy. In regard to the low white-cell count in the blood of Dr. Batty Shaw's case, I might mention that a great number of cases have (as members doubtless know) been from time to time published, showing typical leukæmic infiltration of the viscera or skin, though the total white cell count was relatively low. The blood condition in such cases has been described under various headings, such as "aleukæmic leukæmia," or (when the red cells showed changes resembling those found in pernicious anæmia) "leukanæmia."

Dr. PERNET: A good many years ago I looked after a case somewhat of this lymphodermia perniciosa type at University College Hospital. The patient was under the late Dr. Radcliffe Crocker, and I believe a coloured drawing was made and may be in the library of University College Hospital Medical School.[1] That patient's face too might at first sight have been taken for that of a leper.

Dr. BUNCH: I do not think that Dr. Loughlin sufficiently brought out the point that the pigmentation of these tumours becomes more marked when the patient's temperature is higher than usual. To me such a marked pigmentation as we here see is unusual in such cases, and the fact of its increasing at certain times is one that I have not hitherto experienced. And the lymphocytic count seems to vary in an extraordinary way from time to time. It started at 6,000, then dropped to nearly 3,000; it remained for a time at this figure, and the latest count was again 6,200. Moreover the improvement in the patient's blood condition was not accompanied by any corresponding improvement in his clinical condition.

The PRESIDENT: There can be no question, in my opinion, as to the accuracy of the diagnosis of this case. We shall be interested to hear what treatment has been adopted and with what result. The prognosis is necessarily very grave, no case of such severity having recovered so far as I am informed. A patient (male) suffering from this disease in an early stage was exhibited by Dr. Lediard, of Carlisle, at the first meeting of the Clinical Section of this Society about eight years ago. Subsequently microscopic sections were made and a further report given.

Major GRAY: About two years ago a similar case was in University College Hospital. I have a section of that case, which I would have brought

[1] *See* Radcliffe Crocker's description in vol. ii of his "Diseases of the Skin," 3rd ed., 1903, p. 982.

had I known this case was to be exhibited. The blood count also was somewhat similar to this, and the case was, I believe, classified as "aleukæmic leukæmia." At the time doubt was at first expressed as to whether it was aleukæmia at all. The tumours were confined to the forehead, and showed this pigmentation markedly; they were not however so sharply defined as in this case, and they produced a characteristic leonine aspect, rather than these localized tumours.

Dr. J. H. SEQUEIRA: Dr. Cecil Wall had a case similar to this at the London Hospital, and in that instance great improvement followed the injection of salvarsan.

Dr. LOUGHLIN (in reply): The treatment which this man has had has been arsenic by the mouth, and the effect of that was to raise the hæmoglobin percentage from 15 to 35, at which figure it now stands. The improvement has persisted throughout the period of administering the remedy. An intravenous injection of galyl (0·4 grm.) has had no appreciable effect on the patient.

Postscript.—Note on November 2, 1916: At 1 p.m. the patient suddenly had a fit, which was convulsive in character, and then he was comatose for about three hours before death, which occurred at about 4.45 p.m.

Post-mortem Report: Body wasted; most parts show firm deposits in the skin, some of which are hæmorrhagic, and the whole body shows brown pigmentation; feet œdematous. Brain: Excess of cerebrospinal fluid; soft membranes œdematous; brain pale. Heart: Small, fat on the surface, atrophic and œdematous; a fibrous patch on the anterior surface of the right ventricle; heart muscle rather brown in colour; considerable hydropericardium; aorta normal. Lungs: One or two small nodules present in each aryteno-epiglottidean fold; large deposit occupying the whole border of false vocal cord, which is ulcerated and sloughing at its posterior end. A large deposit in the hinder wall of the larynx and a small deposit in the upper part of the trachea (which is congested throughout). Tongue: There are several large deposits on the back of the tongue; tonsils not enlarged. Glands: One or two glands in lower part of the neck and mediastinum show trifling enlargement and are rather hard; mesenteric and other glands normal. Stomach, intestines, and pancreas normal. Spleen: Universally adherent; enlarged; tougher than normal; weight 13½ oz. Liver appears normal. Peritoneum: Considerable ascites. Kidneys: One of the kidneys has several areas in which multiple abscesses are present, appearing as yellow spots of fluid on the surface and streaks in the cortex; otherwise the kidneys show little that is abnormal, beyond

great œdema of fat of the hilum. Suprarenals: Most of the yellow fat has disappeared. Bone marrow (from centre of femur) appears rather gelatinous, but is still yellow (the gelatinous appearance probably due to atrophy of the fat); in places the marrow is redder than normal.

(*October* 19, 1916.)

Case of Schamberg's Disease.

By H. G. ADAMSON, M.D.

IN the *British Journal of Dermatology*, xiii, 1901, p. 1, Schamberg described a case of "Peculiar Progressive Pigmentary Disease of the Skin." The complaint has since been called "Schamberg's disease," by Colcott Fox, Graham Little, and Whitfield, who have shown similar cases at meetings of this Section. The characteristic features of the disease are the appearance, particularly on the legs below the knees and sometimes on the arms or wrists, of groups of small reddish-brown spots or points which tend to coalesce to form brownish macules or patches. The eruption is slowly progressive during many years. Subjective symptoms are absent or insignificant. There is no general agreement as to the real nature of the disease, or even as to the exact anatomico-pathological conditions which give rise to the naked-eye appearances. The ages of the patients when they first came under observation were 15, 17, 22, 11, and 56. All were males. All observers have described the affection as consisting of yellowish-brown, or brownish patches or macules with outlying red, or reddish-brown, or cayenne-pepper-like punctæ, and earlier groups of isolated punctæ coalescing to form macules. Some have regarded the punctæ as telangiectatic points, others have described them as pigmentary deposits. Whitfield goes so far as to say that Schamberg's disease and Hutchinson's angioma serpiginosum are varieties of the same affection, but Schamberg, though pointing out the resemblance between these complaints, says very truly that the histological picture is different.

The patient I now bring forward is a man, aged 33, who was sent to the clinic at St. Bartholomew's Hospital by Dr. J. Ferguson Weir. The affection first appeared on the right leg four years ago as a group of reddish-brown points, which have since run together into a brownish

patch. A little later similar punctæ appeared on the left leg, and while the patch on the right leg has only slightly enlarged, the punctæ and macules have spread over the greater part of the front of the left leg

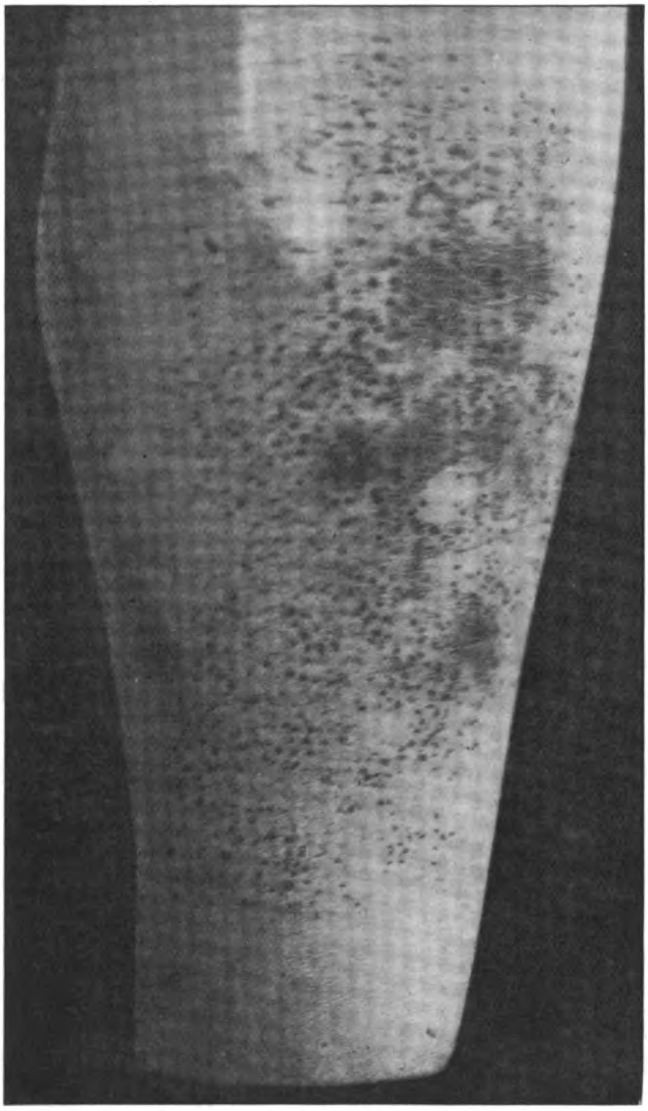

FIG. 1.

Case of Schamberg's disease.

from the knee to the ankle, so that there are now numerous pinhead sized reddish-brown points scattered and in groups, and amongst them

several sixpenny-piece to shilling sized brownish macules. Although the punctæ appear to surround hair follicles inspection with a lens shows that this is not really the case. They do not fade on pressure, and they scale slightly on scraping them. The macules present the appearance of slight atrophy of the skin. Neither the punctæ nor the macules fade on pressure. There are no subjective sensations. The patient stands for long at a time and there are well marked varicose veins on each leg. There is a deep-purple port-wine nævus extensively situated over the right thigh and leg, which has been present since birth and which is quite different in colour and appearance from the bright brownish punctate condition of more recent origin. A group of punctæ was excised for microscopical examination and the scar has become deeply pigmented, almost black.

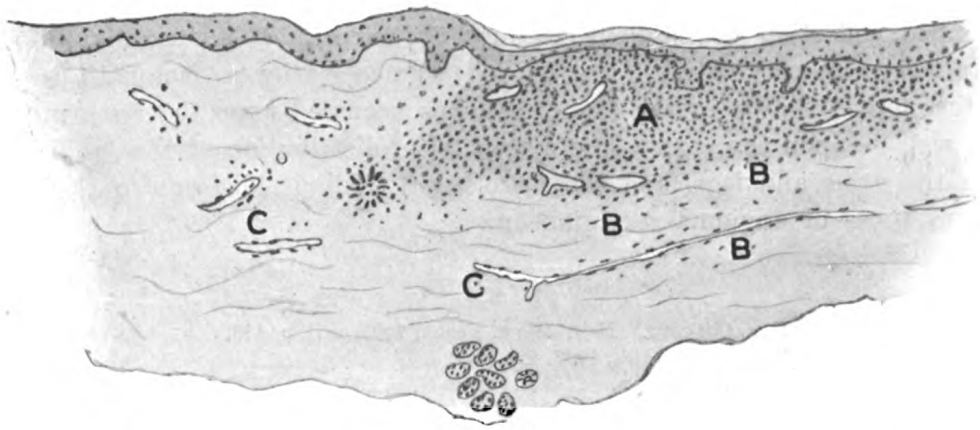

FIG. 2.

Diagram showing **A** the degree and the extent of inflammatory cell-infiltration, chiefly "lymphoid" cells; **B**, the position of pigment granules; **C**, the dilated blood-vessels.

The microscopical appearances of sections, which were cut in series through the whole piece of tissue and stained with hæmatoxylin, are as follows: The epidermis shows no noteworthy changes. In the corium it is noticed, (1) that there are several dilated blood-vessels with some slight proliferation of their endothelial walls and a few lymphocytes around them. At one point immediately below the epidermis there is a localized dense cell-infiltration. Beneath this infiltration there is one particularly noticeable blood-vessel, which extends across the section almost for the whole width of the infiltration. Here and there sweat-ducts, and at the margin of the infiltration a hair follicle, pass through

the infiltration. The cell-infiltration is made up chiefly of lymphoid cells with a few epithelioid cells. There are no pigment-cells in or just below the epidermis, but at the lower part of the cell infiltration, and in and around the walls of the blood-vessels are numerous spindle-shaped groups of greenish-brown granules, some with a cell-nucleus at the centre of the group. These were probably pigment cells, but as the whole series of sections was stained with hæmatoxylin, no sections were examined unstained and none were stained to show mast-cells.

It does not appear that the infiltration occurred especially about the sweat-ducts (as Schamberg suggests), nor about a hair-follicle (as the clinical appearances suggest).

In conclusion: Schamberg's disease is a slowly progressing inflammatory affection. There is a dilatation of blood-vessels, together with localized areas of cell-exudation or proliferation. The pigmentation is not due to blood-changes from purpuric hæmorrhage, but to the spindle-shaped collection of pigment-granules observed in the hæmatoxylin-stained sections. That "stasis" is not necessarily a factor in its causation is shown by the fact that it has occurred upon the forearms as well as upon the legs. The symmetrical distribution of the lesions on the arms and legs, and the histological findings, distinguish them from those of angioma serpiginosum.

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Schamberg. *Ibid.*, 1901, xiii, p. 1.
Whitfield. *Ibid.*, 1914, xxvi, p. 334.

DISCUSSION.

The President: I may remind you that Dr. Schamberg's original paper, with illustrations, was published in the thirteenth volume of the *British Journal of Dermatology*.

Dr. Bunch: I have seen this case before, and then I was not sure whether the inflammatory condition was not due to the congestion caused by the varicose veins from which this man suffers, and that it was in fact a genuine case of Schamberg's disease.

Dr. A. Whitfield: Angioma serpiginosum was described by Sir Jonathan Hutchinson as an angioma, but I do not know that any histology supported his description. I think the case he described was identical with this disease, which I do not regard as an angioma. I believe Schamberg's disease to be a capillary angiosclerosis with secondary inflammatory changes.

(*October* 19, 1916.)

Case of Multiple Rodent Ulcer, possibly of Sweat Gland Origin.

By H. G. ADAMSON, M.D.

THE patient, A. K., is a man, aged 72. On the left side of the abdomen there is a group of flat nodules, some of which are ulcerated and present the clinical appearances of rodent ulcers. There are thirty-six nodules arranged in a zoster-like band 2½ in. wide and 7 in. long. One ulcer, with a few outlying nodules, has been present for four years, but the majority of the nodules have appeared within the last few months. A small nodule has been excised and it shows the histological characters of a basal-cell epithelioma, but the interesting feature of the growth is that it is arranged mainly about the mouths of the sweat-glands, the sweat-ducts and the sweat-glands, and that in some parts of the section the growth seems to take its origin from the epithelium of these structures. (Microscopical sections are exhibited and drawings of these, together with a fuller account of the case will be published later.)

(*October* 19, 1916.)

Cases of Pruritic Dermatitis caused by Infection of Mange from the Kitten.

By A. WHITFIELD, M.D.

CASES of transference of diseases of animals to human beings have always a somewhat special interest, and in this short series of cases there is a rather curious coincidence in addition.

On March 10, 1916, a gentleman developed a pruritic eruption; he consulted a well-known dermatologist, who made the diagnosis of scabies and treated him with success. On June 20 his wife's maid developed a pruritic eruption and a few days later his wife herself became affected with a somewhat similar eruption. Shortly after this one of the children who had been staying in the country came to town and developed an eruption after her return to the country. The doctor who attended the family was puzzled by these cases for, although the

method of spread suggested scabies, he was unable to recognize the eruption as such. He therefore brought the lady and her maid to me for my opinion.

When I saw these two patients their condition was as follows: The lady had a patchy eruption of small papules, about a millimetre in diameter, surrounded by an oval zone of erythema and in some instances surmounted by a minute pin's head sized vesicle or serous crust, the resulting lesions being not unlike those of varicella on a very small scale. These lesions were never very closely aggregated, but were in rough groups, so that the individual lesions occurred about ½ in. from each other, and then there would be a large area of unaffected skin, about 8 in. long, and then another rough group of lesions. The distribution was over the forearms, the upper arms, the thighs, the breasts, but not the nipples; and over the abdomen and the scalp, but not the face. The fingers and the wrists were free. In the maid the lesions were precisely similar, but the scalp was not affected. Pruritus was intense, but was not specially worse at night.

The appearance of the eruption immediately suggested to me mange caught from the dog. I have been lucky enough to see a large number of cases of this, and I asked if the patient had a dog. She replied in the negative, but stated that they had a kitten which scratched a good deal. We therefore sent for the kitten, and as I found it rather scurfy, especially behind the ears and on the face, I removed some of the scales and put them under the microscope. I was lucky enough to find both the acarus and a run, including eggs and fæces, in one of the earlier specimens. The kitten was chloroformed on the spot, the patients were put through a mild form of treatment for scabies, and I have since heard that there has been no recurrence of the disease.

The first point that suggests itself at once is: What was the nature of the original attack in the husband? I have no doubt that this was ordinary scabies, since he developed his eruption on March 10 and the kitten was not born until about May 14—i.e., about two months after the husband was affected. This seems to me to be a rather curious coincidence, since two different acarine infections in the same family within three and half months must be very uncommon. Moreover, if it had not happened that the animal in question was so very young, one would never have been certain that the disease in the husband was not of the same nature. Lastly, although mange caught from the dog is certainly far from rare, this is the first instance in which I have identified the infection as coming from the cat. I would say in passing,

that I regard infection with mange from the dog as common, and with ringworm as rare, while from the cat the infection with ringworm is common and with mange rare.

I only remember seeing one outbreak of mange in cats on any large scale, and this was due to the exceptional opportunities of studying skin disease in animals that I have had for some years owing to the kindness of my friend Professor Hobday. In this instance the disease ran through a valuable cattery of chinchilla Persians, and either the disease, or my too enthusiastic treatment, resulted in the death of about four hundred pounds worth of cat. I found the acarus likewise in the samples of cat submitted to me on that occasion, and it was very much smaller and not quite of the same shape. On looking up this question I find that the cat suffers from two forms of acarus, one almost indistinguishable from the ordinary parasite of human itch, but now believed to be a distinct variety, and a second known as *Sarcoptes minor*, which usually causes the death of the host. I have no doubt that the very small, peculiar shaped acarus that I obtained in the chinchilla epidemic belonged to this variety and may have been responsible for the high mortality rather than my treatment.

It interested me to find the extremely superficial position of the run in this kitten ; it is in no sense a burrow, but rather a pathway among the scales. Hence the name occasionally given to it of "*Acarus squamosus*." It appears that the position of the acarus and runs in scabies norvegica, which I have not seen, is somewhat similar.

DISCUSSION.

Dr. S. E. DORE : I should like to ask if Dr. Whitfield regards this acarus as the human acarus. Fantham, Stephens, and Theobald, in their book on "The Animal Parasites of Man" (pp. 519-521), state that the human acarus can be artificially transmitted to horses, dogs, and monkeys, but not to cats. The *Sarcoptes minor*, however, which infests cats and rabbits, causes, in man, an eruption lasting about a fortnight. I take it that it is more likely to be the small acarus in this case than the ordinary human acarus.

Dr. WHITFIELD (in reply) : This is not the small acarus ; I do not think it is the human acarus. I looked up the book mentioned a few weeks ago, and it is there stated that all these animal acari are distinct. But the *Sarcoptes minor* is much smaller, and is not quite the same shape.

(*October* 19, 1916.)

Resistant Eczematous Eruption associated with Erythræmia.

By J. H. SEQUEIRA, M.D.

THE patient, W. M., aged 28, a lift attendant was transferred to my care by Dr. Leyton in February, 1916. He had previously been under Dr. Pringle for his skin affection. Since 1912 the patient had noticed that his face was getting darker, and in 1914 his face, arms and legs became purplish in colour, the tint being deeper in cold weather. In 1915 Dr. Leyton's notes describe the face as being "plum coloured." The patient was dyspnœic, the fingers were clubbed and there was œdema of the ankles. A red macular eruption was present on the face and chest and there were infiltrated plaques on the legs. The cardiac dullness was not increased, the heart sounds were clear but there was tachycardia. The blood-pressure was 120 mm. The edge of the liver could be felt below the costal margin, but the spleen was not palpable. There was no ascites. The blood examination showed a persistent polycythæmia, varying from 7·5 millions to 10 millions, the average of five examinations being 9 millions. The patient complained of severe headaches which were relieved by venesection from time to time. The urine was free from albumin.

The patient has been under my care for the greater part of this year. He has a dark red, slightly infiltrated, papular eruption with a moderate degree of scaling all over the abdomen, arms and thighs. Below the knees, however, the eruption is diffuse and of a deep purplish tint with some areas exuding serum, but for the most part covered with large flaky scales. The eruption everywhere itches intensely, and that on the legs causes a sensation described by the patient as "aching."

The case has proved exceedingly resistant to the usual forms of treatment and is shown with a view to eliciting opinions as to its chronicity being dependent on the blood condition.

Dr. F. PARKES WEBER: This is not, in my opinion, a case of erythræmia (primary splenomegalic polycythæmia). Owing to the clubbing of the fingers, the history of chronic bronchitis, and the absence of splenomegaly, I have no

doubt that this is a secondary polycythæmia, due to old lung trouble. Such cases are examples of what I prefer to call "cardio-pulmonary" secondary polycythæmia.[1] In true erythræmia, as distinguished from erythrocytosis (secondary polycythæmia), the spleen is practically always enlarged (whence the term "splenomegalic polycythæmia"). In the present case I suspect that there is more pulmonary emphysema and pulmonary fibrosis present than is evident from ordinary examination, and the prognosis is not good. In such cases the red cell count is often as high as in primary erythræmia. I do not think that the skin disease is causally related to the blood condition in Dr. Sequeira's case.

(*October* 19, 1916.)

Sebaceous Adenoma (Pringle Type) in Mother and Daughter.

By J. H. SEQUEIRA, M.D.

THE younger patient, a girl, aged 13, was sent to the exhibitor for treatment. She is one of four children, the others being unaffected. She has the characteristic, symmetrical, bright red nævoid lesions affecting the naso-labial sulci and adjacent parts of the cheeks. She has also a red scar about an inch square in front of the left ear where treatment by carbon dioxide snow had been applied at another hospital. The child has also several pigmented moles, but there are no lipomatous swellings above the iliac crests. She is very nervous and rather dull.

The mother, aged 32, has the cicatrices of an exactly similar affection which involves the naso-labial regions and the cheeks. The cicatrices are the result of treatment by electrolysis at a special hospital. She also has other nævi but no swellings above the iliac crests. She does not know of any other member of her family being affected.

The PRESIDENT: I have seen two cases of this kind successfully treated by the repeated application of strong carbolic acid (90 per cent.) to the separate lesions.

[1] Cf. F. P. Weber, "On the Prognostic Significance of Secondary Polycythæmia in Cardio-pulmonary Cases," *Lancet*, 1913, i, p. 1307. In none of the cases was any skin eruption noted.

(*October* 19, 1916.)

Case for Diagnosis.

By W. KNOWSLEY SIBLEY, M.D.

G. N., A STRONG, healthy man, a gamekeeper, aged 48, who has a good family history, has suffered from the present eruption for some nine years. The condition commenced on the outer side of the right thigh, and gradually extended on to both legs as far as the ankles, and has of recent months appeared on the upper eyelids. At the present time the eruption is situated more or less symmetrically over both shoulders, arms, buttocks, legs, thighs, and upper eyelids. The chest, back, and the rest of the face are free. There are no lesions on the mucous membranes. The lesions are slightly irritable at times, but never excessively so. They consist of small bright red papules and follicles, closely crowded together, with no tendency to coalesce. except on one small area on the right forearm, but with a very distinct curved margin of distribution, and sharp lines of demarcation from the normal skin area, especially marked over the deltoid and scapula regions. Several of the smaller follicular lesions are slightly pustular, probably the result of local applications. The glands in the axillæ and groins are enlarged.

A section of a papule taken from the left thigh reveals the following histology: The layers of the epidermis appear to be normal, except over the region of the nodule. Here the stratum corneum is thickened and infiltrated with cells. Beneath this layer there is a cavity present, which is formed in the stratum mucosum, and which appears to be infiltrated with cells of the mononuclear and polymorphonuclear type. In the dermis there is a dense mass of cells which here and there show a tendency to coalesce and form small giant cells. The blood-vessels are dilated and surrounded with cells.

DISCUSSION.

The PRESIDENT: This is a very unusual case, and I have no recollection of seeing one at any time which exactly corresponded with it. The lichenoid character of the lesions is well marked, but it is possible that the persistent inunctions of vaseline for years has modified the original character of the disorder. We shall be glad to see the case again at a later date.

Dr. F. PARKES WEBER: I hope Dr. Sibley will report the blood count, because the glandular enlargement in the axillæ and groins is suggestive of leukæmia, and some of the cell-infiltration in the skin lesion (shown under the microscope) might be lymphocytic.

Mr. MCDONAGH: I think it is a case of aleukæmic lymphocytoma. The skin lesions are typical of that condition, and the patient has generalized adenitis. The lymphatic glands are most enlarged and hardest in the inguinal regions, where they were noticeable before the rash appeared. It is strange to find in these cases, that the lymphatic glands which appear to become enlarged first are those in the inguinal regions. The picture given by the histological specimen would fit in well with the diagnosis above mentioned. To prove the correctness of the diagnosis, or the reverse, it will be necessary to examine a lymphatic gland.

Blood Count.—Hæmoglobin, 90 per cent.; red blood cells, 5,860,000 per cubic millimetre; white blood cells, 5,400 per cubic millimetre. Differential count: Polymorphonuclears, 65 per cent.; mononuclears, 7 per cent.; small lymphocytes, 25 per cent.; eosinophiles, 2 per cent.; basophiles, 1 per cent.

Histological Report by J. E. R. McDonagh, F.R.C.S.—The section shows circumscribed inflammation, extending upwards as far as the epidermis and downwards into the subcutis, being most marked in the corium. The cellular infiltration is perivascular, and consists of lymphocytes and plasma cells only. The endothelial cells of the capillaries show signs of proliferation.

(*October* 19, 1916.)

Case of Severe Iodide Eruption.

By GEORGE PERNET, M.D.

THE patient is a man, aged 50, who attended the West London Hospital on October 17, 1916, for an eruption involving the face, hands, and feet, and of nine weeks' duration. It started with what the patient called "blisters" in the left palm, with "yellow tops" and containing matter. This was rapidly followed by similar eruptive elements about the hands, palms and backs, and then about the feet. In these situations the lesions have flattened down and dried up. Some of these are about the size of a florin. Looking at the feet alone, the lesions

remind one to some extent of a subsiding keratodermia blenorrhagica, but it may be said, in passing, there is no evidence of gonorrhœa. The patient states he sweats pretty freely. The face and scalp have been more recently affected, and there the lesions are characteristic of a severe iodide eruption, being raised, purulent, and crusted, and about ½ in. and less across. Smaller purulent elements are scattered about the scalp. A fortnight before the eruption started the patient took a bottle of Clarke's Blood Mixture (apparently 8 oz. size, which would represent 52·5 gr. of iodide of potassium according to the Martindale's "Extra-Pharmacopœia"). Examination of the urine reveals nothing abnormal.

(*October* 19, 1916.)

Case of Localized Sweating of the Face and (?) Hidrocystoma.

By S. E. Dore, M.D.

The patient was sent to my department at Westminster Hospital by Mr. Arthur Evans. He is aged 44, and has suffered for two years from excessive sweating in the areas of skin supplied by the first and second divisions of the fifth nerve. The sweating is more marked on the left side and is excited by mental strain or emotion, also by hot, alcoholic, or effervescent drinks or bitters. For six months he has had an eruption of superficial grouped vesicles on the forehead just above the nose and in the malar regions, and this eruption fluctuates from time to time. In the morning he states that it almost disappears, but in the evening it is very noticeable. Crocker[1] refers to cases of hidrocystoma or dysidrosis of the face occurring in association with localized sweating of this type, but it is doubtful whether the eruption in this case can be called by that term, or whether it is a superficial sweat eruption akin to sudamina. He is apparently a strong, healthy man. He states that he suffered from malaria twenty-three years ago in Malta, and he has also been in the habit, during recent years, of frequently indulging in Turkish baths. There is no history of injury and no other symptoms referable to the sympathetic system. I should be glad of suggestions as to treatment. He has taken belladonna for a short time without any beneficial effect.

[1] "Diseases of the Skin," 3rd ed., p. 1040.

The PRESIDENT: A strong solution of boric acid with rectified spirit is sometimes useful in these cases, as also the application of a mild continuous electrical current.

(*October* 19, 1916.)

Multiple Idiopathic Hæmorrhagic Sarcoma (Kaposi).

By F. PARKES WEBER, M.D.

THE patient, M. G., aged 25½, is a well-built man, a tailor, of Hebrew parents, from Russian Poland. At the age of 1 year he was brought by his parents to England. He has numerous elevated purple (and brownish-purple) nodules and patches of various sizes and outlines, in the skin of his left hand and both feet and both legs below the knees. In the lower half of each thigh there are several hard nodules, quite as large as almonds, situated more deeply in the skin than the other lesions. They appear to be separated from the surface (which is not coloured or is only very slightly purplish) by a layer of normal corium, which is even to some extent movable over them.

No other parts are affected, and, excepting for the skin disease, the patient seems to be healthy. The Wassermann reaction is negative. The central portions of all the larger patches of the disease are browner, less purple, and not so much raised above the general level of the skin as the margins, which are in parts somewhat nodular. The most severe lesions are on the left foot, which, together with the lower part of the left leg, is œdematous. Œdema is frequently associated with the severer lesions in similar cases. A nodule of the disease on the sole of the left foot and the tense œdema of that part cause the patient occasional pain. The other lesions sometimes give rise to a temporary sensation of itching or slight pain, lasting ten minutes or so at a time. The superficial lymphatic glands, as usual, are not involved. There are some patches of leucodermia on the right side of the thorax.

The disease commenced in the latter part of 1914, in the neighbourhood of a birth-mark on the third finger of the left hand. About a month later both feet were already affected. An abscess formed in the left leg about March, 1916, which was successfully treated by my colleague, Dr. J. P. zum Busch. He first saw the patient and correctly diagnosed the nature of the skin disease, and to him I am indebted for the case.

A "biopsy" examination of the lesions (sections prepared by Dr. Hans Schmidt) shows changes quite characteristic of the disease. In the corium at various levels are numerous dilated (doubtless newly-formed) blood-capillaries. In close connexion with these dilated blood-vessels are groups of oval or spindle-shaped cells (with large nuclei), often arranged in interlacing bundles, some cut transversely, some longitudinally. These cells are those which have often been regarded as sarcoma-cells, but are probably fibroblasts and connective tissue cells, and represent a new formation (proliferation) of connective tissue elements. There are many capillary hæmorrhages, and in various parts there is a good deal of pigment (intracellular and extracellular), which appears to give the Prussian blue reaction, and is doubtless derived from extravasated blood. There are very few lymphocytes or plasma cells.

I think that the balance of evidence from the literature on the subject points to the disease in question being due to some local microbic infection, the cutaneous lesions representing a tissue reaction towards the as yet unknown invading microbes. The peculiarity of the tissue reaction lies in the new formation of dilated capillaries and lymph spaces and the proliferation of the connective tissue elements, with usually very little evidence of inflammatory cell infiltration.

(*October* 19, 1916.)

Case of Circumscribed Sclerodermia (Morphœa) in a Child.

By J. H. Stowers, M.D. (President).

This patient, aged 7, the elder of two children, was sent to me by Dr. W. F. Addey. She was born at full time, and nothing unusual occurred at or near the period of her birth. The parents are healthy. In October, 1915, the mother first noticed a faint white streak slightly to the right of the middle line of the forehead, extending from the base of the nose upwards to the scalp. Shortly afterwards an impetiginous affection developed, involving the nostrils. The child is extremely neurotic, and it is stated that a few weeks before the disorder was noticed she had been suddenly awakened out of her sleep and greatly terrorized by the explosion of bombs during a Zeppelin raid at midnight in the neighbourhood in which she lives.

The disease, which has gradually increased, now extends from the

junction of the lower and middle thirds of the bridge of the nose upwards on the right side into the scalp, and measures 5½ in., and laterally, for about 3½ in., the forehead is involved. The skin of the upper eyelid is free. The scalp is more markedly sclerosed than the skin of the face, being harder and more tense. The characteristic pearly whiteness of the skin, with a violaceous margin, is very observable, sensation being much reduced. At this time the skin of the forehead and nose on the right side is but little less elastic and yielding than that on the left which is normal. It has been stated that this affection, when involving the forehead and scalp, occurs for some unknown reason more frequently on the left side than the right.

(*October* 19, 1916.)

Case of Secondary Malignant Ulceration of the Skin.

By S. E. Dore, M.D.

This woman, aged 42, is under the care of Mr. Peart, who asked me to see her. She had half her breast removed for "scirrhus" seven years ago, the operation being completed eighteen months later. The present lesion is said to have begun two years ago as a blister, and she states that she had a similar lesion on the chin, which disappeared leaving a healthy scar. It consists of a flat oval plaque of firm thickened brownish-yellow tissue, with a sharply defined border, raised about ⅛ in. above the surface, and measuring 2 in. in length and 1½ in. across, situated on the left side of the chest below the transverse linear scar left by the operation. In the centre of the plaque is a shallow circular ulcer ¾ in. in diameter. In addition there are two small nodules, covered by brown scabs, at the lower anterior axillary border. The question arises as to whether the lesion on the chest is independent of the original tumour, or whether it is a secondary malignant growth of the skin. In spite of its somewhat unusual appearance, there seems to be little doubt that the latter is the explanation of the condition. So far no treatment has been adopted, and I should be glad to hear views as to whether excision, radium, or the X-ray is most likely to prove beneficial.

DISCUSSION.

Dr. J. M. H. MACLEOD: I consider that involution of the skin lesion might be effected by large doses of radium. I consider the skin lesion as secondary to some deep-seated recurrence, however, and consider the removal would be only of temporary benefit.

The PRESIDENT: I agree as to the nature of this, and I think that Dr. MacLeod's suggestion that radium should be generously administered may be helpful; but unless I had had Dr. MacLeod's experience I should have recommended excision. The disease is of such a serious nature that I doubt if any treatment can prove successful owing to the involvement of deeper structures, including deposits, in the mediastinum.

(*October* 19, 1916.)

Acnitis in an Egyptian Soldier.

By ALBERT J. CHALMERS, M.D., F.R.C.S., D.P.H.,[1] and A. F. C. MARTYN, Captain R.A.M.C.[2]

CONTENTS.

INTRODUCTORY.

A CASE of acnitis seen in its earliest stages and quickly yielding to treatment based upon intestinal disinfection appears to us to be of sufficient interest to justify a few remarks. We are also induced to make these observations, because we believe that the disease is by no means as rare as is usually stated, but is probably not diagnosed because it is insufficiently known to the ordinary practitioner of the Tropics in which, so far as we know, its presence has previously only been recorded by Castellani as being occasionally seen in Ceylon.[3]

So far as we know, the case we are about to describe is the first recognized in Africa and in an Egyptian.

KHARTOUM CASE.

Early in June of this year an Egyptian soldier, aged about 27, complained of an eruption on his face and neck which had begun suddenly, and was accompanied by slight fever. He was at once

[1] Director, Wellcome Tropical Research Laboratories.

[2] Attached the Egyptian Army, Khartoum.

[3] *Vide* Castellani and Chalmers, "Manual of Tropical Medicine," 2nd ed., p. 1631.

admitted into the Isolation Ward of the Military Hospital, when his temperature was found to be 100° F. Next day the fever subsided, and the temperature became and remained normal, while a few spots appeared upon the dorsa of the hands. As he did not improve, and as there was a difficulty concerning the diagnosis, we were asked to examine him on the fifth day after the first appearance of the eruption.

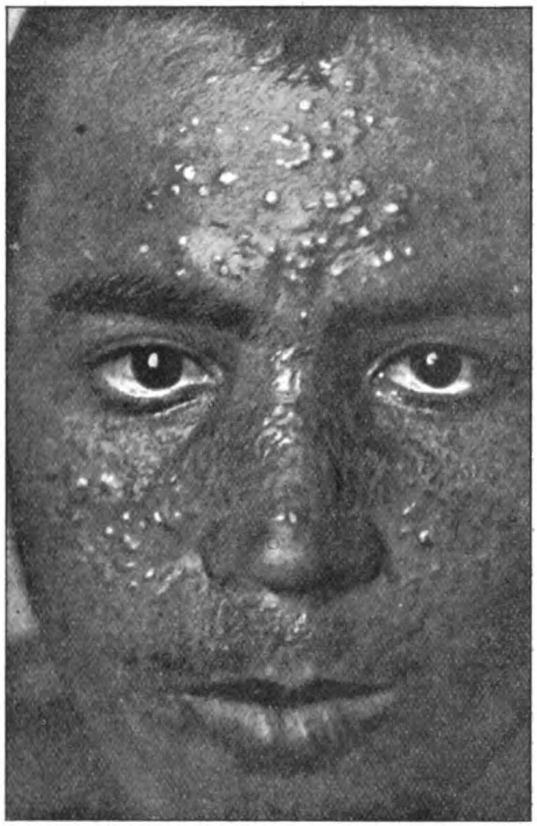

FIG. 1.

First eruption on the fifth day. The photograph is printed very darkly in order to show the papules; the man's skin is really light coloured, *vide* fig. 3. Photograph.

He then presented the appearances depicted in figs. 1, 4, 5, and 6. The reader will note that fig. 1, being from a photograph taken in a strong light, had to be printed darkly in order to show the spots, but the man's skin is not black but lightish, as is customary among Egyptians—i.e., more the colour depicted in fig. 3.

The diagnosis of acnitis was easily made as the individual papule and the distribution of the rash were perfectly typical. The eruption consisted of raised papules distributed on the face, the ears, the neck, and the dorsal aspect of both hands, and nowhere else. With regard to the face (fig. 1) these papules were well marked on the forehead, nose, cheeks and chin, but they did not extend on to the hairy scalp. They,

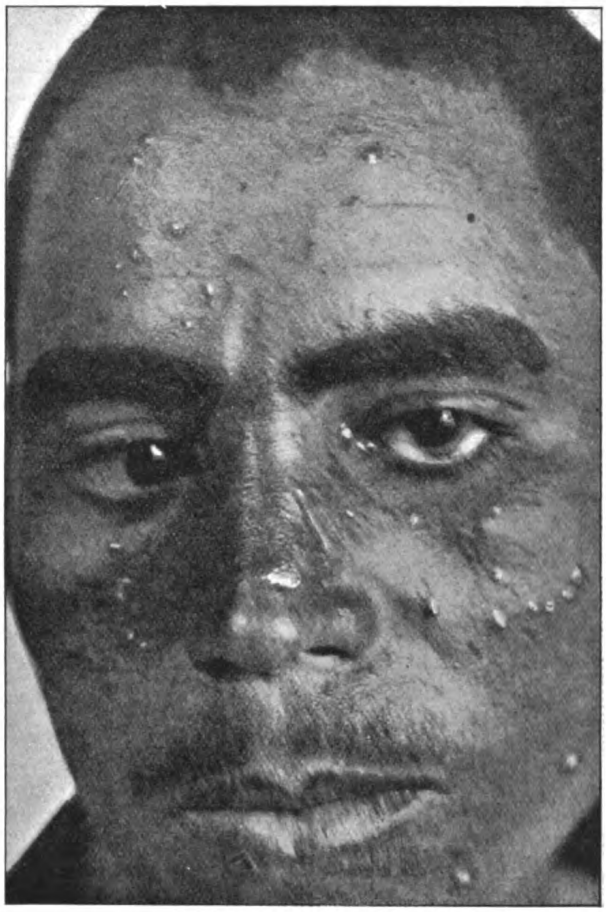

FIG. 2.

Second eruption. Photograph.

however, passed backwards along the cheeks to the ears, where they were almost confined to the rims, and also downwards (fig. 5) from the cheeks to the lateral aspect of the neck where they were closely set, forming, in places, definite patches. From the sides they spread round

to the back of the neck (fig. 4), where they also formed confluent patches. On the hands (fig. 6) only isolated papules were noticed, and these were confined to the backs of the hands from the wrists to the first phalanges.

The distribution appeared to be limited by the clothing to the region exposed to light, and was also characterized by a more or less bilateral

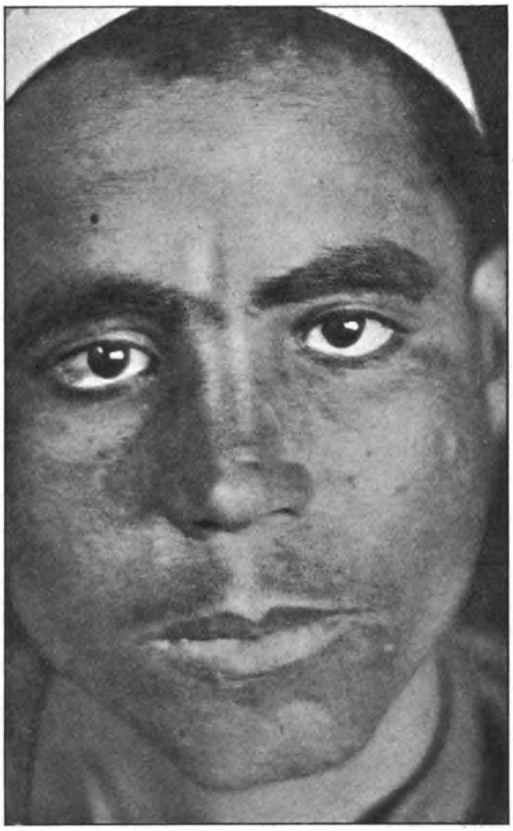

FIG. 3.

Cured. Photograph.

symmetry. An individual lesion commenced under the epidermis as a rather shotty papule, which was better felt than seen, but this quickly became elevated and acquired a brownish red colour, attaining, in many instances, the size of a split pea, and being somewhat firm to the touch. The skin intervening between individual papules appeared to be normal (fig. 1), except in the confluent areas when the whole region was

reddened, probably owing to the juxtaposition of the lesions. Some of the papules showed comedones, but the majority did not, while pustules were not observed at this stage, and, on pricking, a papule exuded only blood. There was no itching nor other disturbance of sensation.

The patient was at once treated by intestinal disinfection, as will be detailed below, with the result that the rash rapidly melted and disappeared, leaving no scars. So efficacious was this method of treatment that in about five days only a few papules were left. The treatment was then stopped, and the man sent to his usual work, but in about one

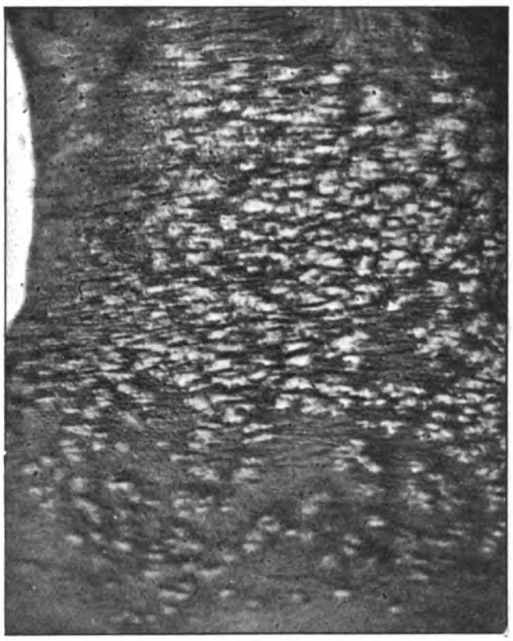

FIG. 4.

First eruption, fifth day, back of neck. Photograph.

week the eruption returned on the face (fig. 2) and neck, but not so extensively as in the first instance, while the hands completely escaped. There was, however, a marked difference in this second eruption in that some of the spots contained pus, as could be demonstrated by pricking them with a needle, although they did not markedly differ in general appearance from the fully developed papule of the first eruption. Where some of the papules were chafed by the clothing, typical pustules could be seen. With this second eruption there was again a slight

FIG. 5.

First eruption, fifth day, side of neck. Photograph.

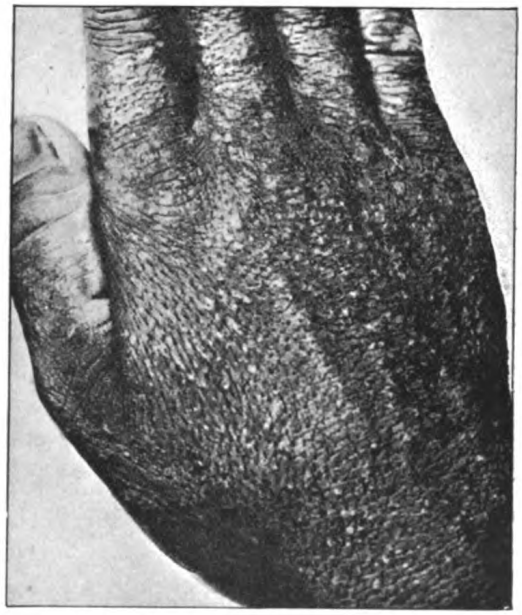

FIG. 6.

First eruption, fifth day, dorsum of hand. Photograph.

rise of temperature—i.e., to 100° F., which, however, subsided in about twenty-four to forty-eight hours.

As the man looked ill his chest was carefully examined, but nothing abnormal could be detected beyond a slight prolongation of the expiratory sounds at the right apex. His sputum, which was very scanty, was carefully examined on more than one occasion for tubercle bacilli, but with negative results.

Von Pirquet's cutaneous tuberculin reaction was tested on the left forearm, and gave a markedly positive reaction of the character +++ (i.e., with well-marked redness, infiltration and vesiculation). It was of the type of a *persisting* reaction, reaching its maximum intensity about the third day, and persisting for about a week, and was associated with slight fever, lasting for a couple of days.

The contents of a papule were injected subcutaneously and intraperitoneally into a guinea-pig with negative results, the animal being alive and well six weeks after the injections, when it was killed and carefully examined, also with negative results.

The patient was again placed upon intestinal disinfectants, when the eruption completely and quickly disappeared (fig. 3), and he has remained quite well up to the time of writing—i.e., some two months after the cessation of the second eruption.

Pathological Histology.

Two very young papules were excised from the first eruption, and one older papule and a pustule from the second eruption, and on this material the following study of the pathological histology is based:—

Young Papule.—Fig. 7 shows the epidermis covering a portion of the young papule depicted in fig. 8. The *stratum corneum* and the *stratum lucidum* appear to be normal, as does the *stratum granulosum*, except that in places its cells are swollen and vacuolated. The *rete Malpighii* and the *stratum germinativum* may be normal, possessing in places cells in various stages of karyomitosis, but on the other hand these layers, the latter especially, may be by no means normal (fig. 7). In such places it is seen that the intercellular spaces are increased in size, while the cells are shrivelled, and possess a darkly-stained cytoplasm and nucleus. These two processes—i.e., the increase in size of the intercellular spaces, and the decrease in size of the cells—produce a peculiar sponge-like appearance (fig. 7), and are most clearly seen in cells covering a papilla. In the *papilla* itself (figs. 11 and 14) the lymph spaces

are dilated, and appear to be connected with the dilated intercellular spaces of the epidermis. The vessels of the papilla are also dilated, but there is at this stage only a very small amount of cellular exudation. In the *corium* the most marked pathological features are the dilatation of the vessels and lymphatics, together with the cellular exudate in connexion with the former (figs. 11 and 12). This exudate (fig. 9) consists of endothelial cells and small lymphocytes. In addition to these vascular changes there is also a general increase in the numbers

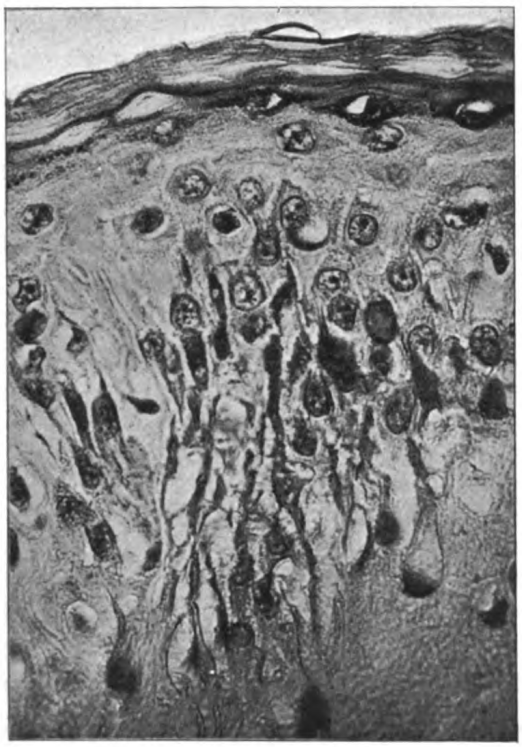

FIG. 7.[1]

Young papule from the first eruption to show the early epidermal changes. Photomicrograph. (× 500.)

of the connective tissue corpuscles which is most marked in the vicinity of the hair follicle (fig. 8), sebaceous glands and sweat glands (fig. 10). In certain places situate near the epidermis the fibres of the connective tissue appear to be undergoing a peculiar form of degeneration or necrosis, and stain deeply with eosine (fig. 8). The hair follicle and the

[1] Figs. 7 to 17 may, with advantage, be examined by means of a reading lens.

sebaceous glands (fig. 8) do not appear to be implicated in this early process as the only change is an increase in the connective tissue cells in their vicinity. The sweat glands (fig. 10) appear to be normal and active, showing the usual cellular changes of sweat formation, but the vessels between the coils are dilated, the connective tissue cells are increased in numbers, and near the commencement of the duct there is some cellular exudate. There is, however, marked cellular exudate along the course of the ducts (figs. 8 and 15), but this appears to be due to the presence of dilated vessels with their accompanying exudate rather than to anything abnormal in the ducts (fig. 12).

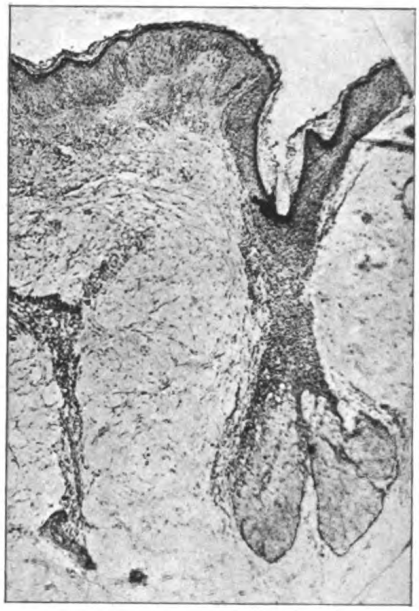

FIG. 8.

General view of a young papule from the first eruption showing the epidermal changes, the connective tissue degeneration, the cellular increase particularly along the sweat ducts. The sebaceous glands are observed to be normal and there is only slight cellular increase near the follicle. Photomicrograph. (×40.)

The above comprise all the abnormal histological changes which we have been able to find in our young papules, and they may be summarized as follows :—

(1) Shrinking of the deeper cells of the epidermis, associated with enlargement of the intercellular spaces.

(2) A general dilatation of the vessels of the corium associated with an exudate composed of endothelial and lymphoid cells.

(3) A general dilatation of the lymphatic spaces.

(4) An increase in the numbers of the connective tissue cells.

(5) Patches of degeneration in the connective tissue fibres.

It appears to us that these pathological findings are capable of being classified into those produced by the direct action of the causal agent, whatever it may be, and those due to the reaction of the body against this causal agent, and our classification is as follows :—

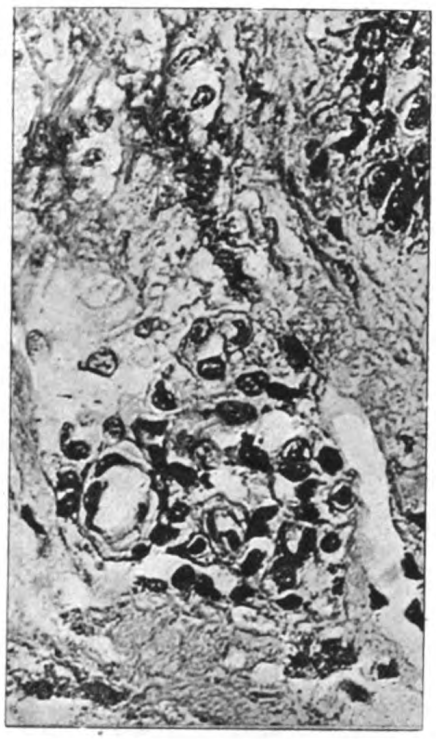

FIG. 9.

Cellular exudate in the neighbourhood of a vessel situate just below the epidermis. Photomicrograph. (× 500.)

(I) *Due to the Action of the Causal Agent.*—(*a*) The epidermal changes. (*b*) The degeneration of the connective tissue fibres. (*c*) The dilatation of the vessels, and consequent dilatation of the lymphatics, which is probably due to the action of the anaphylactic poison (*vide infra*) on the non-striped muscles in their walls.

(II) *Reactive Changes.*—(*a*) The cellular exudate. (*b*) The increase in numbers of the connective tissue cells.

We may, therefore, conclude that, whatever be the nature of the causal agent, its action is in some way associated with the changes found in small areas of the cells of the epidermis, and that probably this is an important pathological feature, as the connective tissue degeneration can hardly be of very great moment with regard to the disease.

Older Papule.—The general appearance of the pathological changes found in an older papule belonging to the second eruption can be seen in figs. 13 and 14. The *stratum corneum* and *stratum lucidum* are pre-

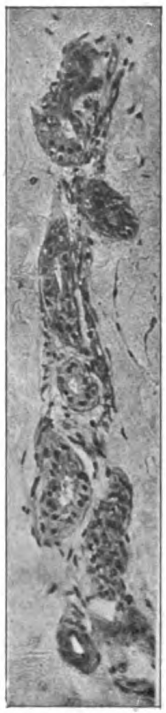

FIG. 10.

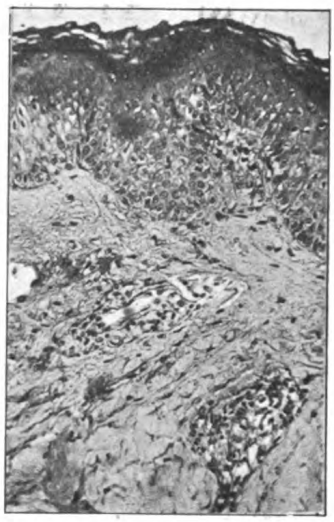

FIG. 11.

Fig. 10.—Sweat gland lying beneath the sebaceous glands depicted in fig. 8. Photomicrograph. (× 120.)

Fig. 11.—Young papule from the first eruption showing epithelial changes and the cellular exudate around vessels. Photomicrograph. (× 100.)

sent, though thinner than usual, while the *stratum granulosum* is but poorly developed. The *rete Malpighii* is necrotic in certain areas, and in patches the *stratum germinativum* shows signs of the same changes as those noted in the younger papules, but in less degree. In addition a few polymorphonuclear and mononuclear leucocytes can be observed

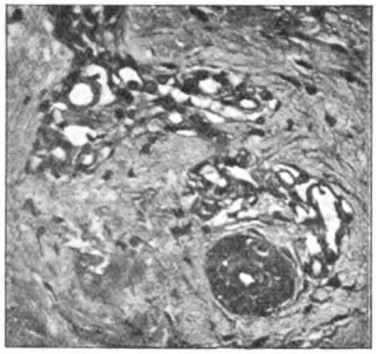

FIG. 12.

Dilated vessels and cellular exudate near a sweat duct. Photomicrograph. (× 250.)

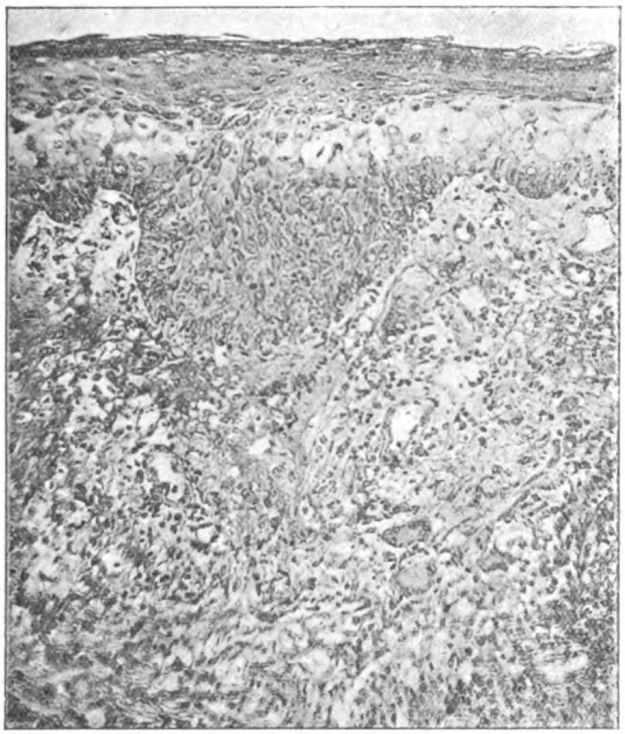

FIG. 13.

Fully developed papule of the second eruption. Photomicrograph. (× 120.)

lying in the intercellular spaces of the epithelium. The whole *corium* is œdematous with dilated vessels and lymphatics, and is invaded by a cellular exudate consisting of endothelial cells, lymphocytes, with a few polymorphonuclear cells and some giant cells of the Langerhans type, which form a most striking feature in the sections. The connective tissue cells are also considerably increased in numbers, while the fibres show more marked degeneration than was seen in the younger papules. A peculiar feature, noted by other authors, was seen in one vessel, and

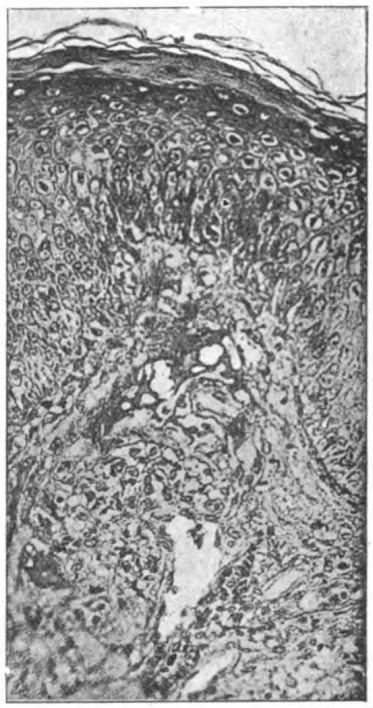

FIG. 14.

Fully developed papule from the second eruption; another area. Photomicrograph. (× 250.)

this was the proliferation of the endothelial cells which completely occluded this small superficially situated vessel. No hair follicles, sebaceous glands or sweat ducts were observed in any of these sections.

The above changes differ from those described in the young papule in the following additions :—

(1) The presence of polymorphonuclear cells.

(2) The appearance of giant cells.

(3) The more diffuse nature and greater extent of the cellular exudation.

(4) The more extensive changes in the rete in places.

Pustule.—When a pustule, excised from the second eruption, is examined (fig. 16) it will be noted that there is a marked thinning of the epidermis in the centre of the specimen, and that here the *stratum corneum* is flattened, while there is an absence of *stratum lucidum* and *stratum granulosum.* The prickle cells are reduced in number and vacuolated while the *stratum germinativum* appears to be wanting.

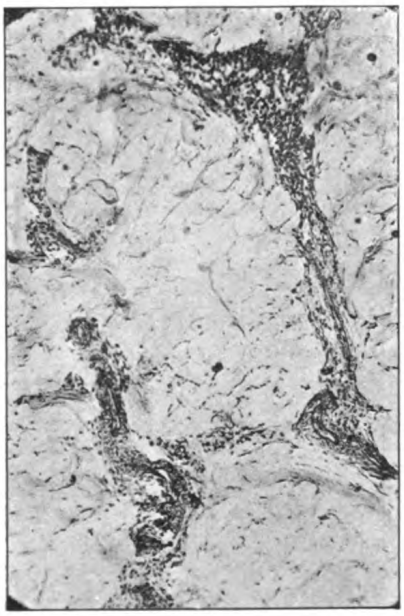

FIG. 15.

Exudate around the sweat ducts from the same specimen as fig. 8. Photomicrograph. (× 60.)

In the *corium* the papillæ and the connective tissue have disappeared, and their place is taken by a cellular mass (fig. 16), largely composed of polymorphonuclear leucocytes, with which are mingled connective tissue cells, some with branched processes, while more laterally as regards the centre of the specimen endothelial and plasma cells can be seen. In addition to these cellular elements blood-vessels and numerous granules can be observed. When the section is examined more laterally it will be noted that the epidermis possesses a thicker *stratum*

corneum as well as some signs of a *stratum granulosum*, while the *rete Malpighii* is well developed, though the cells are vacuolated, and the intercellular spaces show nuclei, which may well be the remains of polymorphonuclear leucocytes which have wandered there. The *stratum germinativum* is to be seen in places. As regards the *corium* the papillæ

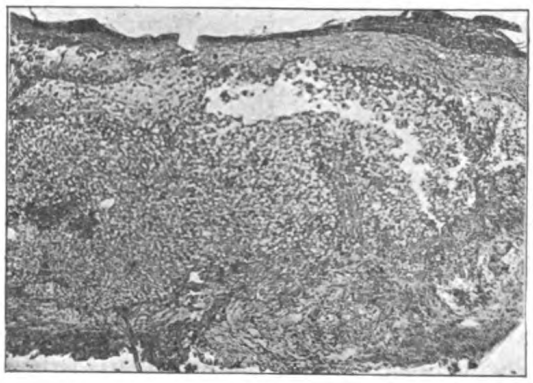

FIG. 16.

Pustule from the second eruption. Photomicrograph. (× 60.)

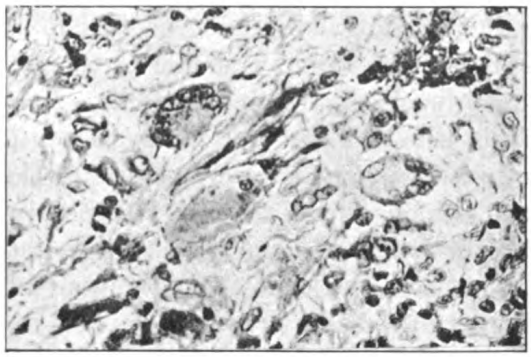

FIG. 17.

Giant cells from the lateral aspects of the pustule. Photomicrograph. (× 400.)

are clearly visible on the sides of the papule, but their connective tissue appears to be undergoing necrosis. The vessels of the corium in this area are dilated, and there are many endothelial cells scattered about, but in places (right hand lower corner of fig. 16) giant cells of the

Langerhans type can be seen, thus producing an appearance somewhat resembling a tubercle.

Tubercle Bacillus.—In none of the sections could tubercle bacilli be detected.

Comparisons.

The histology of acnitis lesions was first investigated by Tilbury Fox, who noted atrophy in the deeper cells of the rete Malpighii, absence of the papillæ, dilatation of the vessels, and a cellular exudate throughout the corium. All of these points are clearly visible in our sections.

The next observation with which we are acquainted is that made by Darier upon a young papule, and a pustule derived from the second of Barthélemy's cases. These two authors concluded that the disease was a subacute peri-follicular or follicular inflammation in which the corium was infiltrated by lymphocytes, epithelioid cells and giant cells (Langerhans type) which in places were arranged in tubercle-like nodules. Neither Koch's nor any other bacillus or coccus could be demonstrated, while animal inoculations of the contents of a pustule made intra-peritoneally, subcutaneously and intra-ocularly were all negative. The follicular relationship is not seen in our section, but otherwise there is a general agreement.

Unna, under the heading "Spiradenitis disseminata suppurativa," gave an account of the histology of a papule given to him by Dubreuilh, which in many points closely resembles some of the descriptions of acnitis, though it is usual to consider Unna's description as applying to folliclis. He noted particularly the necrosis of the prickle layer of the follicle around which there was an infiltration of spindle cells, plasma cells and giant cells associated with a degeneration in the fibrous tissue. The connective tissue cells around the sweat glands were increased in numbers and formed large spindle cells and were associated with plasma cells and a few leucocytes, and later with giant cells. He also noted that this exudation of cells extended along the sweat ducts up to the epidermis and was also present along the blood-vessels, especially along those of the papillæ. There can be no doubt that there is a general agreement between Unna's observations and our descriptions, but the clinical characters of the case from which Dubreuilh obtained this particular papule are not described, and it may have come from an acnitis patient.

Galloway, according to Crocker, found a general resemblance to

tuberculosis in the lesions which he examined, while according to the same authority Pernet found that the sweat coils were disorganized by an inflammatory leucocytic infiltration which partially involved the hair follicles and was associated with a perivascular infiltration, but neither of these observers could detect any tubercle bacilli. Our sections show much the same structure, while Pernet's description seems to resemble that given for our pustule.

Schamberg, according to Colcott Fox's extract of his paper, recorded the presence of an inflammatory cellular exudate extending throughout the corium. This exudate was composed of fibroblasts, epithelioid and mast cells with giant cells here and there, and was associated with a central coagulation necrosis. In some sections there were collections of polymorphonuclear leucocytes resembling an abscess. He also described the dilatation of the lymph spaces and blood-vessels, as well as the general œdema, and drew attention to the proliferation of the endothelial cells of some of the capillaries and veins. He stated that the more superficial of the sweat glands were involved in this process.

No tubercle bacilli could be found in the sections, and negative results were obtained with Calmette's ophthalmic test and with injections of tuberculin, and with animal inoculations. The only history of tuberculosis was its occurrence in a paternal grandfather.

Schamberg's findings agree with our descriptions, but his tuberculin tests were negative whereas ours were positive.

In 1914 Oliver gave an interesting account of a Danish case which he examined histologically, noting a blood-crust on the surface of the papule, an absence of the stratum granulosum, poor staining of the prickle cells, poor definition of the basal cells, associated with an absence of papillæ and the presence of a cellular exudate in the corium, which was composed of lymphocytes, polymorphonuclear leucocytes and giant cells, in association with some mast and plasma cells around the sebaceous glands, where he noted a tubercle-like grouping of these cells. The sweat glands were mostly destroyed. No tubercle bacilli could be detected in the sections, while inoculations into guinea-pigs gave negative results, as did von Pirquet's tuberculin cuti-reaction, as a second positive result after a negative is in his, and our opinion, without value. This patient's mother, however, died of phthisis, so that there was a distinct history of family tuberculosis.

A consideration of the above descriptions shows that they are in general agreement with our observations, and brings out clearly the

tubercle-like appearance of portions of the lesions associated with an absence of tubercle bacilli. It is also evident that our young papules illustrate an earlier stage of the disease than any hitherto described.

Summary.

The results of the histological and experimental researches made by ourselves and by other observers may be summarized as follows:—

(1) The earliest changes which so far have been noted are lesions of the deeper cells of the epidermis and of the fibres of the connective tissue lying in the subjacent corium.

(2) Associated with these changes there is an increase in the numbers of the connective tissue cells, together with a dilatation of the vessels and lymphatics of the corium and with a cellular exudate consisting of lymphocytes and endothelial cells and later giant cells (Langerhans type), plasma cells and polymorphonuclear leucocytes.

(3) Still later a pustule is formed and glands and tissues in the corium disappear.

(4) No tubercle bacilli can be seen in the lesions, and animal inoculations are invariably negative as regards tubercle bacilli and other organisms.

(5) Tuberculin tests applied to the patient may or may not be positive.

(6) The character of the lesions when associated with giant cells is tubercle-like.

(7) There is often some family history of tuberculosis.

Ætiology.

Five cardinal features of the present case appear to us to have an important bearing upon its causation, and they are:—

(1) The more or less marked bilateral symmetry of the lesions.

(2) The ease with which the signs of the disease were relieved by intestinal disinfection.

(3) The limitation of the eruption to areas of skin exposed to light.

(4) The absence of tubercle bacilli in the cutaneous lesions and in the sputum.

(5) The positive nature of von Pirquet's tuberculin cuti-reaction.

In our opinion the first indicates the presence of a poison passing into the skin from the general circulation, while the second favours

the view that in all probability this poison was manufactured in the alimentary canal, and the third seems to explain the distribution of the eruption, while the fourth shows that the lesion is not directly due to the tubercle bacillus or its toxins.

With regard to the fifth point—i.e., the positive tuberculin cuti-reaction, it may be explained by assuming that *the tubercular antigen*, generated in small quantity in a remote tubercular focus, and being carried round the body by the circulation, sensitizes the cells, producing a condition which lasts for a long time. This condition of the cells may be regarded as being due to the formation of *sessile antitubercular amboceptors* which, together with whatever chemical substance (perhaps some ferment but not complement) is united to one arm, form the chemical product variously called the *anaphylactin of Anderson* or the *sensitizin of Weil.*

The free arm of the amboceptor uniting with the injected tuberculin, which is an *anaphylactogen*, produces a *tuberculin antituberculin complex* which gives rise to a poison—*the anaphylotoxin*—producing the signs and symptoms of the reaction, which are limited by the method of applying the tuberculin, and are mostly local in the cuti-reaction because the tuberculin is only applied superficially and not subcutaneously.

This explanation, which is based upon the experiments of von Pirquet and of Friedberger, is also supported by the fact that, associated with the rather severe cuti-reaction produced in our patient, there was a rise of temperature, as is the rule with subcutaneous injections of tuberculin, which agrees with Friedberger's observations that the rise or fall of the temperature in experiments on anaphylaxis depends upon the dose of the antigen which, if small, is associated with a rise, and if large, with a fall.

If these interpretations of von Pirquet's and of Friedberger's experiments are accepted, then von Pirquet's tuberculin cuti-reaction must be looked upon as being of the nature of a local *anaphylactic* phenomenon taking place in persons whose cutaneous cells have been affected by small doses of tubercular antigen, perhaps generated in some remote focus long before the application of the test.

These views, supported by von Pirquet's experiments upon himself, explain how a positive reaction may be induced in non-tubercular persons by a second inoculation of tuberculin, and also point to the fallacy of any deduction as to the presence at any time of tubercular antigen in such persons. Hence our agreement with Oliver in

rejecting the positive nature of the second cuti-reaction in his case as any evidence *per se* of there being anything tubercular in his acnitis patient.

As to the source from which acnitis patients can acquire their tubercular antigen there is a growing suspicion, originally based upon von Pirquet's researches in Vienna, that, at all events in Europe, the great majority of the children of the poorer classes of large towns become infected with the tubercle bacillus in some way or another by the time they reach the age of 12. This infection, even if it is suppressed fairly quickly by the natural bodily processes, appears to be capable of impressing its influence upon the cutaneous cells or, in other words, of sensitizing them and of laying the basis for tuberculide eruptions.

With regard to the particular cuti-reaction which we obtained in our patient, it agrees with the characters laid down by Kolmer as indicating the presence of inactive lesions in an adult patient, and is not in disagreement with our clinical observations.

We therefore conclude, with regard to the special case of acnitis which we are considering, that:—

(1) Some time in his life tubercular antigen has been formed somewhere in his body, and that though this may have been produced merely in small quantity during a limited period, it was sufficient to sensitize the cells of his skin.

(2) At present he has no very active lesion in his body.

Friedberger's work has shown that the successful production of anaphylotoxin is influenced by physical conditions, such as temperature, being produced more rapidly at bodily temperatures than at low temperatures. This adjuvant action appears to be of considerable importance when it is borne in mind that anaphylotoxin is an unstable substance and is rapidly split up into less toxic or even non-toxic products. It is therefore possible that in applying the results of anaphylactic experiments to man, physical as well as chemical conditions may require consideration.

The physical conditions associated with the tuberculin cuti-reaction have not been studied, but there appears to us to be a definite physical influence associated with acnitis, and this is sunlight. Therefore, in searching for possible factors in the causation of this patient's acnitis, we are compelled to take into consideration:—

(1) Anti-tuberculin amboceptors.

(2) An unknown intestinal bacterial product.

(3) Sunlight.

If we compare these possible factors with those considered to be necessary for a positive cuti-reaction a remarkable similarity can be demonstrated as follows:—

Number	Factor	Cuti-reaction	Acnitis
1	Anaphylactin (Anderson)	Antitubercular amboceptors	Antitubercular amboceptors
2	Anaphylactogen	Tuberculin	Unknown intestinal bacterial product
3	Adjuvant	Unknown	Sunlight

We will now consider these four possible acnitis factors in greater detail:—

(1) *Antitubercular Amboceptors.*—With regard to this factor, its presence in our case appears to be rendered probable by the positive reaction obtained with von Pirquet's tuberculin cuti-test. In studying such literature as we are able to obtain in Khartoum we have been impressed with the fact that, although research for tubercle bacilli in the lesions by histological methods and by animal inoculations have been invariably negative, still in all cases there has been evidence of some relationship between the disease and tuberculosis. This relationship may be traced by one or more of the following four tests:—

(*a*) There may be a family history of tuberculosis.

(*b*) There may be a personal history of tuberculosis.

(*c*) Tuberculin tests may be positive.

(*d*) The lesions exhibit a tubercle-like appearance in some places.

As far as our researches go it appears that the fourth test is invariably present and is usually associated with one of the others. Cases resembling that described by Schamberg, in which the ophthalmic reaction and tuberculin injections were negative, are balanced by a history of tuberculosis in a paternal grandfather and by the histological findings. With reference to this family history, it is most interesting to compare it with Cooke and Vander Veer's researches on human sensitization, in which they show that offspring are not born sensitive, but can acquire a tendency to sensitization through a non-sensitized parent from a grandfather. Therefore, without attempting to explain these negative results, we conclude that there is often evidence in the family and personal history of the patients, sometimes supported by

tuberculin tests and always by the histological evidence, in favour of the theory as to *the presence of anti-tubercular amboceptors* in acnitis cases. We would, therefore, classify the disease as a *tuberculide*, if this term be taken to mean a lesion in the causation of which the tubercular toxin or its antibodies take an active part, but in which the tubercle bacillus, *per se*, does not participate. These antitubercular amboceptors appear to be united with some active agent which, from Weil's experiments as well as one of our own, would seem not to be of the nature of complement and may perhaps be some ferment body, but hardly anything is known about this part of the subject at present. At all events these amboceptors, with whatever is attached to one end of them, make up the body known by various names—e.g., *anaphylactin* of Anderson but not of Gay and Southard, *sensitizin* of Weil, *sensibilisin* of Besredka, *allergin* of von Pirquet, &c. It is capable of acting upon the anaphylactogen and so of producing anaphylotoxin.

(2) *Intestinal Bacterial Product.*—By analogy with the cuti-reaction we therefore believe that the causation of acnitis in the present case was the absorption into the general circulation of an unknown bacterial product from the intestinal tract, and that this *anaphylactogen*, becoming acted upon by an anaphylactin (the sessile antitubercular amboceptors, with whatever is attached to them) in the cells of the epidermis, gives rise to *anaphylotoxin*, which is the causal agent. With regard to this union of some form of bacterial product derived from the intestine with antitubercular amboceptors, it must be remembered that the specificity of anaphylactic reactions is chemical, and not biological as Delanoë's experiments have tended to show. With regard to Delanoë's experiments on anaphylactic shock, Zinsser states on p. 411 of his work on "Infection and Resistance":—

"He succeeded in producing shock in tubercle sensitized guinea-pigs with comparatively large amounts of typhoid-paratyphoid and other bacilli, and conversely found typhoid sensitized guinea-pigs hypersusceptible to tubercle injections."

We have been unable to trace this reference in the limited literature at our disposal in Khartoum, but Delanoë seems to have obtained anaphylactic shock in guinea-pigs sensitized by Eberth's bacillus by means of choleraic vibrios—e.g., he says:—

"Nous avons éprouvé par une culture *très forte* de vibrions cholériques (variété de Schottmüller) des cobayes préparés par des injections repétées de

bacilles d'Eberth. En injectant des doses de vibrions, nous avons observé des troubles anaphylactiques de la plus grande netteté."

It is obvious that had we realized the importance of intestinal absorption before the patient was cured we would have investigated the aërobic and anaërobic flora in his fæces, with a view to attempting to determine the organism from which the intestinal product was derived, but unfortunately it was not until we were convinced of the efficacy in this case of treatment by intestinal disinfection that it was possible for us to evolve the above theory, and then it was too late for such an inquiry. With reference to this intestinal bacterial product, it is interesting to quote Barthélemy. With regard to his third case he says :—

" Au mois de Décembre 1890, M. Besnier suivit le malade de près, le soumit aux lotions boriquées, aux onctions d'huile phéniquée au 100e et lui administra 2 gr. par jour de salol. Depuis ce temps l'amélioration apparut très nette et persista. Les boutons nouveaux devinrent de moins en moins nombreux, et ceux qui se montrèrent furent aussi avortés, aussi superficiels que possible. Les croûtelles sèches tombèrent, des accumulations épidermiques s'éliminèrent ; des cicatrices creuses semblèrent se combler, d'autres s'amincirent, enfin les taches pigmentées s'atténuèrent. L'évolution de la maladie était à sa période terminale après avoir duré environ dix mois. Aujourd'hui 14 janvier 1891, il n'y a plus sur tout le corps que trois boutons en activité : encore sont-ils exclusivement dermiques."

In this case also intestinal disinfection apparently cured the condition, and is in support of the theory of an intestinal factor, while the work of Lesné and Dreyfus has shown that under the influence of slightly abnormal local conditions intestinal absorption can sensitize an animal.

(3) *Light Factor.*—There appears to be a general consensus of opinion that the seat of election for the eruption is the face and if this is admitted, then the possibility of sunlight as an adjuvant cannot be excluded. It appears to us that this adjuvant acts, like the higher temperatures in Friedberger's experiments, by accelerating the production of anaphylotoxin, which would naturally produce its most marked effect where it was most abundantly and quickly produced. It is possible that it is, as a rule, produced only in small quantity, and slowly, in parts not constantly exposed to light, and this may be associated with the view that anaphylotoxin is an unstable substance, and is readily broken up into less toxic or even non-toxic products.

Hence the reason why the eruption appears in small amount and but seldom on covered parts of the body.

We now turn to inquire whether there are any other diseases which are produced by the action of a chemical substance absorbed from the bowel together with the action of sunlight. The best known example is the disease called *fagopyrismus*, which varies from an erythema to an erysipelatous inflammation of the non-pigmented areas of the skin of sheep, swine, cattle, goats and less commonly horses, associated in bad cases with nerve disturbances when eating buckwheat fodder or trefoil and exposed to strong sunlight. It appears probable that a chemical substance which can be extracted from buckwheat by alcohol enters the circulation and joining with receptors in the cells of the skin produces when acted upon by sunlight an anaphylotoxin in such quantity that it causes the signs and symptoms of the disease.

Thayer, by local cutaneous application of the toxin, has demonstrated that buckwheat hypersensitiveness in man is anaphylactic in nature.

Pellagra can also be explained by the theory of an intestinal toxin uniting with the receptors of the cells of the skin and thus forming a complex which, even in pigmented skin, under the influence of strong sunlight gives rise to an anaphylotoxin which acts locally on the skin and entering the general circulation causes the nervous symptoms and perhaps the more marked of those of the alimentary canal. Pellagra however has not been studied on these lines, and the above is merely a theory based on analogy with the acnitis case which we are considering.

Pathology.

As some of the earliest changes are to be noted in the cells of the deeper layers of the epidermis, it may be that these are, in part at all events, the site of origin of the anaphylotoxin, which in its turn would paralyse the non-striped muscle cells of the wall of the blood-vessels and thus cause their dilatation, but the other changes described above may be the reaction of the tissues in their attempt to split up this toxin into less toxic substances, some of which may cause the suppurative changes, while the extent of the eruption must depend upon the quantity and diffusion of the poison generated.

It is interesting to compare the rise of temperature associated with the onset of the first and second eruptions in our patient with that associated with the severe positive cuti-reaction, as the explanation in all three cases may be the same—viz., that it was due to the production of small amounts of anaphylotoxin or its products entering the circulation.

The whole acnitis process appears to be a complicated anaphylactic or allergic reaction.

DIAGNOSIS.

The cardinal features of the present case appear to be :—

(1) The sudden onset.

(2) The distribution on areas exposed to light.

(3) The more or less bilateral symmetry.

(4) The lesions are not follicular, although comedones may be accidentally associated therewith.

(5) A lesion beginning beneath the skin comes up into a brownish red papule which may suppurate. This papule may be absorbed, and if so leaves no scar or pigmented area behind it.

(6) The evidence of the positive cuti-reaction that at some time the man had been infected, probably quite mildly, with the tubercle bacillus.

The differential diagnosis of this case required to be made from :— (1) Acne vulgaris; (2) acne varioliformis; (3) lupus vulgaris; (4) other papulo-nodular tuberculides—(*a*) folliclis, (*b*) acne scrofulosorum, (*c*) acne cachecticorum; (5) erythema induratum; (6) dermatitis nodosa rubra; (7) drug eruptions; and this we effected in the following manner :—

From *acne vulgaris* it could be differentiated by its distribution, by the non-follicular origin of most of the papules, and by the brownish red colour of the papules.

From *acne varioliformis* it was diagnosed by noting the brownish red colour of the papule, and the absence of rapid necrosis and of varioliform scars.

From *lupus vulgaris* it was separated by observing the absence of lupus nodules, and by its rapid onset as well as the absence of tubercle bacilli as seen microscopically, and by negative animal inoculations.

From *folliclis* it was recognized by its distribution, and the absence of crusts and ulcers with marked pigmentation and scarring.

From *acne scrofulosorum* it was distinguished by the absence of tubercular glands, and by the distribution.

From *acne cachecticorum* it was divided by the absence of cachexia in the patient.

With regard to *erythema induratum* the absence of node-like swellings on the limbs and the negative inoculations into guinea-pigs indicated that the patient's eruption was not this disease.

Dermatitis nodosa rubra is characterized by its unbearable pruritus, and by its wide distribution practically all over the body, both of which signs were absent in our patient.

From *drug eruptions* a distinction was drawn by the fact that acnitis is essentially papular, and not pustular, though it has pus in many of its lesions. With reference to the pustular drug eruptions the distribution of the acnitis lesions in our case enabled a differential diagnosis to be easily made, even before the histology was studied.

Treatment.

As we had previously concluded that probably the correct treatment of an early case of acnitis was intestinal disinfection, and as the diagnosis was quite easy (fig. 1), as soon as the man was seen he received this treatment on the fifth day of the eruption. He was treated with small doses of calomel every night, followed by salines in the morning, and given cachets of salol with a little bicarbonate of soda three times a day. This treatment was followed by a most remarkable improvement in five days. It was then stopped, and in a week the patient was back with a slight recurrence (fig. 2) when a further and longer course of treatment led to a complete disappearance of the rash (fig. 3), which so far has not recurred. He was also treated locally by the application of a calamine lotion to the face, neck and hands.

Summary.

Clinically our case agrees well with those described by Tilbury Fox, Crocker, Perry, Galloway, Schamberg and Oliver. It also agrees well with the illustrations given by Barthélemy, by Crocker, by Schamberg, and by Oliver, but it appears to have been less severe, and more restricted in its area of distribution than in Barthélemy's cases. In all these cases the principal site of the disease was the face.

The pathological histology as described above is in agreement with the accounts given by Tilbury Fox, Barthélemy, Crocker, Galloway, Pernet, Schamberg and Oliver, but our first sections differ from the others in being obtained in a very early stage of the disease, and hence in giving a clearer view of the sites first affected.

As regards the causation Barthélemy drew attention to the presence of an intestinal auto-intoxication, while the majority of the cases have shown some history of a tubercular taint, either in the family or in the person. When we consider the more modern views as to the infection of children, at all events in Europe, it will be evident that it is difficult to exclude the possibility of the patient's cutaneous cells being sensitized

at some time or another by the tubercle bacillus. With regard to the third factor in the causation—viz., sunlight, we have not noted that any other author has laid stress on this point, and we ask the reader to bear in mind that the occasional extension of the eruption to parts of the body usually covered, or to the mucous membrane of the mouth, does not in any way militate against the possibility of this being a causal factor.

We have failed to note that anyone, except Barthélemy, has attempted treatment by intestinal disinfection, and we are of the opinion that probably the remarkable success of this method of therapy in our case may be due to the fact that he was treated from the fifth day of the appearance of the eruption.

The analogy of this complaint with fagopyrismus and pellagra as regards the mechanism of the causation (excluding, of course, the tubercular receptors, and substituting those normally present in the cutaneous cells, at all events in the case of fagopyrismus, and probably also in pellagra) appears to be interesting.

It is not possible, in an Egyptian soldier, to attempt to trace out any family anaphylactic history on the lines of the valuable work of Cooke and Vander Veer on "Inheritance in Human Sensitization," but it is obvious that such a study when possible might lead to interesting results.

To summarize, we look upon acnitis as an eruption caused by a poison generated under the influence of sunlight by cutaneous cells sensitized to the tubercular virus, and attacked by the products of an intestinal auto-intoxication, the whole process being *anaphylactic* in nature, and the obvious line of treatment being that directed against the intestinal auto-intoxication in very early stages of the complaint.

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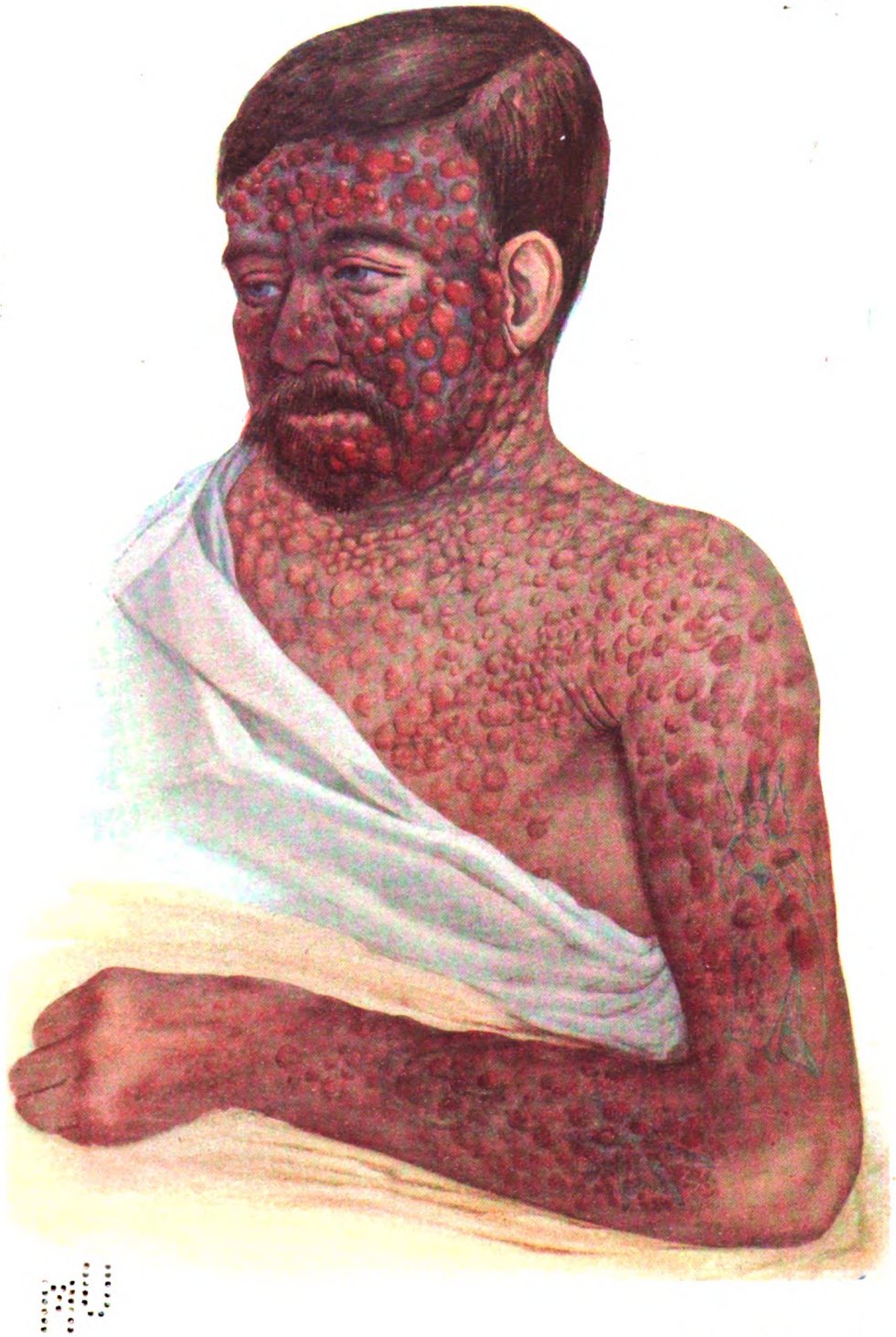

From an original drawing by
Miss Mabel Green.

PATTY SHAW and LOUGHLIN:
Case of Lymphangiectasia Cutis.

Section of Dermatology.

President—Dr. J. H. STOWERS.

(*October* 19, 1916.)

Case of Leucocythæmia Cutis.

By H. BATTY SHAW, M.D., and D. LOUGHLIN.

THE patient whose case-history was fully described in the last number of the *Proceedings*,[1] died on November 2, as reported in the postscript following the discussion. The coloured drawing, here depicted, illustrating the patient's head, neck and left upper extremity, including part of the chest, was made about six weeks before his death.

The whole of the face, the neck, thorax, upper and lower arm are seen to be covered with soft fleshy tumours, varying in hue from purple to pale pink. The skin of the ears, of the palms of the hands, and of the soles of the feet, was quite pale, but that of the rest of the body was deeply pigmented.

Just before the patient's death the tumours of the skin had greatly enlarged; those covering the face had so much enlarged as to be contiguous, so that the whole face had become more deformed than the picture shows.

A case closely resembling this one was described by Pfeiffer under the name of pseudoleukæmia;[2] but Pinkus,[3] in discussing and describing the conditions and changes of the skin met with in leucocythæmia correctly regards Pfeiffer's case as one of leucocythæmia cutis, relying, as he did, upon the fact that though the total leucocyte count was not increased, the relative proportion of lymphocytes was.

[1] *Proc. Roy. Soc. Med.*, 1916, x (Sect. Derm.), p. 1.

[2] Pfeiffer, Th., "Ein Fall von Pseudoleukämie mit specifischer Erkrankung der Haut," *Wien. klin. Wochenschr.*, 1897, x, p. 548.

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(*July* 20, 1916.)

Case for Diagnosis; (Epidermolysis Bullosa).

By E. G. Graham Little, M.D.[1]

The patient is a man aged 55, and has been for many years a verger at a provincial Cathedral. Some twelve years ago the symptoms now complained of began to appear, apparently about the same time in a son now aged about 18 and in the father. The symptoms are thus described by the father: An intolerable very localized itching, "as might result from the bite of a flea," is felt, and scratching and rubbing, resorted to to relieve the itching, produce immediately a blister, such as rowing may cause in an inexperienced oarsman. The itching is ascribed by the patient to the presence of "seeds"—i.e., small granular swellings, which he digs out, or, more often, extracts with the point of a needle. The itching is thereby relieved, but a blister forms on the skin thus treated, and the skin slides off the surface with quite gentle rubbing (Nikolsky's sign). Excoriations are thus brought about which may leave very superficial atrophic patches; or the "seeds" form again in the injured area, to be again picked out. The patient obligingly extracted several of these "seeds" at his visit to me, and the little mass of substance thus removed, teased out on a slide, was seen to consist microscopically of epithelial cells. To illustrate the ease with which blisters form, the patient on his second visit pointed out a blister on his forearm which had not been present when he left home (Teddington) an hour previously, and was ascribed by him to the pressure of his arm leaning on the side of an omnibus which brought him to my house. He says that as a boy he used to knock off great patches of skin when he fell, but he did not then seem to have blisters. The eruption has always affected very restricted areas of skin, which are worked over as it were again and again in the same sequence, beginning with isolated points of itching, followed by blistering and excoriation. The condition of the parts when he was first seen was considerably altered when he came to the meeting; blister formation was then in excess of other symptoms, and possibly the excitement of attending the meeting may

[1] A provisional diagnosis of "acne urticata" was made when the case was originally shown.

have exacerbated the itching, which is the precursor, not the result, of the blister. At the private consultations the seed-like bodies could be readily identified, as, clinically, minute white papules the size of the head of a small steel pin, and grouped not unlike a tiny patch of herpes, but when pricked with a fine needle no fluid escapes. As a result of his self mutilation, for that is not too strong a word for his treatment of his skin, the initial lesion is speedily changed. At the time of his last visit the following note was taken of the distribution and character of the eruption:—

Distribution: This is confined to the lower parts of the thighs, the knees and upper parts of the legs, and the forearms. It is fairly symmetrical, but is a little more pronounced on the right lower and left upper sites. Right side: The thigh from its middle front aspect to the knee, and for some 4 in. below the knee, is occupied by large patches of raised erythematous skin scored heavily with excoriations, and in one position a long thin-walled blister is seen. The individual erythematous patches cover an irregular area of several inches, without any circinate arrangement, and it must be remembered that the "erythema" is a terminal effect. On these patches the surface skin is repeatedly shredded off by very superficial blistering. Eruption of this general type occupies, besides the anterior surfaces described, the outer and posterior surfaces of the thigh, knee and leg. On the right buttock there is a patch of small scars marking an earlier rash. Left thigh: The eruption starts with the lower third, on the anterior and inner aspects, and covers the front and inner side of the knee. On the leg below the knee there are some faintly reddened scars of older invasion, and a similar state of things is found on the back of this leg. There are some fresh raised patches of " erythema papulatum " type in the left popliteal space.

The eruption has a different aspect on the forearms. On the right side it has almost disappeared leaving a large number of minute scars, individually about ¼ in. in diameter, and giving a "rain-washed" look to the forearm on the extensor surface from below the elbow to about 3 in. above the wrist. On the front and back of the forearm on the left side the disease is still active, and here are numerous early granules, like milium, which represent the " seeds " which, in the patient's narrative, are the forebears of all his trouble. Several of very recent appearance were pointed out by the patient and a small patch bearing five of these granules was excised for histological investigation. There is moderate lichenification of the skin, especially on the front of the forearm, where there is some resemblance to a receding lichen planus, but not in my

opinion greater than the resemblance of half a dozen different itching eruptions having no relation with lichen planus. At any rate there are nowhere any typical planus lesions.

In twelve years there has been no complete cessation of disease in the sites named, but no spreading elsewhere, though exacerbations and remissions have alternated. The mucous membranes have not been affected. The nails are thickened on the fingers and partly raised from the nail bed in individual instances. There are some flat warts on the front of the chest, but with this exception the skin is not elsewhere altered. His sleep is disturbed by itching and the patient is anæmic and somewhat frail-looking, but has not stopped his work at any time; he is an expert wood-carver and water-colourist. The eruption has never appeared on his hands, or fingers, or toes.

DISCUSSION.

Dr. A. EDDOWES: As soon as this patient told me he picked "tiny grubs" out of his skin, I was reminded of what patients who have lichen often tell me. The face is a common site for these little spines which "look like worms." There are several other symptoms in this patient which are consistent with the diagnosis of lichen. Lichen papules may be plain or very pointed, and closely associated in patches as in this man's case. And Dr. Little's mention of the term "granule" suggests we have here something akin to lichen; that the exfoliation and the bullæ are consistent with that diagnosis. The lesions are on the limbs, and do not occupy the common site of an acne. The fact that the follicles are affected does not in any way exclude *lichen*, of which I hold this case to be a variety.

Dr. BOLAM: I suggest that this may be dermatitis herpetiformis. Some of the cases which turn out to be such are very much like lichen in some of their phases. And I do not think there is anything about this case which does not fit in with that view. The condition has not been entirely confined to the areas now seen to be involved.

The PRESIDENT: No doubt the possibility of the case being one of dermatitis herpetiformis has occurred to you, there being points of resemblance between the two diseases. However, the weight of evidence supports your diagnosis. Is it your intention to have microscopic sections made?

Dr. ADAMSON: I do not think this is acne urticata of Kaposi. In Kaposi's acne urticata, or the "dug-out excoriations" of Colcott Fox, there are small excoriations scattered over the limbs and body and often the face—not large

bullæ and excoriations in groups as in this case. I believe this case to be lichen planus with bullous lesions, and the papules on the arms seem to me to be typical lichen planus papules.

Dr. PRINGLE: I do not think the diagnosis of acne urticata holds good for two main reasons: first, because it is not acne, and, secondly, because it is not urticate. It does not, in my opinion, correspond in any way with Kaposi's original description of acne urticata, which is a disease almost confined to the face of young women, and accompanied by the neurotic excoriations to which Dr. Adamson has referred. I do not know what the case is, but I think the suggestion thrown out by Dr. Bolam is an extremely good one. It seems to me to be primarily a bullous eruption, with some lichenification—a condition running in lines and produced by finger-nails—rather than true lichen planus.

Dr. PERNET: In my opinion the case does not fit in with the acne urticata of Kaposi. I remember a case under Dr. Radcliffe-Crocker, in which there were no bullous elements. The lesions were more or less discrete, according to my recollection. I do not think the case can be lichen planus. The lesions seen on the arm are apparently the result of the long duration (eight years) and the great itching. In many skin conditions, when seen after they have lasted a number of years, there may be a pseudo-lichen planus. The sliding off of the skin reminds one of what occurs in pemphigus foliaceus; this condition I have also described in a case of pemphigus vegetans under my care some years ago [1] (so-called Nikolsky sign).

Dr. ADAMSON: I do not think the lesions on the arms are lichenification; they are discrete papules. It would be interesting to have a section of a papule.

The PRESIDENT: I take it that Dr. Graham Little does not desire this case to be reported as actually one of acne urticata until further steps are taken by microscopic investigation to prove its nature. It is, of course, of much importance that cases of doubtful character should be recorded as such.

Dr. GRAHAM LITTLE (in reply): This man has not been free of the condition for twelve years, and that is very unlike lichen planus; moreover, the constantly bullous character is against that view. The itching is very agonizing, and extremely local. The digging out of the little plaques seems to place it in the category of dug-out excoriations, "acne urticata." When he came first the lesion was more granular, especially on the arms, and the granule is the point at which the eruption starts, the other phenomena being secondary. I do not regard it as dermatitis herpetiformis, nor as lichen planus. I am not familiar with the occurrence in lichen planus of a bullous eruption maintained

[1] Pernet, "A Case of Pemphigus Vegetans treated on general lines by means of Vaccines." Boeck, Festschrift, *Arch. f. Derm. u. Syph.*, 1911, cx.

so consistently for so many years. In answer to Dr. Pringle's remarks, it should be said that no connexion with acne is claimed by Kaposi's title, though the "urticata" part is here certainly well justified.

Postscript.—The son, now aged 19, was seen by myself and by Dr. Pringle, subsequently to the father's visit to the Section. The eruption in the case of the son was, in my opinion, obviously the same disease as that of the father, an opinion fully shared by Dr. Pringle. Microscopical sections of the father's skin showed epidermal cysts, which constituted the "seed-like bodies" described by the father, and the general character of the histology was diagnostic of epidermolysis bullosa hereditaria. There are numerous points of interest in the family history, and it is my intention to follow this preliminary note with a fuller paper on the subject in an early issue of the *British Journal of Dermatology*.

Section of Dermatology.

President—Dr. J. H. STOWERS.

(*November* 16, 1916.)

Case of Fixed Erythema of the Palms.

By H. G. ADAMSON, M.D.

THE patient is a man of middle age. For five years there has been a sharply circumscribed, rounded patch of erythema upon the ulnar side of the left palm. The patch is not raised and shows no other change beyond redness. It has persisted unaltered except for a slight increase in size. During the past two years a similar patch has appeared upon an exactly corresponding area on the right palm, and is also persistent without any variation in the degree of redness. The patient complains of no local sensations, and there is no anæsthesia nor hyperæsthesia. He suffers from "neuralgic" pains along the forearm and behind the ulnar side of the elbow, but there is no tenderness of the ulnar nerve. I have not seen a similar case and hope that some member may be able to throw light upon its nature.

DISCUSSION.

Dr. F. PARKES WEBER: The red patches on the hands remind me somewhat of the sharply localized patches of erythema which occur on the sides of the face in some persons. But these patches on the sides of the face to which I refer are mostly associated with local sweating, and generally they are brought out by eating.[1]

[1] *Vide* F. Parkes Weber, "Localized Flushing and Sweating of the Cheek on Eating," *Trans. Clin. Soc. Lond.*, 1905, xxxviii, p. 216.

Dr. ALFRED EDDOWES: This patch reminds me of what I have seen on the face, unconnected with sweating. The patch, as large as a shilling, lay over the point of exit of the mental nerve, and remained there for many months. I suggested at the time that it was due to the eruption of a wisdom tooth in the lower jaw on that side. The patient was a City man who had a good deal of work to do and did not take sufficient rest, so that I believe his nervous system was somewhat exhausted. Eventually he got well. It seems to be closely allied to the "flush patch" of Hutchinson.

Major GRAY: The history of the neuralgic pain in this case is, in my opinion, of more importance than the skin lesion; it is that which, I think, most merits investigation. I would suggest the possibility that it may be due to cervical rib; that condition might cause such symptoms. The sensory phenomena should be gone into carefully.

The PRESIDENT: We shall be much indebted to Dr. Adamson if he will give us a further report on this case at a later date. I think further observation is needed before a final opinion can be formed and expressed.

(*November* 16, 1916.)

Case for Diagnosis.

By GEORGE F. STEBBING, M.B.

(Introduced by Dr. PARKES WEBER.)

A. T., AGED 33. The patient first came under observation on May 14, 1916, when she had an abortion. She states that in November, 1915, she had a red rash all over the body. This did not cause any irritation and cleared up after she had been treated for a month as an out-patient at a hospital. The present eruption first appeared in June, starting on the inner sides of the thighs as red, raised papules which caused great irritation. Since then the lesions have appeared all over the body, the face and the scalp being the only parts free. When the papules fade they leave pigmented patches, light brown in colour; this being especially noticeable on the inner sides of the thighs. The lesions vary in size from that of a pin's head to ¼ in. in diameter. Treatment does not appear to have had any influence on the condition.

DISCUSSION.

The PRESIDENT: The initial lesion in this case appears to be a papule. At the margins smooth, flat, shiny, red, and angular papules are visible, with a tendency to linear arrangement. These I regard as characteristic of lichen planus. The larger plaques result from the aggregation of smaller papules, and as they undergo secondary change they are apt to mislead.

Dr. J. J. PRINGLE: I think this case illustrates the extreme difficulty of making a diagnosis of even perfectly familiar lesions in artificial light. This is a typical case of lichen planus; and if we were to see it by daylight there would be no hesitation about our pronouncement.

(*November* 16, 1916.)

Case of von Recklinghausen's Disease.

By J. L. BUNCH, M.D.

THE patient is a woman, aged 35, who first developed some small tumours on her back. They began to appear ten years ago, and since that date they have become larger in size. She has developed an immense number of them all over her body, and on her face. Some are pigmented, of a brown colour, and some are purplish. She ascribes the onset of the condition, in my opinion without any reason, to some injections she had ostensibly for the cure of the eye which she has now lost. The man—I do not know whether he was a registered practitioner or not—said he could restore the sight of the eye, which was failing on account of cataract, by injecting a substance into the bottom of her spine and her head. After these injections she appears to have developed a rash, which persisted, and these tumours have since developed. They are tender to the touch, but they cause her very little trouble. A section from one of the tumours, which I show under the microscope, presents chiefly spindle-shaped cells. The tumours vary in size from that of a small nut to that of a pea. There are no tumours on any of the mucous membranes, such as have been observed in some other cases of the disease. I am a little doubtful about her mental condition, but her general health is quite good.

DISCUSSION.

Dr. F. PARKES WEBER; I suppose that, strictly speaking, von Recklinghausen's disease ought to show evidence of plexiform neuroma as well as the presence of the two other classes of lesions—namely, molluscous fibromata and patches of cutaneous pigmentation. I think that Dr. Bunch's case should be designated an incomplete case of von Recklinghausen's disease, but such incomplete forms are probably commoner than the complete *classical* examples of the disease. In some incomplete forms of von Recklinghausen's disease the patches and spots of cutaneous pigmentation occur without the molluscous tumours and without plexiform neuromata, though molluscous fibromata may develop later on.

Dr. S. E. DORE: I should like to ask what Dr. Parkes Weber implies by the term "plexiform neuroma." Are not all these small tumours in reality plexiform neuromata? I think it has been shown that they are derived from the nerve sheaths.

Dr. F. PARKES WEBER (in answer to Dr. Dore): None of these tumours feel to me as if they were attached to nerve trunks, nor do they convey the feeling of a bag of hard worms which one sometimes gets in the case of plexiform neuromata. Moreover, plexiform neuromata are usually larger than the tumours in the present patient.

(*November* 16, 1916.)

Case of Œdematous Sclerodermia.

By J. M. H. MACLEOD, M.D.

THE patient is a woman, aged 46, who is suffering from sclerodermia affecting the face, extremities, and the greater part of the trunk. She is fairly well nourished and has enjoyed excellent health until this disease appeared about twelve months ago. She has been married twelve years and has had no children. Soon after marriage she had some uterine trouble from which she soon recovered, and with that exception there had been nothing of medical interest in her past history.

About a year ago her menstrual periods became irregular and gradually ceased and following their cessation her face, arms, and

legs became swollen, and later her feet and hands became involved. For some time previous to this she had symptoms of a feeble circulation in her hands, which were suggestive of mild Raynaud's disease. Gradually the swelling disappeared, being replaced by a progressive

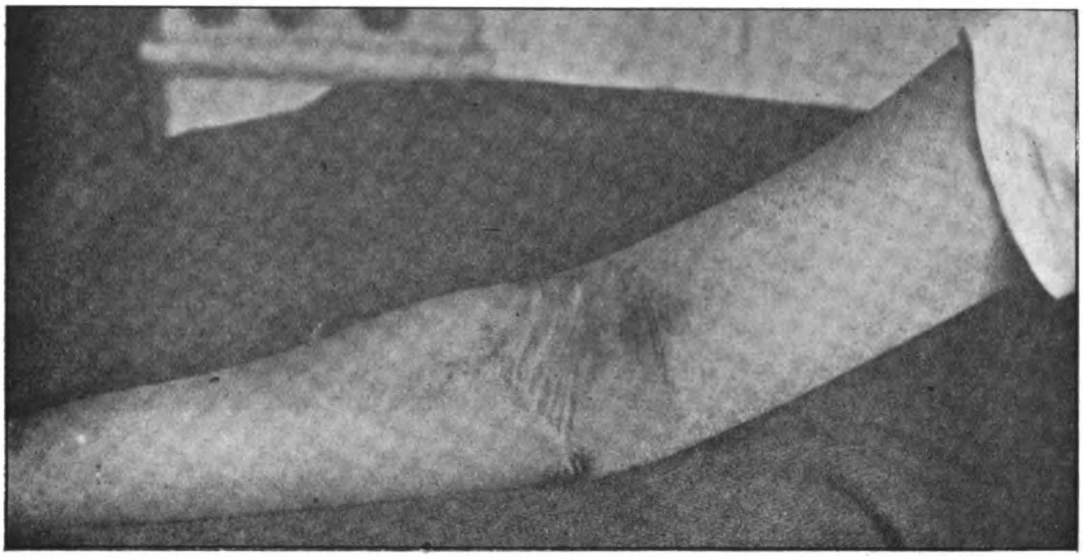


FIG. 1.

Case of sclerodermia, pigmentation and acanthosis.

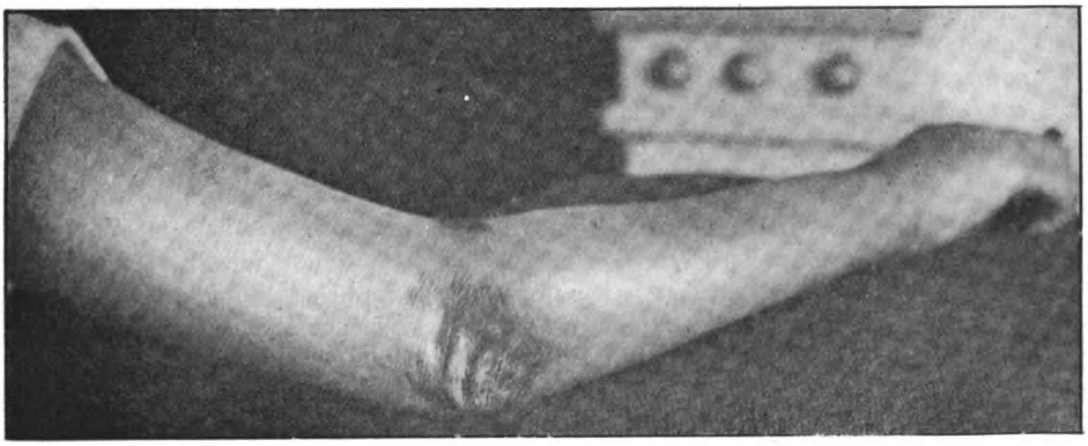


FIG. 2.

Case of sclerodermia, pigmentation and acanthosis.

sclerodermia which has now become universal except in the scalp and a small zone about the umbilicus. The hands are stiff and there is definite sclerodactyly which interferes with all fine movements. The region about the lips is hard and immobile so that she has difficulty in opening her mouth.

Within the last few weeks a new feature has been added to her case, one which I have never seen before—namely, an acanthosis with pigmentation about the elbows, axillæ, groins, and neck, where it forms a sort of necklace. This blackened, slightly warty, condition occurs at a fold in the neck, and on the inner surface of the elbow on the skin just beyond where it folds when the elbow is flexed.

In the regions affected by the sclerodermia the hair has fallen out; two-thirds of the eyebrows have gone, part of the eyelashes, and now the hair in the axillæ and pubes has begun to fall out also.

The only treatment which, as yet, has been employed, has been massage with almond oil, which has been of some slight local benefit. It is proposed to put the patient on a course of thyroid treatment.

DISCUSSION.

Dr. J. J. PRINGLE: This case does not exactly accord with anything I have ever seen or read of. The occurrence of sclerodermia after œdema is common, but the supervention of this acanthotic condition with pigmentation is, as far as I know, unique. In a few cases of sclerodermia, during the last year or two, I have seen some encouraging results from treatment with extracts of ductless glands, which Dr. MacLeod suggested in his remarks, and about which he knows more than I do. I have used a preparation of Martindale's, called "four gland tablets," each of which contains 1 gr. of thyroid, thymus, suprarenal and pituitary gland substance. It is asserted that the combined correlated action of these various substances is an essential factor in their utility.

Dr. G. PERNET: I think this is eminently a case in which thyroid extract should be tried. With regard to the girl I showed at a previous meeting, with morphœa and sclerodermia of the thighs, for a long time she did not respond to thyroid, but ultimately she improved very much and did better than I thought she would. The improvement was very tardy. Since then, at the West London Hospital, I have had a case of œdemato-sclerodermia of both legs in an elderly woman. Noticing scars of old syphilitic trouble about one knee, I put her on mercury, with much benefit. I think inquiry should be made as to specific trouble, especially when there is a history of miscarriages, and where there seems a possibility of syphilis I would give mercury and extract of thyroid as well in suitable patients. I do not mean to imply that

sclerodermia is syphilitic in origin, but syphilis may play an underlying part in some cases.

Dr. F. PARKES WEBER: I should like to draw attention to the earliest symptom in this case of sclerodactylia and generalized sclerodermia—namely, the "going white" of the finger tips occasionally. Similar symptoms are not rarely noted at the commencement of generalized sclerodermia with sclerodactylia. This does not mean that sclerodactylia is generally associated with Raynaud's disease, for I believe the "going white" of the fingers is due to the same cause as the sclerodermia — probably some disorder of the internal secretions. Thyroid treatment may be beneficial. But, even apart from treatment, I do not think that the present case is hopeless, because as long as a case is in the hypertrophic stage, as distinct from the atrophic stage, there is always a chance of retrogression, and more or less clearing up of the condition. I have never seen or read of a case of sclerodermia associated with acanthosis-like thickening and "epidermic pigmentation," such as is a striking feature of Dr. MacLeod's present case.

Dr. S. E. DORE: I do not, of course, question Dr. MacLeod's diagnosis, because there are definite sclerodermatous changes, but I think the question of myxœdema is worth investigating in this case. The curious œdema, and loss of hair from the eyebrows and other parts, are, I think, at least suggestive, and there are analogies between the two diseases.

The PRESIDENT: The acanthosis in this case is a rare and important feature, and well worth recording by means of a photograph or coloured drawing.

Dr. A. EDDOWES: At present I have under my care a case of very well marked Raynaud's disease, in which symptoms of myxœdema have recently developed.

Dr. MACLEOD (in reply): I shall endeavour to have photographs taken of the condition. With regard to Dr. Dore's suggestion, I may point out that the patient is not mentally sluggish, and that her skin is hard everywhere. This seems to put myxœdema out of court.

(*November* 16, 1916.)

Case of Lymphadenoma with Cutaneous Lesions.

By DUDLEY CORBETT, M.D.

THIS case was shown here by Dr. Knowsley Sibley in July and November, 1914, and a full account of it was published by him in the *British Journal of Dermatology*, February, 1915. The diagnosis, based upon the findings of the Pathological Committee, was in favour of the case being one of lymphadenoma with glandular and cutaneous lesions.

The patient was admitted to St. Thomas's Hospital on November 20, 1916, under the care of Dr. H. G. Turney, who has kindly allowed me to show him to-day. On admission the lad, who is now aged 18, was in a fair state of general health. The papular eruption had, however, spread considerably, particularly over the lower part of the abdomen and inguinal regions. A number of the larger papules appeared to have undergone a process of caseation in the centre, and he states that he is able to express a putty-like material from them. The inguinal glands were considerably enlarged, but those in the cervical region, while palpable, were not enlarged to anything like the same extent as shown in the photographs in Dr. Sibley's article. A band of white scar tissue extends from the mid-line above the umbilicus round the left side to the mid-line of the back indicating the site of the herpetic eruption which was previously described. The liver margin can be felt ½ in. below the costal margin. The lower pole of the spleen projects about 1 in. below the costal margin during deep inspiration, and is well defined and of firm consistency. Some glands can be felt deep down in the left iliac fossa. There is some relative dullness over the manubrium sterni and dullness at the base of the right lung where vocal resonance is diminished and the breath sounds are faint. The testicles are undescended and can be felt atrophied in the inguinal canals. Excepting in the scalp there is a complete absence of body or facial pain. These two points were not previously described. The urine contained neither albumin nor sugar. The blood count was very similar in type to that of December 31, 1914: erythrocytes, 5,000,000 per cubic millimetre; hæmoglobin, 80 per cent.; colour index, 0·8; leucocytes, 30,640 per cubic millimetre; (polymorphonuclears, 19 per cent.; small lymphocytes, 35·75 per cent.; large

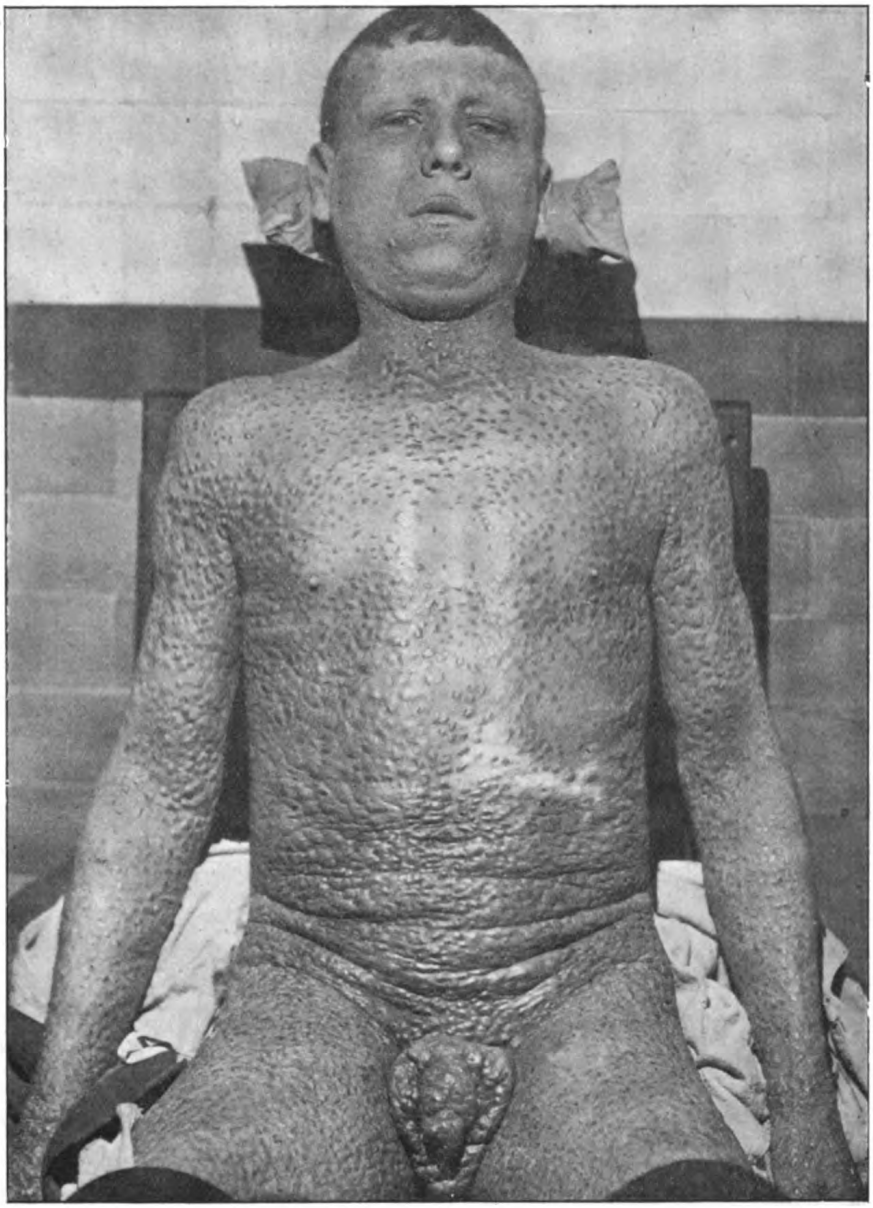


FIG. 1.

Case of lymphadenoma with cutaneous lesions. Frontal aspect. Showing enlarged cervical glands and dense infiltration of skin of pubic region, scrotum, and penis.

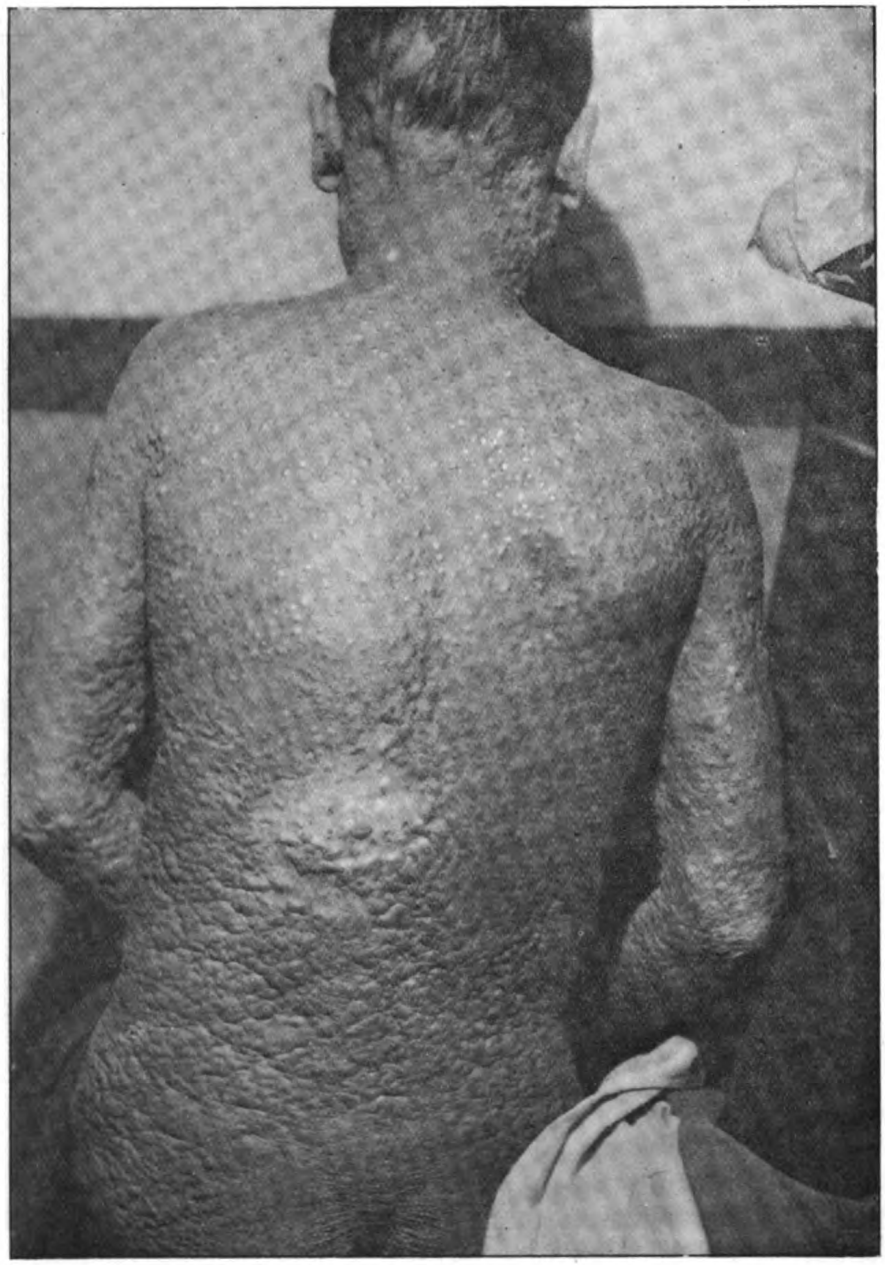


FIG. 2.

Case of lymphadenoma with cutaneous lesions. Dorsal aspect. A similar scar can be seen in the upper lumbar region to the left of the mid-line.

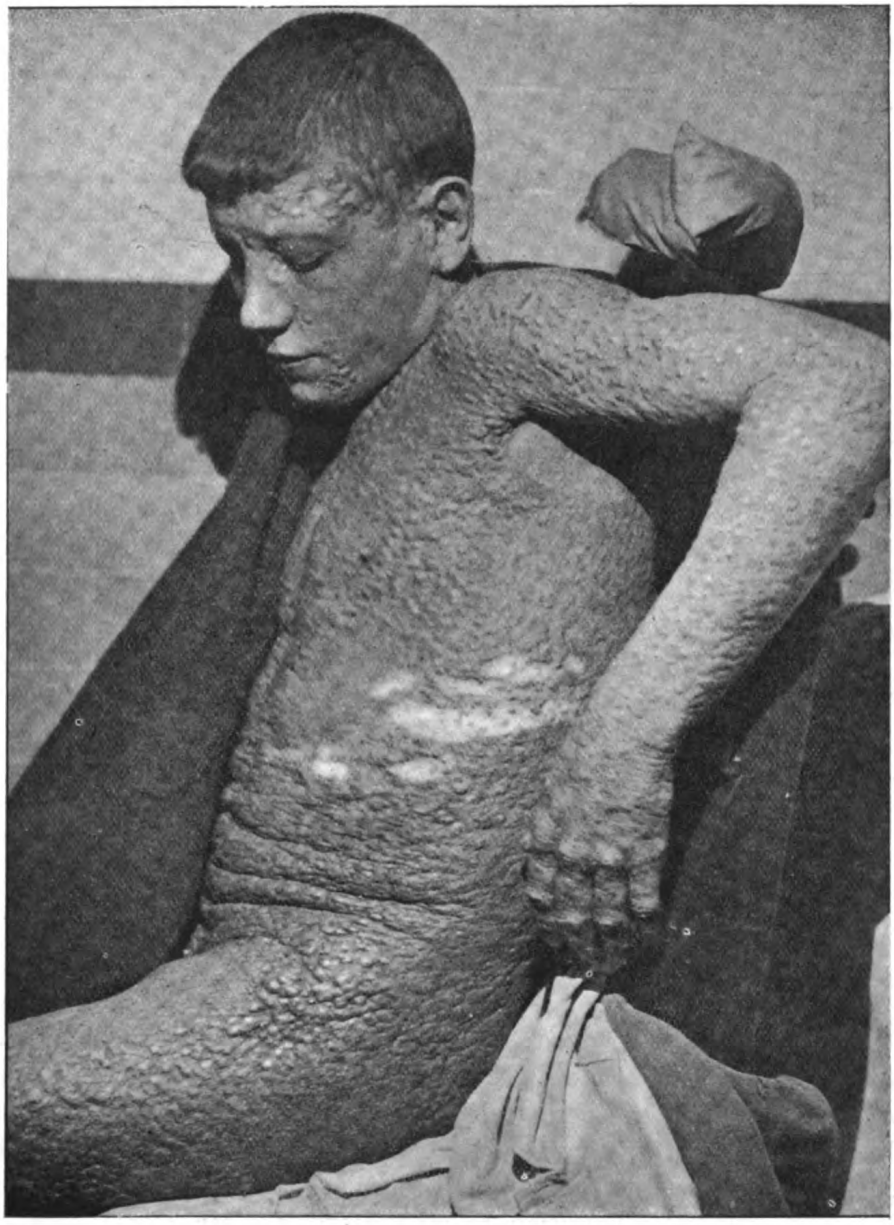


FIG. 3.

Case of lymphadenoma with cutaneous lesions. Lateral aspect. Showing scar on the side of the herpatic eruption.

lymphocytes, 8·5 per cent.; large hyalines, 2·5 per cent.; eosinophiles, 34 per cent.; basophiles, 0·25 per cent). The total leucocytes have remained nearly the same, but there is a considerable diminution in the number of polymorphonuclears, 19 per cent., as compared with 35·2 per cent. on the previous occasion, together with an increase in the total lymphocytes, 44·25 per cent., as compared with 20·4 per cent.

During his stay in the hospital he had a short attack of bullous dermatitis on the palms and soles; its general characters resembled dysidrosis, and it was accompanied by intense irritation. The temperature has varied throughout between normal and 100° F.; once or twice it touched 101° F.

Two biopsies were made. At the first, one of the unbroken caseating papules was excised, and at the second, one of the small nodules without any appearance of caseation. Mr. Shattock has kindly examined the sections made. Those from the caseating papule showed a minute cyst lined with epithelium and containing débris which might be that of aborted hairs or epithelial cells. Surrounding it is a thin layer of the same kind of chronic inflammatory tissue as is seen in the sections of the small nodule. These showed no traces of a cyst. Mr. Shattock is of the opinion that the cellular structure of this tissue would support the hypothesis that the case is one of lymphadenoma with miliary growths in the skin.

(*November* 16, 1916.)

Case of Sclerema Neonatorum.

By J. H. Stowers, M.D. (President).

This male infant, aged 3 weeks, well nourished, and of healthy parentage, was sent to me by Mr. Depla, of University College Hospital, who had undertaken to attend the mother in her confinement. The child was born a few minutes before his arrival, and he found it in a marked state of semi-asphyxia, due to prolonged compression, requiring sustained artificial respiration to resuscitate it. Mr. Depla stated that at birth, and for several days afterwards, the abnormal conditions now so manifest did not exist. As I am informed, the sclerosed skin involving the whole of the back and neck, which is now so marked, together with the vascular congestion, giving it a deep purple colour,

gradually developed. Subsequently a like change involved the skin of the upper arms, and the large knotty lumps, which felt like "solidified fat," were discovered on the front and outer aspects. The remainder of the body and limbs, together with the face and scalp, are unaffected. The healthy condition of the child at this time (for it takes the breast eagerly, and sleeps and functions well) makes it not improbable that the pressure to which it was subjected was a determining feature in producing the sclerema, and, with careful treatment, justifies, I think, a favourable prognosis. I learn that improvement has already taken place, and that parts of the sclerosed integument are more supple. The mother has had six other children, all of whom were born in a healthy state.

DISCUSSION.

Major GRAY: Although one sees it stated in books that this type of sclerema occurs in unhealthy and wasted infants, the few cases of it I have seen, with one exception, have been in healthy looking children. One soon loses sight of these cases, but I think there can be no question that these lesions disappear as the children grow up. In one case in which I watched the condition, there was considerable improvement. I believe it is generally held that these masses are due to an alteration in the chemical composition of the fat. When I was Resident Medical Officer at the Queen's Hospital for Children, Dr. Carpenter had some fat removed from such a case, and analysed by a chemist, but I think there was no marked change found in the composition. With regard to the extreme congestion on the back, it is conceivable that the mass is causing some obstruction to the venous return, but there is no evidence of any superficial hæmorrhage into the tissues.

Dr. J. J. PRINGLE: I am very glad to confirm the good prognosis given in this case by yourself, Sir, and by Major Gray, as the outlook in these cases is indubitably generally good, in contrast to that of œdema neonatorum, a very different disease, which might conceivably, however, be mistaken for this condition.

(*November* 16, 1916.)

Case of Acquired Syphilis in a Girl, aged 8.

By H. C. SAMUEL.

THIS girl has a primary chancre on the lip, a large mass of glands in the neck, and typical roseola on the body, with mucous patches on the vulva and anus. The interesting point is, that her mother had

syphilis five years ago; she was treated with mercury for some time, and was discharged with a negative Wassermann reaction. As recently as a year ago she gave birth to a baby with congenital syphilis; the infant was treated by Dr. Stowers with blue unction for three months, but since then had not been brought to hospital. A point of interest is, how has this girl become infected? She has had a wart on the side of this lesion for two years, and the mother says that she has been picking at this wart recently, and that is probably how she infected herself. Have any other members of the Section had a case of chancre of the lip in so young a child?

DISCUSSION.

The PRESIDENT: I think there is no doubt that this child has been infected by the infant, her sister, by kissing, the latter being the subject of well-marked congenital syphilis, including mucous patches in the mouth, and is now under my care. The amount of gland swelling is limited at present, but may increase. I have seen a primary chancre on the lower lip of a child younger than this patient.

Dr. J. J. PRINGLE: I would ask you, Sir, how you propose to treat this case, whether you think any of the arseno-benzol preparations are applicable to so young a patient, and if so, which is most suitable? If not, what is your opinion as to the probable result of mercurial treatment, and the duration of the mercurial treatment likely to bring about a cure? I have, myself, extreme difficulty, from the mechanical point of view, in dealing with cases of this sort by intravenous injections, and I have no very definite opinion as to how long treatment by mercurials is necessary to obtain a cure.

Mr. MCDONAGH: If this case were under my care, I should prescribe the same treatment as for an adult case, only giving smaller doses. I have given many intravenous injections to children of this age (8) with success, although I admit in some cases it is difficult. Should this patient belong to the latter class, then I should rely upon intramuscular injections. First of all I should give an intravenous injection of collosol iodine (100 c.c.), then, forty-eight hours later, and again three days later, two intravenous injections of a metallic compound, which I should repeat twice at weekly intervals, after an intramuscular injection of intramine (2·5 c.c.). The intramine should be prescribed five days after the third and a week before the fourth intravenous injection. For the next two or three years, according to the condition of the patient, I would prescribe the mixed treatment of mercury, iodides and intramine. If the patient's nervous system showed signs of being infected, which is so frequently the case when the chancre is situated in the buccal region, and the symptoms usually appear between the eighth and twelfth week after the

commencement of the treatment, I should about this time prescribe an intravenous injection of collosol iodine, followed by an intramuscular injection of intramine, and then by two intravenous injections of a metallic compound. I should like to say that treatment cannot be regulated by the Wassermann reaction, a reaction which is also useless as a test of cure. A negative Wassermann reaction means nothing, and a positive reaction only that the patient has had syphilis.

Dr. S. E. DORE: I should like to mention a case which I had at the Evelina Hospital, and which I showed at this Section in June, 1912. It was that of a girl, aged 10, with a genital chancre, secondary eruption, and syphilitic leucoderma on the back of the neck. The mother gave a positive Wassermann reaction, and there were two other children infected, one aged 5, and a baby aged about 6 months. The elder child was taken into the hospital and given an intramuscular injection of neo-salvarsan. The injection was followed by sloughing and an extensive scar resulted from the incisions which had to be made. Subsequently all three children did very well on mercury by the mouth. I notice that lately arseno-benzol preparations have been injected into the superior longitudinal sinus in infants, and should like to ask whether Mr. McDonagh or any other member has had experience of that method.

Mr. MCDONAGH: I have had the opportunity of giving intravenous injections by way of the anterior fontanelle in infants. Like intraspinal injections, theoretically, the procedure appears formidable, but in actual practice both are simple, efficacious and devoid of risk.

Dr. EDDOWES: Does the President remember that, many years ago, before salvarsan was dreamt of, the older practitioners considered that mercury easily upset patients of this age? Was there any ground for that belief? They gave mercurials freely to babies and adults, but feared giving large doses of mercury to children of 10 or 12 years of age. I have not noticed anything to justify that fear in my own practice.

Major GRAY: Mr. McDonagh says the Wassermann reaction is useless: would he use any serological test at all, to control the treatment—his "gel" test, or the ultra-microscope for example?

Mr. MCDONAGH: As to whether the ultra-microscope or the "gel" test will serve to regulate treatment, &c., I cannot at present give an opinion, but there is no doubt that they give a much more accurate picture of the patient's condition than can be obtained with the Wassermann reaction.

Major GRAY: Some time ago Noguchi worked out a complement fixation reaction, using an emulsion of his cultured spirochætes as antigen, and I believe obtained different results from the Wassermann test—that is to say, his test corresponded more to the true complement fixation test as employed in such conditions as typhoid fever. Have you had any experience of this test?

Mr. McDONAGH: The reason why Noguchi's spirochætal extract does not act well as an antigen in the Wassermann reaction is presumably due to the amount of unsaturated fatty acids that such an extract contains. Unsaturated fatty acids, owing to their influence upon surface tension, prevent positive sera from giving positive results.

Major GRAY: Mr. McDonagh rather suggests that any sort of serological test is useless. That means that we must fall back on clinical relapses as a criterion of cure or otherwise. Perhaps this patient will not develop any other symptoms of the disease until she is aged 30 or 40. Under these circumstances our knowledge of the treatment of syphilis by modern methods certainly does not enable us to guarantee a cure after any particular course of treatment.

Mr. McDONAGH: Once a case has reached the generalization stage, a cure in the strict sense of the word cannot be guaranteed, therefore one advises that treatment which clinical experience has proved to give the best results in the majority of cases. In such a case as this I do not think the disease will ever be cured.

Section of Dermatology.

President—Dr. J. H. STOWERS.

(*December* 21, 1916.)

Case of Morphœo-sclerodermia.[1]

By GEORGE PERNET, M.D.

THE patient is a man, aged 54, who attended the Skin Department of the West London Hospital on August 25, 1916, for the first and only time. He then gave the following details: Duration eighteen months, commencing as a "blush" on the fronts of both legs the size of the areas now involved, that is, they had remained of the same size as the original "blush." But the parts affected had gradually become hard. When seen, the areas were of the same extent as now, presenting sclerodermia of a lard-like fawn-coloured aspect, with a faint but definite lilac-tinted border. The areas corresponded closely to those occupied by the greaves or *cnemides* of the ancient Greek hoplite for protecting the shins. "He had greaves of brass upon his legs" (I Sam., xvii, 6).

The patient gave a history of a fracture of the right femur some sixteen years ago, which occurred without injury, that is to say it was apparently spontaneous. He was treated at St. Thomas's Hospital for this by means of weight extension, &c., and from his description was evidently seen by the late Sir William MacCormac. The patient says he was X-rayed at that time and the fracture revealed. Since then his legs, which were up to that time straight, began to get bowed. Now he is plainly bow-legged, walks rather bent forward and with difficulty with the aid of a stick. But quite recently, since I saw him for the first time, he injured his right tibia by running up against a chair in the dark, at Oxford, and he was in the Radcliffe Infirmary there. Returning to London, he was at St. Bartholomew's Hospital up to December 18 last under Dr. Horder's care. The patient tells me a radiograph of the recent injury to the left tibia showed a fracture. I consider these details are of interest and worth recording.

[1] I hope to publish full details after further investigation, in a separate clinical note.

DISCUSSION.

Dr. F. PARKES WEBER: There can be no doubt that Dr. Pernet is right with regard to the sclerodermia, but the patient has likewise a symmetrical and painless, or relatively painless, form of Paget's osteitis deformans, apparently limited to the bones of his legs, the shape of which are obviously altered by the disease. Spontaneous fractures, or fractures from relatively slight violence, have been occasionally observed in cases of osteitis deformans.

The PRESIDENT: I think there is corroborative evidence of osteitis deformans in the condition of the patient's spine, which is distinctly curved. I have not seen the two conditions associated before. I consider that the skin condition is better described as sclerodermia rather than as morphœa, a term which should be limited to the circumscribed form.

Major GRAY: Perhaps Dr. Parkes Weber can tell us whether there is any known association between deficient or increased secretion in the thyroid gland and osteitis deformans. The supposed association with sclerodermia is, of course, well known.

Dr. PARKES WEBER (in reply to Major Gray): I think thyroid treatment has been tried in osteitis deformans, but I do not think it has been proved that there is any causal connexion between thyroidal disease and osteitis deformans.

Dr. PERNET (in reply): When the patient was first seen by me there was a slight but definite lilac border round the sclerosed areas; hence I prefer to call it morphœo-sclerodermia.

(*December* 21, 1916.)

Case of Psoriasis and Lichen Atrophicus.

By W. KNOWSLEY SIBLEY, M.D.

THIS woman is aged 67, a widow, and appears quite healthy. She tells us that about four years ago a rash commenced on the inner side of her left knee, and from then until the present time she has had a rash appearing on various parts of her body. She now presents a typical psoriasis on her knees and elbows, a little on the outer surface of the right forearm, and a patch beneath her right breast. She also has a good deal of superficial scarring occurring on the anterior surface of the right wrist in a band form, and also slightly on the left wrist; a large area of pale scarring over the right sterno-clavicular region; a patch of guttate scars on the back of the neck, also slightly on the left shoulder, and one or two isolated patches besides. Also, she has had suspicious-looking lichen patches on her buccal mucous membrane. She has

definite psoriasis: has she not also lichen atrophicus? From the band-like formation of some of the lesions, and their distribution, I fancy she has. Alternatively, has she sclerodermia on her chest? I have brought the case forward to elicit opinions.

DISCUSSION.

Dr. G. PERNET: There is no doubt about the psoriasis in this case. But with regard to the patch over the right clavicle, it appears to be a combination of atrophic morphœa and sclerodermia, which usually in that area, in my experience, begins in bands, and unilaterally, forming patches ultimately by coalescence. The band on the flexor aspect of the right forearm appears to be of the same nature. I am not able to see, in this light, anything on the buccal mucous membrane.

Dr. S. E. DORE: I think there is no question that the eruption is psoriasis. The atrophic lesions I regard as part of the same disease. I do not know whether Dr. Sibley has been able to trace the evolution of the lesions, but I think the papules on the arm are those of psoriasis and not lichen planus. My view is that this is a case of psoriasis in a woman who has senile atrophic skin. I could not see anything in the buccal mucous membrane to suggest lichen planus.

Dr. F. PARKES WEBER: There can be no doubt about the existence of typical psoriasis in the case. The patient also has typical senile anetodermia on the back of both hands. Are we to suppose there is a third condition present—namely, sclerodermia? I think Dr. Dore's suggestion as to the atrophic scarring being the result of the psoriasis in a patient with senile tendency to skin-atrophy is worth consideration. The position in the neighbourhood of the right clavicle is certainly characteristic for superficial sclerodermia, though when occurring in that situation it is usually found on both sides and not unilaterally, as is the scarring of this patient. I hesitate to suggest there is sclerodermia present as well as senile anetodermia and psoriasis. In regard to the question of lichen planus I could not see any spots in the mouth, and I should not be inclined to admit the presence of any form of lichen planus.

The PRESIDENT: I agree with Dr. Sibley's view of this case, which is supported by the distribution of the lesions. I have a coloured drawing of a well-marked case of lichen planus sclerosus, seu atrophicus, seu morphœicus, quoted by Crocker in the third edition of his book and originally shown at the Dermatological Society of London, the distribution of which entirely corresponds with the case before us. The patient is also the subject of psoriasis coincidentally, although lesions of a psoriasiform appearance are frequently seen in severe and chronic forms of lichen and are misleading. Senile atrophy is not limited to the areas involved in this case but is more general in character.

Major GRAY: I should like to ask Dr. Dore whether he has seen any other cases of psoriasis occurring in patients with atrophic skin and leaving scars such as we see in this case. Personally, I am not familiar with them.

Dr. S. E. DORE (answering Major Gray): No, I have not, even in senile patients, but I see no reason why such a state of affairs should not occur. I would ask Dr. Sibley whether treatment of a somewhat severe kind might not have induced this atrophic condition.

Dr. SIBLEY (in reply): The area which is in favour of my contention that this condition is the result of psoriasis is the right forearm just below the elbow, where there is progressive scarring, and where she still has psoriasis in connexion with it. The lesions which are against that view are the band-like formations at the wrist and the back of the neck, over the ligamentum nuchæ. With regard to severe treatment, this patient has been under me a year, and she has had only mild placebo treatment: she has not had X-rays, or anything of that kind.

(*December* 21, 1916.)

Case of Symmetrical Gangrene of the Skin.

By W. KNOWSLEY SIBLEY, M.D.

THE patient, a French woman, aged 60, is a cook by occupation. On Saturday last, while walking, she felt a fullness on the inner side of both her thighs, later she found her clothes saturated with liquid, and thought she must have evacuated the contents of her bladder. When we examined her, we found large symmetrical gangrenous masses on the inside of her thighs about 6 in. in diameter, obviously the result of broken blebs. She says she had no symptoms before the blebs appeared. On the following day she applied a little vaseline. Presumably it is a staphylococcus infection. I have only to-day seen the patient for the first time.

DISCUSSION.

Major GRAY: I do not agree that these lesions are likely to be due to a staphylococcal infection, though they might well be streptococcal. There seems no doubt that the lesion started as a bleb, and it must have spread very rapidly, causing considerable superficial destruction of tissues. This case appears to be similar to two cases which will be described in the forthcoming issue of the *British Journal of Dermatology*, by Dr. MacCormac, in which there was a rapidly-spreading streptococcal infection, with deep ulceration.

This sort of lesion might well occur in a diabetic, whose skin is specially susceptible to organismal invasion. It would be interesting to hear the result of an examination of the urine.

Dr. F. PARKES WEBER: I suggest that these symmetrical lesions on the inner upper aspects of the thighs may have a partly artificial origin. There may have been an unsuspected superficial traumatism from the friction of her clothes at a time (the weather was extremely cold and "raw") when the skin was very susceptible. There may have been some incontinence of urine, that is to say, the patient may have passed a little urine involuntarily, as she herself at first thought she had done. The condition now seen may thus be the combined result of local cutaneous irritation by friction, by maceration in urine, and by secondary infection.

The PRESIDENT: It is very important that an examination of the genito-urinary organs should be made in this case having regard to the age of the patient and the possibility of sepsis arising therefrom. The gangrenous looking plaques may be explained by secondary local infection.

Dr. S. E. Dore: I suggest that this may be a case of dermatitis repens.

The PRESIDENT: In my opinion this case does not correspond with dermatitis repens, a case of which, involving both hands and feet, I published in the *British Journal of Dermatology* in 1896, with coloured illustrations. We shall be glad to see this patient again at a subsequent meeting, if possible.

Note.—Bacillus coli was subsequently isolated from the pus.

(*December* 21, 1916.)

Transitory Keloid excited by Urticaria Papulosa.

By ALFRED EDDOWES, M.D.

I AM indebted to the kindness of Dr. Frederick Palmer for permission to show this patient. The boy, aged 2½, is said to have been a six months' child, born with "eczema." He is mentally deficient and has left hemiplegia. The lesions to which my attention was first drawn consisted of a network of keloid-like bands occupying in some cases an area of several inches wide and occurring in groups. In connexion with each group there appeared to be a papule in different stages of inflammation apparently the result of scratching. Though the keloids may be described as transitory there are indications of resulting atrophy of them practically all over the skin, especially on the trunk

and limbs. The child's general health is greatly improving under treatment. I can see plainly to-day that the condition of the skin no longer has that dull look and wasted feel that it had even a week ago. No family history has yet been obtained. To be brief, I would submit that we have here an instance of a *congenital tendency to keloid* and that the exciting cause is *urticaria papulosa* plus traumatism.

DISCUSSION.

The PRESIDENT: I should regard this case as an unusual and aggravated form of what is described as lichen urticatus, vel pruriginosus, in which the papules are unusually severe and lasting, this leading to the appearance which Dr. Eddowes speaks of as keloid. I take it he does not mean true keloid but merely a transient condition with remote keloidal appearances. Some of the manifestations have been of short duration. The one essential feature is pruritus of severe kind, intensified probably by the defective state of the child's nervous system and by superadded nutritional disorder. Without doubt much that is now visible results from secondary friction and scratching.

Dr. F. PARKES WEBER: I admit that the condition looks, at first, something like keloid or pseudo-keloid, but I do not believe that either keloid or pseudo-keloid has anything to do with it. I doubt even whether any scar tissue would be found in these curious reticulate-shaped patches of raised and thickened skin. I hardly think that it is possible to tell at present what the condition really is, though one may suggest the possibility of its being a kind of erythema perstans with a network-like distribution. One or two places look as though they might break down, and that makes one also think of the possible presence of tuberculosis.

Dr. EDDOWES (in reply): The case has been under my observation only a week. Some of the bands which I regard as keloid are well-formed while others are quite new. I think it is due to urticaria, plus a congenital peculiarity of the skin which easily tends to form keloid. I do not hold the view that any particular organism must necessarily be associated with keloid; we get keloid in acne and in many other conditions. A keloid of the chest can be produced by a nurse putting on a mustard plaster and leaving it on too long, especially in the case of young children. In this case there are indications of fibrous thickening running along what I presume are vessels in the cutis. It is behaving *exactly* like a keloid, *somewhat* like the result of a burn. With regard to the term "lichen urticatus," I think the newer name "urticaria papulosa" is better; I should have said that they were one and the same affection. Careful examination of the patient will show that there have been attacks of this on most other parts of the body. The lesions disappear and leave fine atrophic striæ.

Section of Dermatology.

President—Dr. J. H. Stowers.

(*January* 18, 1917.)

Case of Small-spored Ringworm of the Scalp in an Adult.

By E. G. Graham Little, M.D.

This is an unusual example of the contraction of small-spored ringworm by an adult. The patient's two children, who are shown with her, had ringworm, or showed symptoms of it, in October, and a few weeks after that their mother noticed that she had a patch on the scalp. I saw her about a week ago, and there is this typical patch, and the small-spored fungus in the hair. I propose to make a study of the cultural characteristics of the fungus, for which there has not been time, and to make a later report. I have never met with a previous case of ringworm of the scalp in an adult, and it is certainly rare.

DISCUSSION.

Dr. MacLeod: In all my experience at Charing Cross Hospital and the Victoria Hospital for Children, I have only seen one instance of *Microsporon audouini* affecting the adult scalp. It was a case which I showed years ago at the Dermatological Society of London, in which a mother was infected in the occipital scalp by her child, who was suffering from scalp ringworm. I have seen, however, several cases of this fungus affecting the glabrous skin in adults.

Dr. W. J. OLIVER: In 1915, Dr. Sequeira and I showed cultures from a case of microsporon infection in a mother and child. These were considered to be those of *Microsporon felineum*, but fresh studies of the same proved them to belong to a microsporon of the *Microsporon audouini* type. Last year, I had a second similar example at the London Hospital, in a mother and her two children. I once obtained cultures which I considered to be a microsporon from a beard case in a man.

Dr. G. PERNET: We know how rare it is to see microsporon in the scalp of adults, and especially is it rare to find it at the same time present in the children of the affected adult. In 1912, I published a case of *Tinea tonsurans* in a woman, aged 60.[1] Microscopically and culturally, it was a *Trichophyton megalosporon endothrix*, and not microsporon as in Dr. Little's present case. The origin in my case was not traced.

Dr. A. EDDOWES: In 1891 and 1892 I attended a large number of cases of ringworm at Shadwell, and there I met with the disease in the scalps of two women, aged over 50; the age of one, I well remember, was 52. They had what I took to be the same variety of ringworm as the children who were attending. At that time I did not know anything about the difference between microsporon and megalosporon.

The PRESIDENT: I agree with Dr. Little and Dr. MacLeod that this disease is very rare in the adult, but I have a recollection of five or six cases, at least, of proven " ringworm " in adults. I think it more than probable that instances are overlooked owing to an erroneous impression existing that this disease is limited to childhood. The possibility must always be borne in mind, and a microscopical examination should never be omitted in doubtful cases.

(*January* 18, 1917.)

Case of Epithelioma of Hand following Traumatism.

By J. L. BUNCH, M.D., D.Sc.

THIS man, an old soldier, is aged 66. Since his discharge from the Army he has worked as a packer. About twelve months ago he was unpacking a case of German goods, when a splinter ran into the back of his right hand. Some time after, he noticed a wart developing on

[1] Pernet, *Brit. Journ. Derm.*, 1912, xxiv, p. 141.

the site, and during the past six months it has increased considerably in size; it has also broken down and ulcerated, and, as a rule, there is a rather offensive discharge from it. I cannot feel any enlarged glands at the elbow or the axilla. The growth seems to be slightly adherent to the bone, but, so far, it gives him very little trouble: in fact, he has continued at his work until very recently. He says he had gonorrhœa twenty years ago, but denies spirochæte infection. Section of a portion shows typical squamous-celled epithelioma. I brought the case so that I might elicit opinions on treatment from members. Is it generally thought desirable to use measures such as X-rays or radium, or to recommend total excision, or even amputation of the hand?

DISCUSSION.

Dr. G. PERNET: The case reminds me of one I saw at University College Hospital when I was dresser to the late Marcus Beck. That patient had the growth on the back of the hand too, but it was somewhat larger, and of longer duration than this one. That patient was an old sailor. I have concluded, looking back on that case, that it was a sailor's-skin epithelioma. In the present case, I feel diffident about recommending anything short of amputation. A somewhat similar case was illustrated and described in the old *Illustrated Medical News.*[1] I do not know whether fulguration is being used now after thorough surgical scraping and excising. Some of Keating-Hart's cases I saw in France some years ago appeared to have done very well. I have a feeling that this man's hand will eventually have to be amputated, perhaps under less favourable conditions, for the glands do not yet appear to be involved.

Dr. MACLEOD: I have at present under treatment a case of an epithelioma growing on an old-standing lupus patch. This I treated for some time with radium, but without success, and as I found that the lesion was progressing rather than otherwise, I discontinued the treatment. The patient is now having massive doses of X-rays, but the results from them are not satisfactory either. I think that in this case, short of surgical measures, it might be worth while trying to see whether the lesion could be destroyed by freezing with solid carbon dioxide.

Dr. GRAHAM LITTLE: I had a case somewhat like this, in a man, aged under 40, who sustained a similar accident: he was struck on the face by a fragment from a boat, and two months afterwards he developed a lesion which I took to be rodent ulcer; clinically, it was typically so. I gave him two

[1] Purcell, *Illustr. Med. News*, 1889, v, p. 1.

treatments with freezing, but after the second I became rather alarmed at the rapidity of the local spread. I took a portion from a corner of it, and the microscope showed it to be typical squamous-celled carcinoma. The lesion was freely excised by my surgical colleague, but recurred in six months. It was again operated upon, and the triangles cleared of glands. I saw him about nine months afterwards, and by that time his mediastinum had become full of enlarged glands. It was evident that he would die in a short time. The whole duration of the disease was less than a year. It was probably carcinomatous from the beginning. In this case I advise excision, and scraping of the bone. I had an extraordinary case, one which started as a rodent ulcer on the chin. The patient had a multitude of things done for him, including the application of X-rays, radium, carbon dioxide snow, and ionization. He was seen by Sir Alfred Pearce Gould, with myself, and Sir Alfred suggested having the bone scraped. But the patient did not wish to have that done, and arsenical paste was applied to the whole surface. When I saw him six months afterwards there was an amazingly favourable result: there was then no discharge, and I have never seen such a transformation.

Major GRAY: Putting radium and the X-ray on one side—because I am less able to express an opinion about them than many here—there are, in my opinion, only two alternatives in such a case as this. One is amputation, and the other is treatment by arsenical paste. I do not think excision would, in this case, have any advantage over amputation; these carcinomata spread chiefly by means of the superficial lymphatics, and unless you excise extremely freely, removing large areas of skin, you are not likely to check the spread. Dr. Norman Walker has told me that he has had some cases of this sort associated with lupus of the face. Some of his cases were treated by excision, and others had arsenical paste applied, and he found the latter were less liable to recurrence. In such a case as this, arsenical paste might be of considerable value, seeing that no glands can be felt, and, of course, we want to save the man his limb if possible. There should be a thorough scraping before the paste is applied. Arsenic causes considerable necrosis, far beyond the area to which it is applied; and a great deal of inflammatory reaction, which appears to cause destruction of the outlying nodules in the lymphatics. It is only of value in these slowly growing tumours with little tendency to glandular involvement. Pain is not such a prominent feature as one might imagine, but it probably depends on the site of the lesion and it can be controlled by morphia.

Captain HANNAY: I was in Edinburgh a little while ago, and I saw several of Dr. Norman Walker's cases which had been treated with arsenical paste, and the results in the patients were extraordinarily good. But those patients whom I saw suffered great pain after the application. However, I did not see a lesion of the size in the present case so treated.

The PRESIDENT: This is a very important case, for obvious reasons. The free application of CO_2 and scraping combined may prove successful, but failing that, I think an excision might be undertaken with good result if it is made sufficiently wide of the present growth, especially, as I understand, there is no enlargement of lymphatic glands to be felt. Amputation, serious as it is, might be required as a last resort, but I certainly should not recommend it at present. The patient, of course, will be closely watched by Dr. Bunch.

Dr. S. E. DORE: May I suggest a compromise? I agree that it would be unwise to waste time in applying radium and X-rays, and I suggest free excision followed by the application of X-rays, with the view of obviating the larger operation.

Dr. BUNCH (in reply): I intended to bring another case to-day to contrast with this. The patient came to me with carcinoma of the side of the face, secondary to lupus vulgaris. He had massive doses of X-rays for about a month, and when seen a fortnight ago the growth had progressed so far that there was a huge perforation in his cheek, so that one could see across his mouth and the dorsum of his tongue. As he did not come to the hospital when due two days ago I fear the worst. The case has discouraged me from using X-rays for such conditions. I am much obliged for the suggestion concerning arsenical paste. I treated one case with it, but the pain was so intense that I do not feel keen about the use of that either. Mixing the paste with cocaine might alleviate the pain somewhat.

(*January* 18, 1917.)

Case illustrating the Oxidation and Reduction Theory of Therapeusis (Case of Mercurial Poisoning cured by Intramine).

By J. E. R. MCDONAGH, F.R.C.S.

SOME time ago I propounded the theory that metals acted as oxidizing agents, and that non-metals acted as reducing agents. In other words I considered that the arsenic in salvarsan, the iron in ferrivine, and mercury did not attack the parasites directly, but only indirectly by increasing the oxidizing action—a surface action—of the colloidal protein particles in the serum. Iodine and sulphur acted as

reducing agents, and were therefore complementary to the oxidizing agents just mentioned. This being the case, the therapeutic programme was incomplete, without the combined use of both oxidizing and reducing agents.

The following cases appear to bear out this theory in a striking manner:—

The patient whom I show to-day had a primary sore on the skin of the penis, general adenitis, and was more or less covered with a follicular syphilitic eruption. On December 12, 1916, 10 c.c. of a new colloidal mercurial preparation were injected intravenously. In the quantity injected there were nearly 8 grains of colloidal mercury, the action of which would be very much greater than 8 grains of ordinary mercury. The following day the patient had severe abdominal pain and diarrhœa. The diarrhœa increased, and blood was passed *per rectum*. This continued for a week, and during that time not a drop of urine was passed. On the second day severe stomatitis set in, which became gangrenous a few days later. The patient also had hæmorrhagic conjunctivitis and herpes oris; he both looked, and was, desperately ill, and I had fears that he might die. This was a typical case of acute mercurial poisoning, and the mercury was acting as a poison in virtue of its oxidizing power. This being the case it struck me that the administration of an equally powerful reducing agent might cure the condition. I injected 100 c.c. of colloidal iodine intravenously and 5 c.c. of intramine intramuscularly. Within forty-eight hours the diarrhœa ceased, and the patient passed nearly his full amount of urine. The condition improved so much from day to day that, with no other treatment whatever, he was perfectly well by December 30. There was no albumin in his urine, and every syphilitic symptom had vanished.

Another patient received 10 c.c. of the same mercurial preparation injected intravenously on the same day as the case exhibited, having already had 10 c.c. injected intramuscularly three days previously. Therefore the patient had about 15 grains of colloidal mercury in his system. This patient had exactly the same symptoms as above described, and recovered in the same way, after an intravenous injection of colloidal iodine, and an intramuscular injection of intramine. I have had three other cases in which the symptoms were not so pronounced, which improved at once with one injection of intramine. In all these five cases the syphilitic manifestations disappeared in a few

days, and some of the lesions were such as would not have vanished with six or more injections of salvarsan.

I have had two cases of generalized arsenical dermatitis, in which the skin eruption entirely disappeared with one injection of intramine. One of these cases was that of a woman, who was treated with six injections of galyl for cerebrospinal syphilis in April, 1916. After this course mercury was taken internally for nine months. A severe arsenical dermatitis set in after the last galyl injection, and persisted, in spite of treatment, for nine months, when the symptoms of the cerebrospinal syphilis reappeared. Within three days after an intravenous injection of colloidal iodine, and an intramuscular injection of intramine, the dermatitis had practically disappeared.

Recently I have had a case of intramine poisoning—the patient had 20 c.c. of a 0·1 per cent. solution injected intravenously. The symptoms were headache, abdominal pain, and persistent vomiting and diarrhœa, all of which immediately disappeared after an intravenous injection of colloidal mercury. These cases, I think, go a long way to prove the correctness of my theory of oxidation and reduction, as well as to show what a much greater therapeutic action can be obtained by combining oxidizing and reducing agents, than by using only oxidizing agents as is now the rule.

DISCUSSION.

Dr. G. PERNET: Does Mr. McDonagh recommend that we should inject doses of colloidal mercury of that strength, and so run the risk of these symptoms? I think Mr. McDonagh has seen cases of generalized desquamative dermatitis, like pityriasis rubra. Has he tried intramine in those cases? I mean the acute cases which sometimes follow intravenous injections of salvarsan.

The PRESIDENT: We are much indebted to Mr. McDonagh for bringing this case before us as at any time we may be confronted with the consequences of the excessive use of arsenic or mercury. Comparatively recently I have seen a patient who suffered seriously from arsenical poisoning incurred in the treatment of a parasyphilide and who subsequently died. If I had had the knowledge with which Mr. McDonagh now supplies us I should certainly have tried the method he suggests.

Major GRAY: I think the facts which Mr. McDonagh has brought forward are extremely interesting, and require considerable thought: it is not easy for

some of us to discuss them at a moment's notice. The point which interests me is the arsenical dermatitis in the patient mentioned. I gather that no treatment had been given for the nine months during which it had lasted. [Mr. McDONAGH: Mercurial treatment, but no arsenic.] I think it is a question whether the persistence of the dermatitis was entirely due to the presence of arsenic in the tissues: one would have imagined that by that time the arsenic would have been excreted. So it is a question whether the clearing up of the lesion was due to the neutralization of arsenic by the intramine, or whether there was not a direct action of the intramine on the inflamed tissues. With regard to the question of the rapid clearing up of the mercurial stomatitis and poisoning generally, to which he refers in the case he has exhibited, it seems to me we are here dealing with a type of mercurial poisoning which we have not met with before—namely, that resulting from the intravenous injection of a very large dose of the metal itself. And it is possible such a case might run a different course from one in which the drug has been given in an ordinary medicinal way. Therefore it is conceivable that the symptoms might have cleared up almost as rapidly as they came on. I throw that out as a suggestion. It does, however, seem as if in the cases quoted there was something definite in the reaction of the body to those opposing types of drugs.

Dr. BUNCH: Does Mr. McDonagh look upon all metals in the body as oxidizing agents, and does he suggest intramine for all cases of metal poisoning —to take a common example, lead poisoning, which is a much more chronic affair than the case which Mr. McDonagh is now showing?

Dr. A. EDDOWES: I am not surprised to hear that an arsenic rash may last a long time, because the pigmentation produced by arsenic often persists for a very long period, as does also the plush condition of the palms. I have seen herpes produced by arsenic and the post-herpetic neuralgia continue for years, yet finally disappear quickly under what I term physiological rest for the parts, secured by appropriate dressing and protection.

Mr. McDONAGH (in reply): The case was exhibited to support my oxidation and reduction theory of therapeusis, and not to point out the merits or de-merits of the colloidal mercurial preparation used, or even to state in what doses this drug is best prescribed. Up to the present I have had no opportunity of trying intramine in cases of pityriasis rubra. It is known that arsenic may persist in the body for several months after it has been injected, but whether the dermatitis in the case described continued for so long owing to the direct presence of arsenic in the skin, or not, is a point impossible to determine. Major Gray's hypothesis that the symptoms of mercurial poisoning might have disappeared as quickly as they arose, owing to the fact that the drug was administered intravenously, is extremely unlikely, for there is no difference in the length of duration of the symptoms of arsenical poisoning,

whether the arsenical compound is injected intramuscularly or intravenously. Moreover, the more acute the case, the greater the likelihood of a fatal termination, a result which Major Gray would have anticipated with me in the cases described, had he had an opportunity of seeing them at their worst. Therefore there can be little doubt that the patient's life was saved by the timely use of the reducing agents described. In answer to Dr. Bunch's question, I hold that all metals act as oxidizing agents *in corpore*. I also believe that intramine would prove extremely useful in all cases of metallic poisoning—a view upheld, for instance, by the beneficial influence of iodine in cases of plumbism.

(*January* 18, 1917.)

Case of Late Congenital Syphilis Manifestations.

By GEORGE PERNET, M.D.

THE patient is a boy, aged 14, first seen by me on January 8, 1917, at the West London Hospital in the throat department. I am indebted to Dr. Banks Davis for the case. The uvula and soft palate are extensively ulcerated, with some destruction. The duration is six months. At the time, I noted the Olympian forehead with marked frontal bosses and also the irregular implantation of the teeth pointing to congenital syphilis, but there is no typical notching. The mother had had one stillborn child and a miscarriage. The patient complained of nocturnal headaches, which improved on the administration of mercury. On January 12, a Wassermann reaction was done and was positive, though this does not prove that the throat condition is necessarily syphilitic. The differential diagnosis lies between syphilis and tuberculosis; though the large amount of ulceration and destruction of six months' duration only are in favour of a syphilitic origin. The patient is, undoubtedly, a congenital syphilitic. The case will be followed up and the result of treatment on antisyphilitic lines noted.

DISCUSSION.

Dr. EDDOWES: I had but a glance at the throat. Is the bone of the hard palate affected? Many years ago, when I was a student at Edinburgh, I saw syphilitic sores of the palate treated by a 20-gr. solution of sulphate of copper, which was considered a very good local application. I agree that this case is specific.

The PRESIDENT: I am quitė satisfied that this is a case of syphilis.

Dr. G. PERNET (in reply): The hard palate is not affected, but the uvula and soft palate are.

Addendum.—The patient improved at once on iodide of potassium and the ulceration healed up.

Section of Dermatology.

President—Dr. J. H. STOWERS.

(*February* 15, 1917.)

Treatment of Scabies by Sulphur Fumigation.

By Lieutenant-Colonel JOHN BRUCE, R.A.M.C.(T.F.).

I WAS called upon to treat a considerable number of cases of scabies in June, 1915. The old treatment by sulphur ointment and sulphur lotion failed to cope with the rush of cases, and I commenced to experiment with sulphur dioxide gas. The results exceeded my expectations. At first the cases were kept under observation for ten days after treatment, but as confidence in the new method became established, the period of detention was gradually shortened until I felt justified in returning patients to their units in a few hours after exposure to the vapour.

The cabinets were made of tongued and grooved wood on the lines of a Turkish bath cabinet, and were constructed to hold two patients. The size was as follows: Front, 4 ft. 7 in. by 4 ft. 2 in.; sides, 4 ft. 2 in. by 3 ft. 7 in.; back, 5 ft. 3 in. As it was necessary for the cabinet to be used out of doors, I found a canopy 2 ft. high, covered with canvas, a useful addition. It afforded protection to the patients from sun and rain. The roof, which slopes towards the front, is provided with movable outer portions which are adjusted after the patients are placed in position. The apertures for the neck are small, about 5 in. in diameter. As the wood is soon warped by the heat and exposure to the sun, it is necessary to cover the inside of the cabinet with thick brown paper, and to see that all the joints fit closely. A little felt or rubber may be fastened to the sides of the doors and to the sliding panels to ensure a close joint. The doors may be in front or in the sides. In the latter case the sliding panel can be fastened to the top of the door.

One long seat at the back, made of narrow rails, or two side seats, also made of laths, can be used; or a round seat with a large hole in it may be tried. The bottom of a cane chair could also be used. An ordinary solid seat would not allow the buttocks to come in contact with the fumes.

Sulphur may be used either in the form of candles or lump sulphur. If the latter is used, a little methylated spirit must be sprinkled over it. I do not recommend this, as it is impossible to control the rate of burning. I got the best results from the large sulphur candles supplied by Jeyes. These burn slowly, last for five hours, and each candle is sufficient for the treatment of ten patients.

Sulphur vapour acts more powerfully in the presence of moisture. A small basin or tray may be placed over the candle on a tripod so that a little watery vapour is given off at the same time. Steam may be allowed to pass into the cabinet from a portable disinfector or a steam generator. It is necessary to keep the patient warm during the time he is inside the cabinet so as to encourage sweating, and in cold weather I have occasionally placed a small paraffin stove in the box so as to warm it up before putting the patient inside. The temperature inside the cabinet should be kept at 100° to 106° F. The candle is sufficient to keep it at this point if the cabinet is previously warmed.

The duration of exposure to sulphur vapour should be from forty to fifty minutes. Anything longer than this tends to set up dermatitis, especially about the buttocks.

The following is the method of procedure I adopt: The patient is given a hot bath, allowed to soak for at least five minutes in the water, well lathered with soap, either soft soap or yellow bar, and the skin scrubbed to open the burrows. He is then transferred to the warm cabinet, placed on the seat with the head protruding through the aperture in the roof, and the sliding portion adjusted. A warm wet towel is applied round the neck to prevent the escape of fumes, and a sulphur candle placed inside the cabinet, lit, and the doors closed. An orderly must remain in constant attendance, with instructions to remove the patient at once should he show signs of faintness or difficulty in breathing. At the end of forty to fifty minutes the lid is quickly removed and the patient returns to the bathroom where he puts on clean warm clothing.

It is necessary to send with the patient all his kit, every article of clothing he possesses (not omitting those at the wash), his blankets, his paillasse and pillow. If a Thresh or steam disinfector be available, all

suitable articles can be treated by steam. I used a field portable disinfector for several months, and found it efficient. If neither of the above is available it would not be difficult to construct an air-tight box or chamber and have steam let into it by a flexible metal pipe from a boiler or oil-drum. The clothes can also be disinfected in the cabinet, and when only one case is being treated, I generally hang his clothes at the same time in the spare part of the box. Boots and other leather articles can be treated by formalin spray, or in the cabinet.

The treatment must be supervised carefully, and not left entirely to the orderlies. It is important to see that the cabinet is warm, and that it contains water vapour. Quick burning candles should not be used, as they produce irritating fumes. The cubic capacity of the box is only 78 ft. No antiseptic, such as Jeyes' fluid or lysol, should be added to the bath as it may produce irritation of the skin.

The best results are obtained in recent cases with little induration, and one application will invariably cure these cases. One application will also cure most of the old-standing cases, but to be on the safe side when there is much induration, I give a second application at the end of forty-eight hours. The relief from itching and irritation is immediate, and a patient who has not had a comfortable night's sleep for weeks will sleep the whole night without scratching. Dermatitis has been infrequent, and is easily treated by a simple zinc ointment. A slight general branny desquamation often takes place about forty-eight hours after the treatment. I have treated about 200 cases, and have had 2 per cent. of returns, but in each of these cases I feel certain that some article of clothing had escaped disinfection and thus reinfected the patient. I have received most encouraging reports regarding the efficacy of the treatment from various Home Stations and from France.

The treatment is rapid, certain and cheap. One candle treats ten cases. If suitable arrangements can be made for the disinfection of the clothing at the same time as the treatment of the patient is being carried out, cases can be returned cured to their units on the day of admission. For example, twenty patients turned up one morning at 9 a.m., were all treated in one double box, their clothing disinfected, and all returned to their units the same evening, and none of these cases came back for further treatment. The treatment, if carefully carried out, should not be in any way disagreeable to the patient.

(The discussion was preceded by a demonstration of the cabinet, and of the portable disinfector above described.)

DISCUSSION.

Dr. BUNCH: We are, of course, deeply interested in this apparatus and demonstration, but I do not think Colonel Bruce can claim any great novelty for it. I am attached to a hospital in which we have had a precisely similar apparatus in use for some years past. I asked the secretary how long it had been in use there, and he replied "forty years," and one of the servants there had personal knowledge of it for twenty-five years, and the nurses in attendance have given many hundreds of such baths to soldiers and civilians. We know it is a successful treatment, and as the exhibitor says, some of the patients ask for more. I know of a patient who, without the knowledge of the R.A.M.C. officer who sent him, recently induced the attendant to give him as many as seven baths, because he felt so much benefit from the first bath or two. That man came to me with such a severe sulphur dermatitis that it is doubtful if he will be able to go to France this week as Squadron-Commander.

Dr. H. G. ADAMSON: I was interested in Colonel Bruce's experiences with the sulphur fumigations because about two years ago I had occasion to make trial of this method in a case of psoriasis, and on looking up the literature I could find nothing later than the early nineteenth century. It appears to have been employed extensively in Paris and in Vienna at that period, and it is curious that it should have ceased to be used and only revived after one hundred years. Hebra says that "sulphur fumigations" were used so far back as the seventeenth century by Glauber, and afterwards by Lalouette in 1776, and by Galès in 1816. In 1816 Galès published a small book, "Mémoire et rapports sur les fumigations sulfureuses appliquées au traitement des affections cutanées et de plusieurs autres maladies," a copy of which I was able to find in the library of the Royal College of Physicians. As a result of his experiences of this method and his recommendation of its employment on the score of efficiency and cheapness the council of administration of the hospitals of Paris appointed a committee to watch cases under treatment, with the result that this committee advised the Government to establish at the Hôpital St. Louis a department for the treatment of scabies by sulphur fumigations. Galès' book, with details of the treatment and illustrative cases, was published by order of the Government and dedicated to the Duc de Richelieu. Galès received a pension for life of 6,000 francs. How long this department existed I am unable to say, but Galès' success seemed to have prompted others to use sulphur fumigations for scabies and other skin eruptions, and it was employed in Dublin by Wm. Wallace, who also wrote a book, "Observations on Sulphureous Fumigations, 1820," and by Sir Arthur Clarke, also of Dublin, who also wrote a book, "An Essay on Diseases of the Skin: containing Practical Observations on Sulphureous Fumigations in the Cure of Cutaneous Complaints," which he dedicated to George the Fourth. Sir Arthur Clarke's book is in the library of the Royal Society of Medicine. Hebra tells us that de Caro introduced the treatment into Vienna in 1819, and

that afterwards a trial was made in the General Hospital of Vienna, the boxes invented by Galès being used; but that the results obtained were not such as to lead to the further adoption of the method, for it was found to set up artificial eczematous eruptions which so greatly prolonged the treatment that the average duration exceeded four weeks. Galès, in summarizing his experiences, says that the number of treatments for scabies is from four to twenty, though most cases can be considered cured after the seventh fumigation, and that from seven to fourteen days suffices for the cure. The duration of the fumigations was half-an-hour, and one or more were given daily. It does not seem, therefore, that Galès' treatment was a particularly rapid one, since we know that we can cure scabies in three days with baths, soft soap, and ung. sulphuris. Galès, in his dedication to the Duc de Richelieu, speaks of designs of the apparatus, but these are not reproduced in the book. Neither does he give any description of the apparatus which he had constructed, "des boites fumigatoires ou baignoires d'une forme particulière." It is interesting and important at the present time to learn from Colonel Bruce that he is able to cure his cases of scabies by one "fumigation." Possibly the difference between his results and those recorded by Galès and by Hebra may be due to the fact that he prescribes a bath, with soft soap, before the fumigation.

Captain GRIFFITH: At the present time scabies is a most important disease, and I trust the Section will discuss the matter pretty fully, for if the experienced dermatologists here can give guidance as to the best way of treating this disease, they will thereby be doing an important national service, on account of the very large number of soldiers who are suffering from scabies. As previous speakers have said, this method is not new; still, it is not widely enough known, and needs to be better known. It has been in use for many years in the hospital to which I am attached, and in the Army it is very much a question as to which is the method which will enable the largest number of men to be treated in the shortest time, because the patients have to be kept as in-patients until they are well. I should like to know how many can be treated in one day by this apparatus. [Colonel BRUCE: With two boxes, fifty cases in twelve hours.] It is very convenient indeed for treating twenty cases or so in a day, but if it is a matter of treating hundreds, unless one has an unlimited supply of these boxes, the most convenient means is the old-fashioned one of giving baths and using sulphur ointment for three days. I have seen many cases treated in the Army, and I think the commonest fault is that they are treated too much, so that the complication of dermatitis is, on the whole, fairly frequent.

Major GRAY: One important point which has been brought out to-day is that, in Colonel Bruce's experience, a cure can be brought about by this method by a single exposure to sulphur vapour. There are many methods by which sulphur can be applied to the body—and other drugs too—and by which cure results from a single application. But there is one cardinal point in connexion with that cure, and that is, that the whole of the patient's

belongings must be sterilized at the same time. Most patients who are treated by sulphur vapour, in civil life, go home and lie on an infected bed, and in a week's time or so require further treatment. But in the Army, when the soldier can put all his belongings in a bag, and these can be sterilized while he is undergoing the treatment, there is no reason why the vapour treatment should not be satisfactory. To apply it satisfactorily in civil practice, except in workhouses, and so on, would be a matter of considerable difficulty. Therefore it is better that these patients should be treated with an application which can be smeared on the body, and so be kept in contact with the wearing apparel and the bed clothes, so that the acarus will be killed not only on the body but also in the objects which come in contact with it.

Dr. J. H. SEQUEIRA: It is scarcely relevant to Colonel Bruce's paper, but I may tell Major Gray that I have an arrangement with the Local Authorities in my district by which I notify to the Medical Officer of Health all cases of scabies, and he sees that the patient's home and clothing and other belongings are disinfected.

The PRESIDENT: I think it will interest the Section, and especially Colonel Bruce, if I read a letter on the subject which I have received from Major MacCormac, who has had considerable experience of this subject with troops in France:—

February 9, 1917.

I have now had the opportunity of seeing a number of patients who have undergone this treatment, and I cannot say I have been favourably impressed by it.

It seems to me that in the cure of scabies three things should be attempted—the opening of burrows, the destruction of the parasite *without producing dermatitis*, and the disinfection of clothing and bedding to prevent re-infection. The vapour from burning sulphur will no doubt destroy insects wandering on the surface of the body; but that it can penetrate into the burrows and there kill the female and her ova seems to me unlikely, unless it be pushed to the extent of causing severe dermatitis; certainly among the vapour-treated cases which I have seen, active scabies was often still present. Some had both scabies and dermatitis; others dermatitis alone.

The method is by no means new. Hebra writes as follows:[1] "The so-called sulphur fumigations afford the best example of the employment of remedies in the form of vapour in the treatment of scabies. So far back as the seventeenth century these were tried by Glauber, and subsequently they were recommended in 1776 by Lalouette, and in 1816 by Galès. At Vienna they were introduced by De Caro in 1819, and they were afterwards employed in Naples by Asalini, in Dublin by Wallace, and in London by Anthony Clark. A trial of these fumigations was made in the General Hospital at Vienna, the boxes invented for the purpose by Galès being used; but the results obtained were not such as to lead to further adoption of the method, for it was found to set up an artificial eruption which so greatly prolonged the treatment that its average duration exceeded four weeks."

It may be argued that among patients subjected to sulphur vapour "return cases" are not common. There are no immediate returns, because the more accessible insects having been killed a latent period is established before the disease appears anew. During this latent period the apparently cured individual rejoins his unit where he has ample opportunity of infecting a number of other men. Thus the treating medical officer has not time to see the final results of his methods.

[1] "Diseases of the Skin," ii, p. 241; Sydenham Society translation.

I have had occasion to treat many thousands of soldiers with scabies, and under service conditions I believe nothing is superior to sulphur ointment applied for three days after a preliminary hot bath—provided these things are done properly and under suitable supervision. A remedy discredited by so acute an observer as Hebra almost a century ago does not appeal to me as a substitute for an established treatment. Remedies such as sulphur vapour, since they do not cure but only manufacture what perhaps may be called "scabies carriers," are responsible for the spread of this disease amongst soldiers.

I hope Colonel Bruce will not think I have too strongly or unfairly criticized his paper, especially as I have not had the pleasure of hearing it. I have founded my remarks upon an article in the *British Medical Journal* and upon the observation of cases coming to this hospital. If he can show the method he employs is the best for conditions in France then I will be most happy to adopt it and follow it.

While I have had much experience of treating scabies in a variety of ways, including vapour, I am bound to say that I think the treatment of Hebra, if carried out efficiently, is still the best possible, in the majority of cases. As has been pointed out by Major MacCormac, it is essential, in the first place, that the diagnosis should be proven, and it seems to me that the practice of demonstrating the acarus is not taken up and studied to the extent it ought to be. In practice, it is not what one thinks a case is, but what it is, and proof is essential. Secondly, there is the necessary opening up of the burrow, and, thirdly, the *efficient* application of soft soap and sulphur ointment for a limited period, so as to avoid secondary dermatitis. I cannot do better than refer you to what I think is an exceedingly clear and practical and up-to-date statement on the treatment of scabies in the *Lancet* of February 10 by Dr. Adamson. He gives the exact quantities used: 24 oz. of sulphur ointment, 24 oz. of soft soap, each of which is divided into three applications, and the inunctions are thorough and complete. Then if, in a few days there is itching, a sedative lotion is applied. The efficient disinfection of clothes is essential, which perhaps we have the better opportunity of controlling in London than abroad. I have seen the best results from the aforesaid, both in private and hospital practice, and—I say it with respect—I do not see how it can be improved upon. The conditions at the front are such as I am not familiar with, but I still think the chief part of the difficulty may be that the remedy is insufficiently and inefficiently applied. The condition of the skin of some people is such that they cannot tolerate inunctions, and for them vapour, &c., may be advisable. The method I have referred to need not occupy the soldier more than three or four days, and after that he will no longer be a carrier of infection. The members of this Section are much indebted to Colonel Bruce for coming to us, and we have appreciated the paper which he has read, as well as the trouble he has taken to demonstrate the method he uses. We hope it may be possible for him to be present when we discuss the matter more fully.

Lieutenant-Colonel BRUCE (in reply): There are certain points which I might have mentioned showing the effects of the treatment when carried out carefully among a large body of troops—e.g., I demonstrated the method to the chief medical officers of the Southern Army in July last, and I had

several cabinets available, but the difficulty was to get patients. We could not find a single case of scabies in the whole division, though the medical officers of units made a careful search for them. We had to import some cases from another district for the demonstration. Again, last week, I carefully superintended the examination of 4,000 men before they were sent overseas, and instructed the medical officers to pay special attention to scabies. We found one recent case, in spite of the fact that most of these men had been living in overcrowded conditions—an environment conducive to the spread of the disease. I had not heard of the treatment being used in the Army before Captain Hodgson and I started the method in May, 1915. The main point about the treatment is that the medical officer must give personal and careful supervision. If he leaves it to the orderlies they will become slack, and there will be a lot of return cases. From the military point of view the chief advantage is that we get the men back the same day, and the treatment does not seriously interfere with their duties. I supervise the issue of drugs to the division and I know that no sulphur ointment or lotion has been supplied for the treatment of scabies during the past eighteen months.

(*February* 15, 1917.)

Case of Xantho-erythrodermia Perstans.

By J. L. BUNCH, M.D., D.Sc.

THE patient, a man aged 21, has a number of slightly scaly, erythematous patches on the trunk and lower limbs. The first patch showed itself more than two years ago, and numerous other patches have since made their appearance. The lesions are irregular in shape and vary in size from a shilling to the palm of the hand. They do not cause any irritation. The patches, once they have made their appearance, persist, but take on a more yellowish tint. They are extremely resistant to treatment.

DISCUSSION.

Major GRAY: I agree with Dr. Bunch's diagnosis, but I should be satisfied by calling it "parapsoriasis en plaques," the most convenient name for the group to which this case belongs. I am unable to see any advantage in inventing a name which merely describes the colour of the lesions in certain of these cases, but if Dr. Bunch is anxious for a special name for his case, I suggest he should invent one in which the colours purple or brown are included, and not use one in which the lesions are described as yellow and red.

The PRESIDENT: The absence of itching in the case is somewhat unusual. I think there is nothing against this man being accepted as a combatant.

Dr. BUNCH (in reply): I do not think the absence of itching is unusual. There are only a few cases on record, and of these the majority showed no sign of irritation. I look upon this as a case of parapsoriasis en plaques, or xantho-erythrodermia perstans. I am in no way responsible for the name, which was first used by Radcliffe Crocker.

(*February* 15, 1917.)

Two Cases of Follicular Keratosis (Lichen Pilaris, Lichen Spinulosus).

By J. H. SEQUEIRA, M.D.

I BRING these two cases for comparison and contrast. Histologically the conditions are almost identical, the only difference being that in the elder patient the horny plugs which fill the mouths of the follicles are dome-shaped, while in the younger the horny plugs are of the typical pointed character. The following are brief notes of the cases:—

S. B., aged 68, a married woman who has had nine children, has had good health until four months ago, when she complained of irritation of the chest. This irritation continued for a month and then spread all over her body. She then noticed that the chest was studded by a large number of "little lumps." Scattered over the whole of the chest and back are many small dome-shaped follicular papules of a brownish tint, the central part of each papule being much darker. On palpation the lesions are hard and give a nutmeg-grater-like feel to the surface. On compressing one of the papules a solid brownish mass may be extruded from the pilar orifice. The lesions are rarely larger than a millet seed, but in some cases they are as large as a split pea. These papules are distributed over the trunk, thighs and arms, more especially the extensor surfaces, and they are larger in the groin. The patient has been out of health, has slept badly, and has been admitted into the ward, where she has been kept at rest. Great improvement has followed regular bathing and the application of a salicylic acid ointment.

H. B., a half-caste little girl, aged 7, is in good health and has never had any serious illness. Two months ago the mother noticed that the

skin of the shoulders and of the rest of the trunk and upper limbs was covered with spiny projections. The case is a characteristic one of lichen spinulosus.

As already mentioned, histologically these two cases are representative of a process of keratinization in the hair follicles. There appears to be very little inflammatory change in the neighbourhood of the lesions, which take the usual staining. In neither case is there any element which can be recognized as lichen planus. I am aware that Dr. Adamson believes that in the majority of these cases lichen planus develops sooner or later, especially in the type seen in the elder woman. I shall watch both cases with interest with a view to seeing whether this interesting change takes place.

(*February* 15, 1917.)

Case for Diagnosis.

By S. E. Dore, M.D.

The patient is a woman, aged 55. For three years she has had a lesion in the right scapular region which she says began "as a small red spot," and gradually increased in size. It has never ulcerated, but became sore and discharged as the result of a plaster she put upon it. There is now a raised mass apparently consisting of hypertrophied granulation tissue, measuring 2 in. in its longest diameter and ½ in. transversely, situated upon a deep indurated base which extends subcutaneously for about ½ in. around the external lesion. There is no history of syphilis or tuberculosis, and the Wassermann reaction is negative.[1]

DISCUSSION.

The President: I regard this case as of tuberculous nature, and not syphilitic.

Dr. Eddowes: Its appearance suggests to me that it is scrofulodermia.

Major Gray: I once saw a case like this. The lesion was on the breast; the woman ran a knitting-needle through her clothes there. The lesion persisted for two years, and showed no sign of healing. It yielded readily to yellow oxide of mercury in zinc paste, which was kept tied on. But that

[1] Subsequent microscopical examination showed the growth to be a sarcoma.

case was not infiltrated to anything like the degree in this case. I suspect the intense hardness is due to keloid formation, but one cannot ignore the possibility of a new growth, therefore I think a biopsy should be done before deciding on the treatment.

(*February* 15, 1917.)

Case of Dysidrosis (Cheiropompholyx).

By S. E. DORE, M.D.

THE patient is a prison warder, aged 43. He has suffered for five months from a vesicular and pustular eruption, almost entirely limited to the thenar eminences of both hands, although occasionally he has a few small scattered vesicles on the knuckles and sides of the fingers. The disease followed a septic finger-nail due to the prick of a pin in September of last year, and at that time the eruption covered the whole of his hands. I have called the condition dysidrosis, although I think there are objections both to the name and the diagnosis. There is a possibility of local irritation due to the fact that he previously worked with tar twine used for the seaming of coal sacks, and his duties necessitate the frequent handling of prison keys, but he has taken precautions to avoid irritation from these causes and the eruption still persists. I do not think there is any reason to suppose that it is an artefact.

He has had stimulating and soothing ointments and lotions, also X-ray treatment and a vaccine prepared from a staphylococcus showing on culture buff coloured colonies (not typical aureus) isolated from a recent pustule, but no treatment has been successful up to the present time and the pustules crop up again soon after they have been removed.

DISCUSSION.

Major GRAY: I should be inclined to fix this up with ichthyol-zinc-gelatine. I suspect that there may be an "artefact" element, possibly quite an innocent one.

The PRESIDENT: The condition is suggestive of dermatitis repens, but only remotely. I should be inclined to puncture the vesicles and pustules, get them thoroughly empty, touch them with 90 per cent. carbolic acid, then paint them daily with 2 per cent. salicylic acid in alcohol. It is possible the

treatment has been inefficient because the patient has not been continuously under observation and control. There appears to be some septic infection which has never been completely removed, probably a secondary condition.

Dr. ALFRED EDDOWES: This case reminds me of one which I recorded some years ago, in which the patient burned his hand against a greenhouse stove. For three summers he had "erysipelas" of that hand, which the late Dr. Crocker thought was due to handling the "primula obconica." It was finally cured by strapping it with mercurial plaster, which produced very considerable reaction and a small abscess which had to be opened. Possibly similar treatment would be successful in this case.

(*February* 15, 1917.)

Two Cases of Lupus Erythematosus of Unusual Extent.

By E. G. GRAHAM LITTLE, M.D.

Case I.—The patient was a Russian Jew, aged 50, a teacher, long resident in this country. The disease had commenced sixteen years ago, on the face, and now covered the cheeks, the nose, ears, forehead, and nape of the neck and behind the ears. There were also discrete lesions on the dorsum of the hands. The scalp was free. There were two very remarkable patches of the disease, oblong in shape, with the long axis at right angles with the axis of the vertebral column, situated at the level of the ninth dorsal vertebra, 3 in. by 2½ in. and 2 in. by 2¼ in. respectively, with several small satellite lesions near the edges, the patches being sharply circumscribed by a vividly red border, which recalled the picture of Colcott Fox's erythema gyratum. A diagnosis would perhaps have been difficult if I had not had the other manifestations of the disease to guide me. The man had been under the care of numerous physicians and had not benefited by any treatment, the disease spreading slowly all the time. The urine was normal.

Case II.—The second patient was a girl, aged 26, who had had the disease for seven years. It had commenced on the face, which was now extensively diseased, and had more recently, within the past twelve months, invaded the upper arms, forearms and hands, the latter since Christmas. But the chief interest of the case lay in a new, rather indefinite, eruption of blotchy erythematous type which was seen all

over the chest, back and front, and had developed within the past two weeks. The patient was taking quinine in doses the quantity of which could not be ascertained, and the possibility of the eruption being determined by the drug had to be considered, as well as the more serious alternative, that the new eruption was the beginning of a rapidly generalizing lupus erythematosus, a possibility of which the steady and undoubted extension of the disease on the arms offered some corroboration. There was no phthisical history, and the urine was normal. The scalp remained unaffected notwithstanding the extensive distribution on the face.

(*February* 15, 1917.)

Case of Chronic Ulceration of the Legs in a Young Girl, aged 12.

By E. G. Graham Little, M.D.

The case was under my observation in St. Mary's Hospital for six weeks from October 2 to November 12 of last year. She then had exactly similar, but more numerous, deep ulcerations confined to the legs below the knees, back and front. The ulcers are the size of a shilling or larger, and developed very rapidly, with a strong superficial resemblance to gummata. The Wassermann test had proved negative twice, and there was no history of syphilis. There were about twenty or more ulcers on the two legs. Smears were taken from the pus, and films examined, but no mycelial threads nor specific organisms could be seen beyond the usual pyogenic cocci. Cultivations on glucose agar proved negative, these having been undertaken on the possibility of the ulcerations being due to sporothrix.

On October 13 she was tested with the injection of ½ c.c. of old tuberculin, this dose being repeated next day, and 1 c.c. was given on October 16. There was no appreciable rise of temperature after any of these tests, the highest fluctuation being half a degree. The patient was kept in bed, and fomentations of salt and citric acid solution were applied for four hours at a time, with dressings of eusol after their removal. On October 9, pot. iod., in 10 gr. doses three times a day, was prescribed, and under this treatment she improved enormously, so that within four weeks the ulcers had completely healed and she was discharged.

She was readmitted on February 8 with new ulcers exactly similar to the old, but not on the same sites, although still confined to the leg. These are said to have developed within the last fourteen days. Renewed attempts to grow sporothrix have failed. The girl is well nourished and presents no symptoms of tuberculosis. The diagnosis remains doubtful; the rapidity of development and of cure seems to me very unlike what takes place in Bazin's disease, and the absence of reaction to tuberculin does not lend support to that explanation. The ulcerations are healing rapidly again with large doses of pot. iod. and local antiseptic dressings.

Dr. GRAHAM LITTLE also exhibited a case of *Erythème annulaire centrifuge of Darier*, the report of which was deferred until further study of it had been made.

(*February* 15, 1917.)

Acneiform Eruption of "Doffers."

By S. W. ALLWORTHY, M.D.

IN the flax-spinning mills of Belfast "doffers" are usually young girls whose occupation is principally to "doff" or remove the bobbins from the machines and to clean and oil them. The eruption is probably produced by dirt, sweat, and the sperm oil which is used for the machinery.

Dr. J. M. H. MACLEOD: The acneiform eruption seen in Dr. Allworthy's photograph is of interest as an example of the so-called "oil acne" or "bouton d'huile." In it the follicles become plugged with a mixture of dirt and oil which causes inflammatory changes and produces the acneiform lesions. This condition is met with, not only in flax spinners but in any form of work in which the skin is liable to be bespattered with oil, such as in stokers, engineers, mill-hands, &c. It is a milder form of the dermatitis from petroleum, shale oil, &c., which tends to go on to warty growths and cancer. It occurs on the arms from the drops of oil and on the legs from contact with clothes saturated with oil.

Section of Dermatology.

President—Dr. J. H. STOWERS.

(*March* 15, 1917.)

Case of Dermatitis Herpetiformis ("Hydroa Gestationis" Type).

By E. G. GRAHAM LITTLE, M.D.

THE patient is a woman, aged 32, the wife of the out-patient porter at a hospital. She was confined of a healthy child on February 20, and developed a thrombus in the right leg, but there was otherwise no abnormal incident until just a week after delivery—i.e., on February 27—when some grouped vesicles appeared on the wrists, and were followed speedily by similar groups on the limbs and by large bullæ, accompanied by the most intense pruritus. The mucosæ have remained exempt throughout, and except during a period of three days (milk fever) the temperature has been normal. She continued to suckle the infant and had plenty of milk. I saw her first on March 12, when the conditions were much the same as at present. Large surfaces of the body are occupied by fluid elevations of all sizes, from that of a pinhead to that of a tangerine orange. On the wrists, where the eruption began, they are chiefly small, and grouped in the usual herpetiform way. I would draw special attention to the large circinate erythematous patches on the forearms, which bear a close resemblance to the similar erythematous patches in the case shown by me at our last meeting, when I offered the suggestion that the case was an example of Darier's newly named group, "érythème annulaire centrifuge." The presence of these large erythematous rings, combined with typical dermatitis herpetiformis, lends colour to Darier's contention, contained in the description of his group of cases mentioned above, that the cases of "persistent gyrate erythema" described by Fox in the "International Atlas of Rare Diseases of the Skin," were really cases of dermatitis herpetiformis. And it may interest members to know that in the last few days the case

which I reported as érythème annulaire centrifuge has developed a grouped frankly vesicular eruption which places it in the category of Fox's gyrate erythema rather than in that of Darier's new disease, which he carefully discriminates from Fox's cases.

It is interesting to note that the patient now shown has had a previous pregnancy not attended by any unusual symptoms, the child being now aged 3½. The description of this case as "hydroa gestationis," notwithstanding that the appearance of the eruption came on only after delivery, is warranted by a similar history of several other cases, one[1] for example reported by myself, in which the eruption came out some three weeks after delivery. And several other instances of this delayed development, though it is comparatively rare, are to be found in the literature, notably those reported by Lesser[2] and Galloway.[3]

DISCUSSION.

Dr. PRINGLE: I accept Dr. Little's diagnosis of dermatitis herpetiformis, or, what is perhaps a better descriptive term, hydroa gestationis. There is one point in connexion with it which I would like to raise, and it is this, that with every successive pregnancy this disease tends to get worse, and so the question arises whether this woman ought to allow herself to become pregnant again, because if she repeatedly does so, the probability is that this skin disease will ultimately kill her. I have seen one case which began as hydroa gestationis, and which, after nearly twenty years, proved fatal by perforation of the intestine. She went on having children, and with each successive child her eruption got worse, and the interval between the attacks became smaller and smaller, until finally the eruption was a continuous one. It attacked the mucous membrane of the mouth, spread down the œsophagus and finally caused ulceration of the bowel. I made the post-mortem examination myself. I have been consulted more than once in cases of hydroa gestationis as to whether it was a legitimate thing to allow the patient to become pregnant again. The opinion I expressed may or may not have been ethically right, but it was to the effect that further pregnancies were dangerous, and liable to lead finally to a fatal termination.

Dr. G. PERNET: While I was assisting the late Dr. Radcliffe Crocker we had a case of the kind, which had been getting progressively worse. She came one day with a very severe attack, and on investigating the matter I found she had been given iodide of potassium by somebody outside under the idea that the condition was syphilitic. It should be known that bullous lesions in syphilis are very rare. I agree with Dr. Pringle that such women ought not to become pregnant again.

[1] *Brit. Journ. Derm.*, 1901, xiii, p. 419.
[2] *Ibid.* (abstract), 1899, xi, p. 258.
[3] *Ibid.*, 1901, xiii, p. 413.

(*March* 15, 1917.)

Case of Morvan's Disease (Syringomyelia).

By GEORGE PERNET, M.D.

THE patient is a man, aged 26, a metal-trimmer at present, but previously a brewery cellarman. He has been under treatment for cracks and fissures of the hands, which were originally attributed to

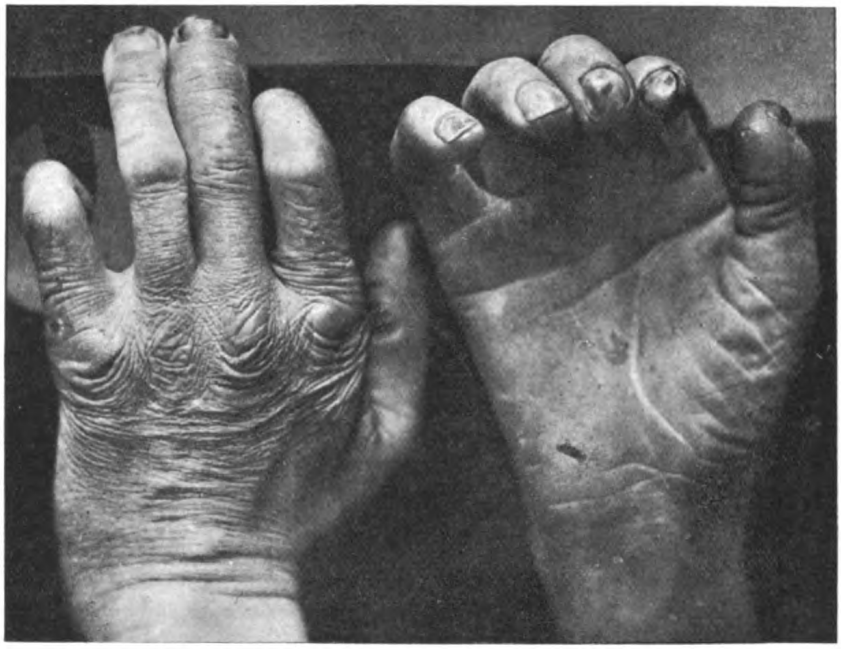


FIG. 1.

Case of Morvan type of syringomyelia.

bottle-cleaning, in which acids are used, and to cold weather. Bad whitlows from which he suffered from time to time had been opened, and necrosed bits of bone removed from the ends of some of the fingers. The disease started some two or three years ago. I saw him for the first time on February 16, 1917, when his hands presented the appearances shown in the photograph. Some of the fingers were thickened (cheiromegaly of Charcot), nails deformed, a painless whitlow here and there (panaris analgésiques), fissures in the palms. The picture reminded

me of the case I had seen when attending Charcot's clinic at the Salpêtrière in 1891, and which was described and depicted by him in a lecture,[1] when the syringomyelic nature of Morvan's disease previously described by him in 1889[2] had been demonstrated by Joffroy.

I made the diagnosis of syringomyelia (Morvan type) and asked our neurologist, Dr. Grainger Stewart, if he would go over the case from the point of view of the dissociation of sensation. This he very kindly did

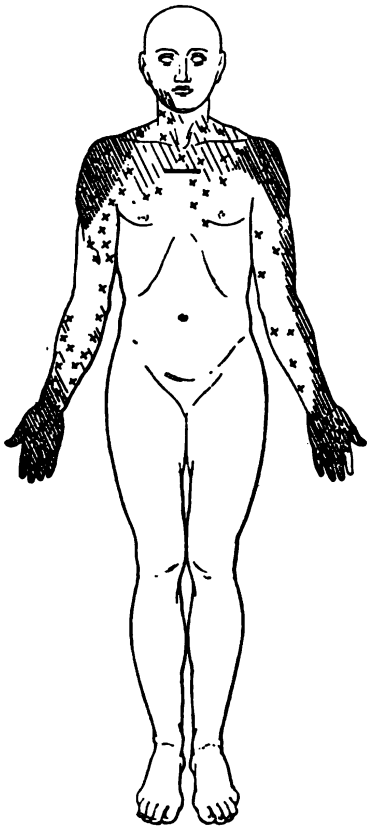


FIG. 2.

Case of Morvan type of syringomyelia. Patient is a bad witness. The loss to heat and cold is over a greater area than the loss to pain. No loss of sense of position; no loss to cotton wool.

▨ = { Absolute or partial loss to pain. Absolute or relative loss to heat and cold. Varies according to intensity of shading.

× × × = Loss of appreciation of heat and cold.

[1] Charcot, "Clinique des maladies du système nerveux," 1892, i, pp. 243 *et seq.*

[2] *Idem*, *ibid.*, pp. 1 *et seq.*, with figures.

and returned the case with a note confirming the diagnosis of syringomyelia. I am indebted to him for the annexed diagram. In his report he notes that "(1) the *cranial nerves* are normal; (2) *Sensory* loss as described in diagram; (3) *Motor*: ? as to wasting of some hand muscles —no weakness of lower extremities; (4) *Reflexes:* Those of upper extremities diminished or absent; *knee-jerks* increased; *ankle-jerks* increased, clonus on left.

As to lepra, I excluded that as the patient had spent all his life in the neighbourhood. I also excluded Raynaud's disease and sclerodactylia, which were suggested as possibilities. Wassermann's test is negative.

(*March* 15, 1917.)

Case of Post-operative Elephantiasis of the Finger.

By GEORGE PERNET, M.D.

THE patient is a man aged 75, who was operated on ten months ago for pus about the flexor region (ulnar side) of the left wrist, followed by a deep palmar abscess. On the ulnar side of the wrist, a longitudinal incision was made, and another in the palm, both practically in the line of the left ring finger. Some four months ago this finger began to swell, and it is now much enlarged as compared with the other fingers of the same hand and with the right ring finger. This was aggravated during the recent severe cold weather, the affected finger and the adjacent little and middle fingers becoming very blue, and some ulceration had occurred about the tip of the ring finger. In my opinion, the elephantiasis of the finger is due to the blocking and destruction of the lymphatics, resulting from the deep pus formation. It is comparable with what is observed in the leg, for instance, in some cases of severe old local destructive tertiary syphilis. The patient is shown in connexion with the case of Morvan's disease described above.

DISCUSSION.

Major GRAY: I think that in the second case there is considerable evidence that the ulnar nerve is involved in the scar in front of the wrist, though it is difficult to make certain on a casual examination. He gets a shooting pain up the hand over the ulnar area when the scar is pressed upon; there is wasting of the interossei muscles, and diminished sensation over the three inner fingers, especially on their palmar aspect, associated with marked blueness of those

fingers. I think the type of lesion present is therefore comparable with that of the other man, for the lesions occur only on the partially anæsthetic fingers. As to the swelling of the fingers in both cases, I imagine it to be due to a chronic lymphangitis set up by traumata to the skin.

Dr. PRINGLE: My opinion that the nerve in the second case shown is involved is based upon the extraordinary resemblance to the condition in a relative of mine, who severed his ulnar nerve by putting his hand through a plate glass window when he was a boy at school.

Dr. F. PARKES WEBER: Dr. Pernet's first case is a typical example of what Charcot called the Morvan type of syringomyelia. It would be interesting to examine the neck by X-rays for cervical ribs. I mention this because there are various disturbances of nutrition in the hands connected with the presence of cervical ribs. The condition in the hands of this patient is certainly not due to cervical ribs, but cervical ribs have sometimes been found in cases of syringomyelia. The Berlin neurologist, Oppenheim, has drawn particular attention to that fact, and he has gone so far as to suggest there is some indirect ætiological relationship between the two conditions. Perhaps cervical ribs are a stigma of degeneration. I think it is very unlikely that the swelling of the soft parts of the hands (a kind of "cheiromegaly") in some cases of syringomyelia (i.e., in the Morvan type of syringomyelia) is due to chronic septic lymphangitis. I saw cases in Paris in which there was, I think, no sign of lymphangitis. It is one of the characteristics of the trophic disturbances in the bones and joints and hands and feet sometimes associated with syringomyelia that there is thickening of the parts involved. In that respect they tend to differ from the trophic disturbances of tabes dorsalis.

Dr. PERNET (in reply): My view of the second case is that the swelling of the finger is due to blocking of the lymphatics, such as is seen in a bad case of syphilis, without any interference with nerves at all. This man has good movement at the wrist and hand. The ulnar nerve was not divided transversely in this case. That some filaments were interfered with would explain the diminution of sensation. With regard to the patient with Morvan's disease, I agree with Dr. Parkes Weber that the whitlows are simply the result of micro-organisms invading a part which is below par.

(*March* 15, 1917.)

Case of *Œdème bleu de Charcot.*

By GEORGE PERNET, M.D.

THE patient is a woman aged 27, who was transferred to my department at the West London Hospital from the surgical out-patients. She had first come under Mr. Tyrrell Gray, who had

carefully gone into the case, including radiographing, and who brought her to me as not being a surgical case. My diagnosis was *œdème bleu de Charcot.* The details are as follows: Early in November, 1916, the lower part of the left leg began to swell and the swelling spread downwards over the dorsum of the foot. When I saw her on February 27, 1917, the lower half of the left leg and instep of the foot to the roots of the toes were much swollen, blue and œdematous. The œdema did not pit on pressure in the ordinary way, but the pitting rapidly disappeared on removal of the finger, in the manner described by Sydenham, and named by Charcot "elastic œdema." The affected area was exquisitely sensitive to the slightest touch. Stigmata of hysteria, such as the usual tender points and anæsthesia were not present. Nevertheless I maintained the diagnosis of *œdème bleu,* and on referring to Charcot's lecture[1] on the subject to refresh my memory I found this case tallied with his description. In one case he mentions, a surgeon, called in to a case of this kind involving the right leg and thigh, made two large incisions down to the bones under the impression it was one of *phlegmon diffus,* so it behoves one to be careful. Charcot looked on this *œdème bleu* as a form of the hysterical œdema originally described by Sydenham (*œdème blanc* Charcot calls it to distinguish it). I put the patient on pil. zinci et belladonnæ et assafœtidæ, which happened to be in the West London Hospital pharmacopœia.

DISCUSSION.

Dr. F. PARKES WEBER: I feel very strongly that this is a case of venous thrombosis involving the deeper intra-muscular veins in the limb. This view is confirmed by the history of sudden painful onset. I do not think this patient manifests any sign of hysteria. Later on, an elastic, rather hard, œdema is apt to develop in such cases, which may ultimately disappear, but may last a long time. In some cases there ultimately supervenes in the calf muscles either a real hypertrophy, or a pseudo-hypertrophy due to chronic interstitial thickening of the fibrous tissue. I made some references to the literature of the subject in connexion with a case which I showed about seven years ago before the Clinical Section.[2] The cases which Charcot grouped

[1] Charcot, "Clinique des maladies du système nerveux," 1892, i, pp. 95 *et seq.*, with figures.

[2] F. Parkes Weber, "Apparent Muscular Hypertrophy following Œdema of the Left Leg, due to Venous Thrombosis," *Proc. Roy. Soc. Med.*, 1909, ii (Clin. Sect.), p. 60. According to Geipel (at the Gesellschaft f. Natur- und Heilkunde zu Dresden, March 23, 1912) the deep-seated veins of the calf are not rarely the only veins in the body to be affected by thrombosis. The diagnosis of thrombosis, owing to absence of the ordinary signs, in such cases, may be very difficult.

under the headings, *œdème bleu* and *œdème blanc* have been gradually redistributed amongst various groups, according to their supposed ætiology. What Charcot called *œdème bleu* affected generally a hand or foot rather than the limb above. In the present case the leg above the ankle is the part specially involved.

Dr. A. EDDOWES: I have a patient under my care who has one leg in a condition very similar to this patient's leg. She is a nurse who came from France, where she had been much exposed to cold. She has been liable to chilblains. The first time I saw her, her leg was very much swollen and almost blue, also tender, very similar to the condition in this case.

Postscript.—On March 16, when again seen, the patient volunteered the statement that the pill had done her more good than anything else she had taken. I may add that to divert her I had also ordered mist. sacchari usti three times a day. That there was some suggestion in the matter is quite likely. At any rate the swelling and œdema were much less, the parts not so tender, and somewhat paler in hue. The patient also looked much better.

(*March* 15, 1917.)

Tuberculosis Cutis in a Patient with Phthisis.

By W. KNOWSLEY SIBLEY, M.D.

THIS patient, a well developed Frenchman, aged 30, is a tool-maker by occupation. He presented himself to the French Army in November, 1914, but was rejected because of active phthisis at the right apex, of which he was unaware. A few weeks before that date he developed a warty condition on the dorsum of the left hand and the little finger of the right. The point that interests me in the case is the connexion between the tuberculosis cutis and the phthisis. A certain proportion of lupus cases, sooner or later, suffer from phthisis, but, in my experience, we do not come across many cases of phthisis who develop lupus. I presume this patient had his phthisis before he acquired his lupus. Owing to his occupation, this man is perpetually injuring his hands, therefore he would be much more liable than other persons to inoculate himself with his own tubercle bacilli.

Section of Dermatology.

President—Dr. J. H. Stowers.

(*May* 17, 1917.)

Lichen Planus with Unusual Features.

By S. E. Dore, M.D.

The patient, a man aged 40, has suffered from attacks of lichen planus for many years, and about twelve years ago, when he attended Westminster Hospital under the late Dr. Colcott Fox, a section was made from his skin by Dr. Adamson. He has now typical lichen planus papules around his waist, in the areas of pressure due to his truss, but I brought him on account of another eruption which he has had on the left lower abdomen for about a year. This consists of closely aggregated, discrete, shiny, convex, follicular papules, somewhat indistinct when viewed by artificial light, but quite definite and characteristic by daylight; each follicle being picked out by a miliary papule, rounded in outline and of a reddish-brown or bronze colour. The papules are uniform in shape and size, and do not possess the peculiar grouping, colour or configuration of lichen planus papules nor coalesce to form patches as in that disease. I have seen a similar eruption on the abdomen before in two or three cases, but not in association with lichen planus. I have not seen the condition described. I brought the case in order to obtain the opinion of members as to its nature, and whether it is a follicular hypertrophy, associated with the lichen planus, or a separate and distinct eruption. There are also some large patches of brownish yellow discoloration on the extensor surfaces of the forearms and on the inner and upper aspect of the left thigh, which the patient states are the result of a condition similar to that on the abdomen. With the exception of slight irritation, he does not suffer inconvenience from the eruption.

DISCUSSION.

The PRESIDENT: I am familiar with the appearance of the eruption that Dr. Dore mentions, but I do not anticipate that it will assume the typical features of lichen planus papules.

Dr. ADAMSON: This case seems to have no unusual features. We are all familiar with the association of follicular papules with lichen planus under the name first employed, I think, by Dr. Pringle, of lichen plano-pilaris. Whether the follicular papules are of the lichen spinulosus type, or are the large papules with horny plugs called lichen acuminatus, or are small papules without spines, as in Dr. Dore's case, seems to me merely a question of degree.

Dr. GRAHAM LITTLE: The eruption on the abdomen to which Dr. Dore draws attention is as characteristic of lichen planus as are the lesions on the back. It is impossible to draw a hard and fast line in a disease characterized by such protean forms of eruption.

Dr. MCLEOD: As soon as I saw it I connected the eruption on this man's abdomen with lichen planus. I agree with Dr. Dore that the papules are different from those of lichen spinulosus.

Dr. DORE (in reply): I cannot agree with Dr. Adamson's opinion that this is a common condition frequently met with in association with lichen planus; the papules have not the well-known character of that disease, they are not acuminate like those of lichen spinulosus, there are no spines nor follicular plugs, and it is unlike any eruption I have seen described as "lichen plano-pilaris" or simple lichenification. It is not, in my opinion, commonly observed either with or apart from lichen planus, and I am inclined to regard it as a distinct eruption.

(*May* 17, 1917.)

Multiple Soft Moles.

By S. E. DORE, M.D.

THIS man, aged 41, has a large number of tumours, varying in size from a millet seed to a large pea, scattered over the face, chin and scalp. There are about fifteen on each side of the face and forehead. They are soft, rounded, sessile growths, of the same colour as the skin. He has noticed them for about five years. There is also a much larger tumour on the scalp which I take to be a sebaceous cyst. One of the growths was removed and a section showed the characteristic structure

of a mole. I am treating them with solid carbon dioxide and several of the smaller ones have been removed. The report on the section, received from Dr. Braxton Hicks, is as follows: "Surface epithelium much thinned but papillæ hypertrophied. General hypertrophy of sebaceous glands. Subepithelial connective tissue much fibrosed and the interstices filled with polygonal, spheroidal and spindle-shaped cells. General appearances those of a soft mole, but clinical history of importance in this case. No appearances of a secondary deposit."

DISCUSSION.

The PRESIDENT: I consider electrolysis an appropriate treatment for removing these tumours, as well as the application of CO_2.

Dr. DORE (in reply): I have not treated the tumours by means of electrolysis, partly because the carbon dioxide pencil is more convenient in hospital practice. I do not think the scarring resulting from carbon dioxide is greater, but it sometimes causes de-pigmentation, and a white scar which is rather noticeable in dark-skinned people.

(*May* 17, 1917.)

Lymphadenoma Cutis.

By W. KNOWSLEY SIBLEY, M.D.

PATIENT is a male (gamekeeper), aged 49. I showed this case in its earlier stages, on October 19, 1916. He then had had a papular eruption on the shoulders, forearms, face, hips and legs dating back nine years. Recently he has had obviously enlarged glands, mostly in his groin and axillæ. On the former occasion a section of one of the skin papules was taken, and Mr. McDonagh, concluded from that section, that it was lymphadenoma cutis, and in the discussion it was suggested that I should have one of the glands excised and examined. The patient is apparently a healthy man, and has not had a day's illness in his life. Both himself and his doctor consider him to be healthy and strong. A section from a gland from the right groin is now under the microscope, and Mr. McDonagh has promised to give a further description of it. I have a photograph (fig. 1), which was taken when he was shown on the previous occasion, and it shows the distinct line of demarcation of the

lesions on the shoulder. That sharp line of demarcation has now subsided. He is now in hospital, and I am giving him increasing doses of arsenic: he is now on 12 minims of liquor arsenicalis three times a day. There is no doubt the rash has very much lessened; whether it is the

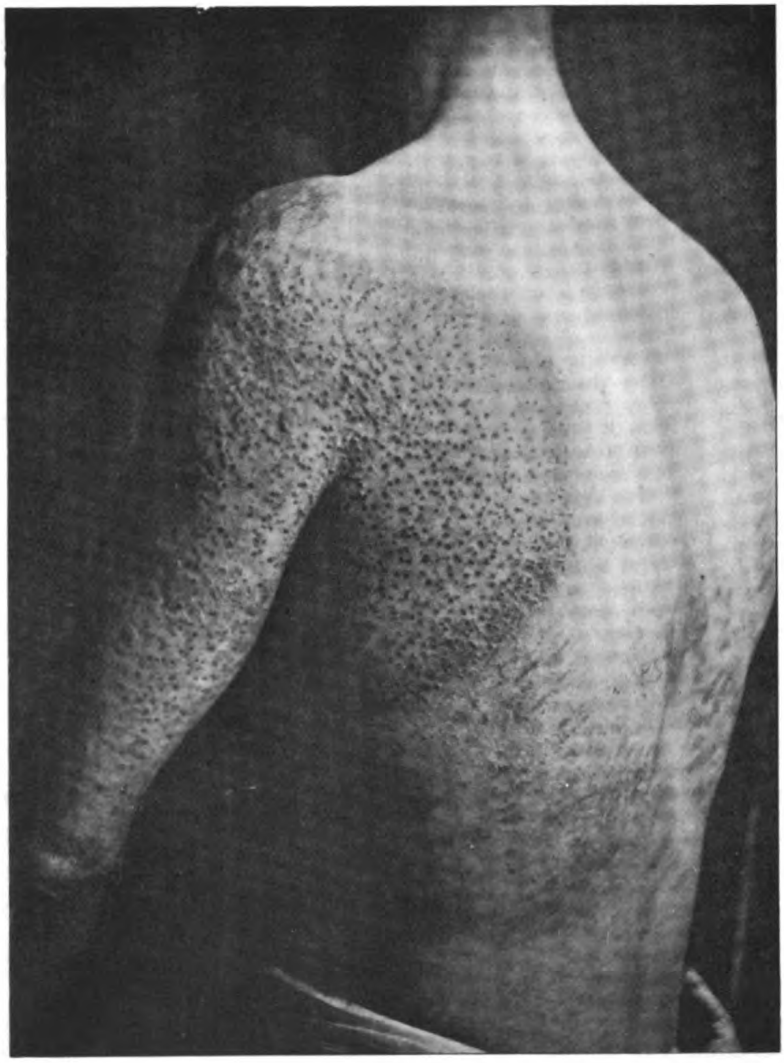


FIG. 1.

Lymphadenoma cutis.

result of rest in bed, or the arsenic, I do not know. His upper eyelids were badly affected, and the right one suppurated. He says the skin came off in washing some days ago. The blood count varies very much.

Some members may recall a case I showed in a boy in July, 1914. An inquiry by a special Pathological Sub-Committee of this Section was held upon that case. This case is very similar to that one. There is, apparently, very little enlargement of spleen or liver. Before I saw him, he had been in the habit of rubbing vaseline into the lesions, because of the irritation; in November there was considerable pustulation of the skin, and I think it probably resulted from the applications. He has not used it lately, and the lesions have quieted down. In the case of the boy, one of the glands in his groin had suppurated. Eventually it healed up. I removed a small gland from the groin in this present case, and there was apparently satisfactory healing, but at the end of

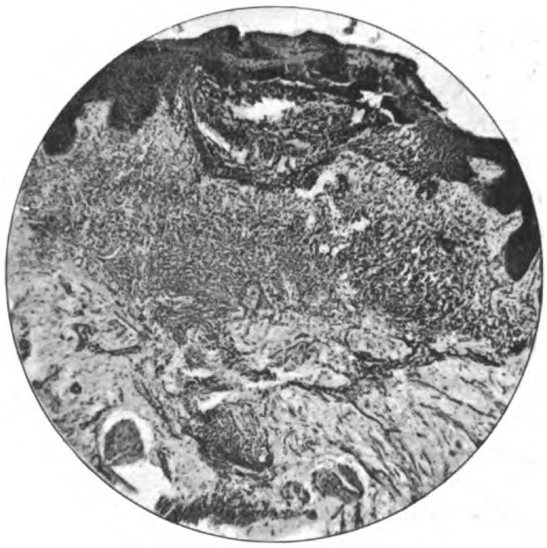


FIG. 2.

Lymphadenoma cutis. Section of skin papule. (× 75.)

a week it broke down again, and now he has a discharging sinus. I have not applied X-rays to this case. In the boy I applied them to one forearm, but though there seemed to be some benefit, I afterwards concluded the applications had not made much impression on the eruption. There were, however, two tumours as large as tangerine oranges on the boy's occipital region and they completely disappeared under X-ray treatment, and there has been no return of these. This boy was more recently (November, 1916) brought again before the Section by Dr. Dudley Corbett and his case fully reported.

Blood Counts.—November 2, 1916: Hæmoglobin, 90 per cent.; red cells, 5,860,000 per cubic millimetre; white cells, 5,400 per cubic millimetre. Differential count: Polymorphonuclears, 65 per cent.; mononuclears, 7 per cent.; small lymphocytes, 25 per cent.; eosinophils, 2 per cent.; basophils, 1 per cent. November 30, 1916: Red blood cells, 5,600,000; white blood cells, 5,300; polymorphonuclears, 35·5 per cent.; mononuclears, 5·0 per cent.; lymphocytes, 33·5 per cent.: eosinophils, 23·5 per cent.; basophils, 2·5 per cent. May 4, 1917: Hæmoglobin, 93 per cent.; red blood cells, 5,400,000; white blood cells, 5,100; polymorphonuclears, 44·25 per cent.; mononuclears, 12·75 per cent.; small lymphocytes, 23·75 per cent.; eosinophils, 13·75 per cent.; basophils, 3·75 per cent.; transitional cells, 1·75 per cent.

Histology of the Lymphatic Gland.—The predominating cell is the plasma cell; indeed there are very few lymphocytes in the section at all. Here and there plasmolysis has occurred with a few plasma cells, but as far as can be ascertained, since the section is stained with hæmatoxylin and eosin, the nuclei are not dividing and the nucleoli show no activity. There are a few aminoplasma cells. Sparsely distributed in the section are some eosinophil cells. The endothelial cells appear to be somewhat degenerated, but they show no nuclear nor nucleolar activity. The section is a typical one of non-malignant aleukæmic lymphocytoma of the plasma cell type.—J. E. R. McDonagh.

DISCUSSION.

Dr. F. Parkes Weber: I take it that Dr. Sibley regards this case as one of Hodgkin's disease. Hodgkin's disease (by which term I mean the same disease as lymphogranulomatosis maligna) is, I believe, one of the most fatal, and I should be glad to see an undoubted example of it which has been cured. A case may go on for six or seven years, and then the abdominal viscera often become involved and the patient dies miserably. When, in this disease, a lymphatic glandular tumour in the neck or axilla is treated by X-rays, it seems sometimes to precipitate the visceral complications so that death sometimes comes even sooner than without that treatment. Is Dr. Sibley's case really an example of Hodgkin's disease (lymphogranulomatosis maligna) or an example of an aleukæmic (aleucocythæmic) stage, or type, of leukæmia (such as was formerly termed "pseudoleukæmia")? I have never seen a condition of the skin resembling that in the present case occurring in an undoubted case of Hodgkin's disease, but such conditions of the skin (with very little itching) do certainly occur in leukæmia and "pseudoleukæmia" (i.e., in the aleucocythæmic stages and types of leukæmia).

Mr. McDONAGH: Some time ago[1] I suggested for this condition the name of "cutaneous aleucæmic lymphocytoma." I consider the condition the same as Hodgkin's disease, with the differences that, in the latter, the disease commences primarily in the lymphatic glands and that the inflammation is generally of a more malignant nature. The histology of the skin and lymphatic glands in no two cases of cutaneous aleukæmic lymphocytoma is the same, and in some cases it is absolutely indistinguishable from that usually found in Hodgkin's disease. The disease may be inflammatory or malignant, it may attack the lymphocyte or its progenitor, the endothelial cell, or its offspring, the plasma cell. Neither the aleukæmic lymphocytomata of skin or of lymphatic gland origin are, except on very rare occasions, accompanied by a leukæmic blood picture, the usual change being merely a relative increase of the eosinophil cells. When leukæmic changes occur in the blood it signifies that the bone-marrow is involved, and the condition, leukæmic lymphocytoma, is in my opinion the same as the two types above mentioned, with the difference that the disease primarily affects the bone-marrow. Cutaneous aleukæmic lymphocytomata may run an extremely insidious course, or soon prove fatal, and I have never yet seen a case recover. In the course of the disease there may be frequent and periodic rises of temperature, and septic eruptions simulating furunculosis, impetigo contagiosa, &c. When a case is complicated by sepsis there is usually an absolute and a relative increase of the polymorphonuclear leucocytes.

Dr. F. PARKES WEBER: So far as I know, no evidence has been published that a condition resembling that in the present case, has ever been proved to be connected with true Hodgkin's disease (lymphogranulomatosis maligna).

(*May* 17, 1917.)

Case of Iodide Eruption.

By GEORGE PERNET, M.D.

THE patient, a woman aged 34, came under observation on May 15 for an eruption involving the greater part of the arms and the upper third of the forearms, of six weeks' duration. The extensor surfaces are mainly affected, especially about the elbows. The lesions are polymorphous, ranging from small yellow-topped papules to oval and circular vegetating and crusted ulcerations 1 in. across and over.

[1] *Brit. Journ. Derm.*, 1914, xxvi, pp. 283, 337.

The latter are situated chiefly on the elbows and their neighbourhood. The smaller non-ulcerated lesions are characteristic, and are situated more peripherally. There is also a single crusted lesion on the right cheek about ¼ in. across. No other parts of the body are affected. It

Case of iodide eruption.

was elicited from the patient that she had taken three-quarters of a large bottle of a "blood-mixture" on account of some slight and irritating skin trouble about the outer side of the right arm. Blood mixtures sold

over the counter contain iodide of potassium, as is well known. The woman was pale and had only recently experienced great mental distress owing to the loss of her husband in the war, hence her lowered resistance. The case is shown on account of the severity of the eruption and its unusual distribution, which are brought out in the photograph.

DISCUSSION.

The PRESIDENT: This is a very good example of the iodide eruption. The resemblance of some of the lesions to variola is striking. I had a similar case under observation several years ago which was admitted into a fever hospital and mistaken for small-pox. A special examination of the patient, however, enabled me to prove that the eruption resulted from the ingestion of iodide of potassium and to remove him from the institution forthwith.

Dr. ALFRED EDDOWES: A small dose of iodide will often cause a marked rash when a larger dose will not. As this patient had some spots on the right arm before she took the drug, I suggest there was some special cause of infection in this area.

(*May* 17, 1917.)

Acne Scrofulosorum and Lichen Scrofulosorum.

By E. G. GRAHAM LITTLE, M.D.

THE patient is a little girl aged 5. She has had the eruption on the legs for six months, that on the trunk is of later date. The legs are closely covered from the foot to the knee by a typical eruption of acne scrofulosorum, the papulo-necrotic tuberculide of Colcott Fox. The abdomen and back are extensively occupied by a nearly continuous sheet of eruption of follicular papules typical of lichen scrofulosorum. The glands in the neck are greatly enlarged, and the abdomen is swollen and prominent, probably from enlarged mesenteric glands. No definite evidence of fluid can be detected in the abdominal cavity. There is obvious pulmonary tuberculosis, and the child has wasted considerably in the last few months. The mother has suffered from

tuberculosis of the lung for many years, contracted before her marriage. The combination of lichen and acne scrofulosorum I regard as excessively rare, but it is not uncommon to find one or other of these eruptions in association with glandular or pulmonary evidence of tuberculosis, as in this instance.

Section of Dermatology.

President—Dr. J. H. Stowers.

(*April* 19, 1917.)

Skin Diseases and their Treatment under War Conditions.[1]

By Henry MacCormac, M.D., F.R.C.P., Major R.A.M.C.(T.C.).

War is a very serious business in which every detail counts towards the final triumph of victory. Essential above all things is the maintenance of man-power; every soldier unfit for the firing line is a gain to the enemy, and for military purposes it matters not what removed him from the line, only that he has been removed. In the present War the losses occasioned by diseases of the skin have been considerable, and therefore we, as dermatologists, are much concerned with two questions: first, whether our art can prevent them, and second, when they have arisen how we can best cure them.

In France the problems presented are new; unusual types of skin affection have arisen, while the progress of war, the environment of an army in the field, its ebb and flow and the complicated movements of its being, renders impracticable those processes familiar in the quiet habit of civil life.

Humanitarian principles compel us, and rightly, to give our best aid to those who by reason of grievous wounds or severe sickness can never more fight. In dealing with diseases of the skin, we are content to know that not only are we alleviating illness but, further, since nearly every case will return to duty, we are able to add considerable reinforcements to the Army. We are dealing with men whose health is but

[1] The author is indebted to Mr. A. K. Maxwell for his skill and care in making the drawings, and to the Medical Research Committee for the provision of his services.

little impaired, many of whom are highly trained soldiers, and who from a purely military point of view are of the utmost value to the combatant forces. I particularly desire to emphasize this point because it is so necessary to insist that the employment of the highest skill and the best methods are well repaid by the results obtained.

The work of a dermatologist is important for a further reason. Where so large a proportion are affected with contagious disease, the cure of one case may mean the prevention of many others.

The problem is no new one; in the medical history of past campaigns we may read how severe and extensive skin complaints were. During the American Civil War, out of an army of some 600,000 men, 32,000 cases were diagnosed as itch, and another 35,667 were merely recorded as skin disease. So severe was the former complaint that its pathology was much disputed at the time.[1] During the Napoleonic campaign cases of itch were counted by the hundred thousand,[2] and in his admirable observations on diseases of the Army in camp and garrison Sir John Pringle refers to its existence in his time.[3] And so the tale goes on through the New Zealand and South African Wars.

We have therefore sufficient precedent to compel us to consider the problem seriously, evidently no light one. In the past typhus and typhoid played frightful havoc in field and camp; these diseases medical science has curbed—a triumph amply recognized—the scourge of scabies still, however, survives to the present time.

With such evidence before us, from both the past and present, it is, I think, apparent that the scope of dermatology in war is considerable, and not in our Army alone but in those of our allies also. At the commencement of hostilities the Belgian Army suffered considerably from itch. M. le Médécin Principal Dupont tells me that this has been very largely checked, no doubt in consequence of an admirable bathing system and the establishment of dermatological centres in various sections, where expert opinion and treatment is available. Where troops are moving forward rapidly over contested ground, such fixed arrangements are hardly practicable.

[1] Munson's "Military Hygiene," Lond., 1901, p. 606.

[2] Hirsch, "Geographical and Historical Pathology," ii, p. 360 (New Sydenham Society's translation).

[3] Sir John Pringle, "Observations of the Diseases of the Army in Camp and Garrison," Lond., 1752, chap. viii.

In Paris, the Director of St. Louis Hospital assured me that the incidence of scabies in the troops has been greatly lessened since the beginning of the War. The French Army has also established dermatological centres. So far as could be observed, the cutaneous affections amongst French soldiers were less severe than those seen in our troops, probably as the result of these arrangements.

In the British Army at the Front, a man reporting sick comes under his own medical officer, by whom he may be evacuated to a field ambulance, thence to a casualty clearing station, or base hospital. The question arises where skin complaints can be most efficiently dealt with, and this demands consideration from several points of view. The regimental Commanding Officer is naturally loth to lose a soldier suffering from what appears to be a trivial complaint; but since regimental treatment cannot be efficient under war conditions, and as the danger of infecting other men is considerable, it should be definitely ruled that regimental treatment should not be attempted.

What plan can be followed? Obviously, the best results are to be got in fixed institutions with expert personnel. Now from their nature and purpose neither field ambulances nor casualty clearing stations come under this heading. On the other hand, a scabies station for each Army Corps would fulfil these requirements admirably. It is argued against the establishment of such units that this means the unnecessary creation of new hospitals to which medical officers and quartermasters would have to be detailed. Those who reason in this manner overlook the fact that these stations would release beds and personnel elsewhere employed in the treatment of skin diseases, and that since each medical officer can deal with a large number of skin cases an actual saving would be effected. They forget that skin patients must be housed and treated somewhere; they doubtless fail to appreciate that special departments make for speedy cure. I submit the argument, then, that corps scabies stations would both shorten treatment and effect a saving of personnel, two points which, if sustained, are very worthy of consideration.

The adoption of such a system would not end the administrative difficulties. To attain the best results, it is essential that early cases be selected. I suppose hardly any battalion is completely free from itch. Regular medical inspection is necessary, often most difficult to arrange. Since scabies in France differs in some important features from the form seen in civil life, medical officers must know what to look for. The

hands are often entirely free from lesions, while interdigital burrows, that pathognomonic sign, are only present in about 13 per cent.—this figure was obtained by Captain Small, R.A.M.C., in an examination of sixty consecutive cases.

The problem is further complicated by the presence of lesions and itching caused by pediculi. The louse-bitten soldier regards pruritus as a normal accompaniment of his life. I have been amazed whilst watching a stream of men passing through divisional baths to observe how extensively their bodies were covered with numerous red papules produced by this insect. No, or hardly any, secondary scratch marks so characteristic of the phthiriasis of hospital out-patients are seen. The pediculosis is acute rather than chronic, and presents a close resemblance to scabies, at times most puzzling. Fortunately the louse, so far as I know, never attacks the penis, while this organ is frequently affected in scabies, and the presence of papules or crusts there is of the greatest help in forming a diagnosis.

These difficulties in diagnosis have occasionally led to the most amazing errors. I have seen vaccines given for long periods—up to six months—for the complications of unrecognized scabies; I have seen opium given to relieve its itching; I have even seen lesions burnt out with solid silver nitrate. In this I do not think medical officers are altogether to blame. Text-book descriptions are misleading when applied to the disease as seen in France. Even so distinguished an expert as Dr. Adamson in a recent paper[1] lays stress upon itching, a symptom sometimes of little account, and interdigital burrows, a sign frequently completely absent.

Any system of regimental inspection, for the detection of scabies, must permit of an examination of the whole body and above all of the penis. Interdigital vesicles rather than burrows should be sought for; impetigo of the buttocks is pathognomonic of scabies, and every patient with boils should be regarded as suspicious, as they form 28·4 per cent. of the pyodermic complications, either alone or associated with impetigo.

The treatment of scabies opens a wide field for discussion. In this, prevention is of primary importance, and demands some comment. How does a soldier acquire this disease? Dermatologists insist that prolonged and intimate contact is necessary. Since opportunities for removal of clothing are comparatively rare and offer themselves only

[1] H. G. Adamson, *Lancet*, 1917, i, p. 221.

when in rest, infection must occur at this time, and as it is then that blankets are chiefly used, reason points strongly to them as the means of transmitting the disease. This argument is strengthened by the history of epidemics amongst officers occupying the same dug-out. No doubt horses and a venereal origin account for some cases—a small and negligible class.

It is perhaps a counsel of perfection, but were it possible to disinfect blankets more frequently, using for example the Clayton sulphur vapour method, one is tempted to believe that scabies would be greatly lessened.

Another source of infection—viz., the importation of fresh cases from England or the base—merits some passing reference. The watchful draft-inspecting medical officer soon catches and removes these men, but he is powerless to deal with the scabies "carrier," the individual who has been partially cured by methods such as sulphur fumigation. In spite of the luke-warm reception accorded to this method of treatment by this Section, it has a considerable vogue and enjoys an undeserved popularity. In the discussion to follow, I hope speakers will express their experience and views of this treatment and its modifications.

Military authorities are well aware of the losses occasioned by itch. In Base Hospital B it has been found that when severe pyodermic infections have occurred a patient remains under treatment on an average 31·7 days. This does not include additional time spent in other hospitals and in transport.

These complications are so severe as to suggest the presence of an unusual type of acarus. Specimens were sent to the British Museum. Mr. Hirst very kindly examined them for me; he reports that "The examples certainly seem to belong to the human variety. The size is quite typical, and also the structure of the dorsal scales, which are longer than wide and acutely pointed, instead of being rather shorter and blunter as in var. *equi*."

Chart I illustrates the more important admissions of skin diseases into Hospital B from August to January inclusive. Especially striking is the curve of the impetigo; note should also be taken of the similarity between this curve and those of boils, scabies, dermatitis (unclassified) and eczema. The rise corresponds with, and to a large extent results from, the offensive of last summer. I have, however, shown it for other reasons. When examined in conjunction with Chart II it can be seen what an important part scabies and its

complications play in the causation of skin disease in the Army. Chart II represents graphically the analysis of 1,000 cases, diagnosed as scabies, boils, or impetigo, diseases that are responsible for by far the

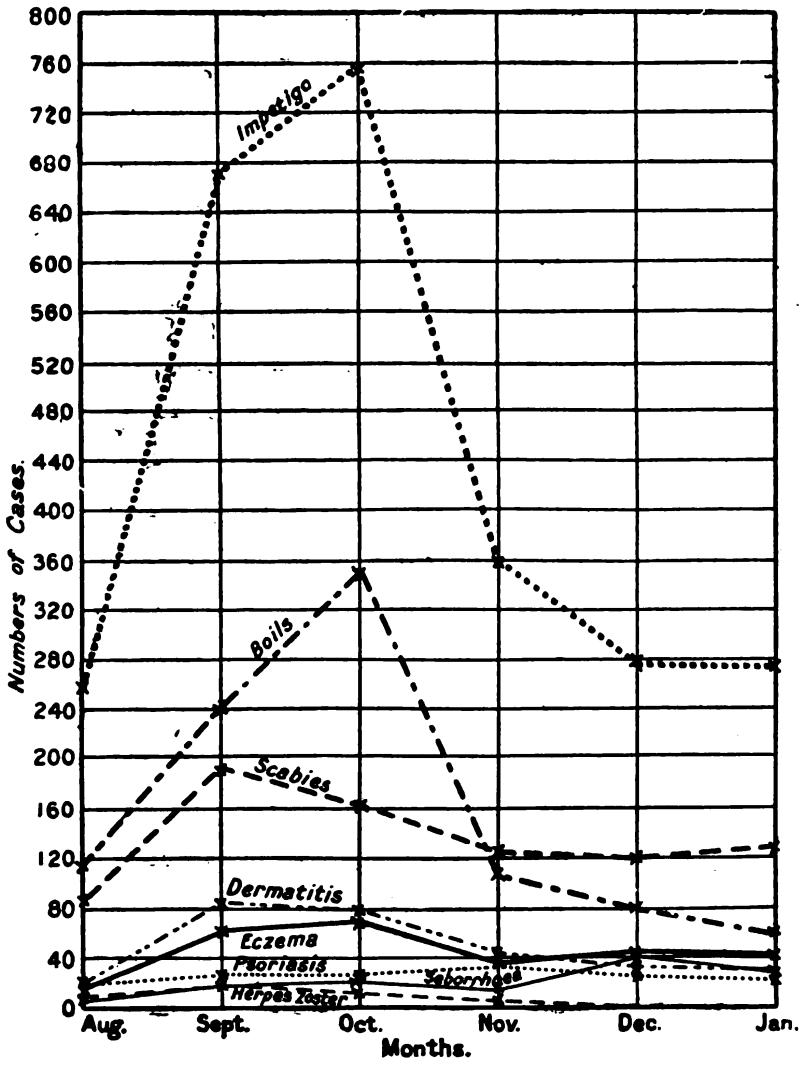


CHART I.

Admissions to Hospital B, representing graphically the more important groups.

greater number of admissions. Of these, 65·9 per cent. can be directly attributed to scabies. From this it follows that if it were possible to prevent or give early treatment to this disease, a very large number

of beds would be free for other purposes, and this holds true of very many hospitals both at home and abroad.

Opinion is not unanimous as to the best method of treating itch. Under conditions of active service, that is best which is most suitable for the majority, most easily carried out, and least expensive.[1] Any system to be effective must fulfil three conditions: Burrows must be opened to permit access of the parasiticide to the insect and ova; the parasiticide should be of such a nature as to destroy the parasite without producing dermatitis; finally, to prevent reinfection, contact clothing

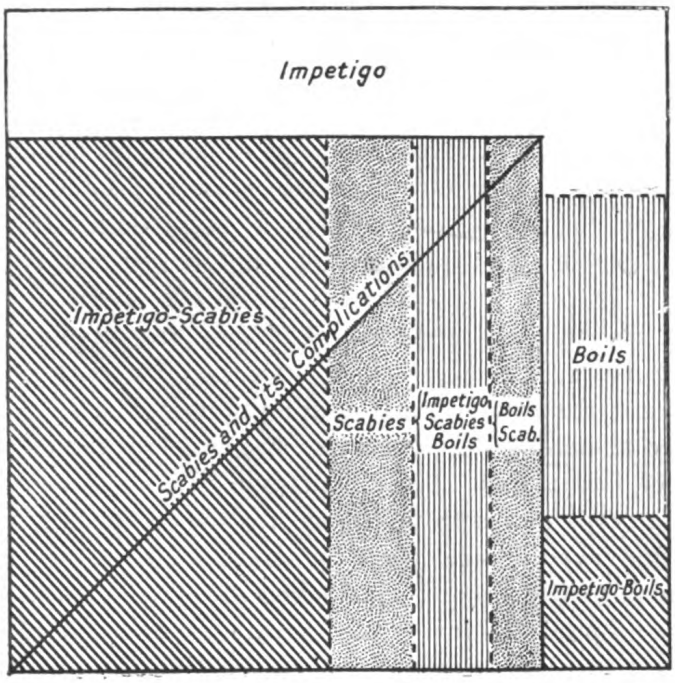


CHART II.

Analysis of 1,000 cases diagnosed as scabies, boils, or impetigo.

and blankets must be disinfected. The first of these conditions is achieved by a hot bath, soap and a soft brush; the second by the application of sulphur ointment twice daily for three consecutive days, and the third by means of any steam pressure or sulphur vapour apparatus. In this, as in any other system, to be effective it must be

[1] Ungt. β-naphthol co., 2 oz., cost 2¼d.; Balsam of Peru, 2 oz., cost 1s. 2½d.; Ungt. sulph., 2 oz., cost 1¼d.

thoroughly and conscientiously carried out. Showers and steam baths are unsatisfactory and almost useless. I have seen men coming from them with vesicles unopened. The sulphur is blamed for the inevitable failure in cases treated in this manner. To attain success, the ointment must be thoroughly rubbed in over the whole body below the neck. I have seen men applying it with trousers, puttees and boots still on; and again the failure is attributed to the application. For these reasons it is necessary for the soaping and the application of sulphur ointment to be superintended by a medical officer, or carried out by a skilled orderly.

Where pyodermic complications are so common, care must be taken to prevent cross-infection. Each man should have a separate portion of ointment. This is best arranged on a wooden shelf, beside which the patients stand. The photograph illustrates this point (fig. 1, p. 139).

Many other remedies have been used, such as balsam of Peru, β-naphthol, &c. None is universally satisfactory; some are too costly, others produce dermatitis, and for general use I do not think any plan superior to the one outlined, an old but a satisfactory method of treatment.

Experts are aware of the facts, but they are often overlooked by others, that many of the lesions of scabies still persist at the end of treatment, and that the remedy employed may itself occasion some slight degree of itching. Discovery of the acarus is the only absolutely certain proof that a man is still uncured. This test is useless when applied to the type met with in France, for the acarus is extraordinarily difficult to find, even in well marked untreated cases.

If these facts were more widely known, cured men would not be returned to hospital for further treatment, as so frequently happens; and the practice of continuing the application of sulphur ointment, for days, or even weeks, under the mistaken idea of obtaining a more thorough cure, would cease.

Brief reference should be made to the impetigo associated with scabies. Its distribution on the buttocks (fig. 2, p. 140) and frequently over the elbows and knees is very characteristic. This impetigo is of an ecthymatous type, and is caused by streptococcal infection; it is relatively common. Those unfamiliar with it are apt to overlook the primary scabies, which may be of slight degree. Its presence in no way contra-indicates sulphur treatment, which indeed often acts most beneficially. After the scabies has been cured, the same treatment is followed as for ecthyma elsewhere.

Other Skin Diseases.

Skin disease during war is not entirely made up of scabies and its complications; where large bodies of men are engaged it is natural to expect that other types, both common and rare, will be met with; the two following tables show the admissions into hospitals A and B where I have worked. The high figure given for impetigo is somewhat misleading, since it includes impetiginization following scabies and seborrhœa. I do not suppose among the 5,000 odd cases there have been fifty instances of true impetigo contagiosa.

Table I.—Admissions to Hospital A.

	1915		1916						Total
	Nov.	Dec.	Jan.	Feb.	Mar.	April	May	June	
Impetigo	122	172	151	161	220	170	147	116	1,259
Boils	24	59	50	51	42	36	65	48	375
Scabies	95	770	170	8	25	5	9	23	1,105
Dermatitis	7	10	10	11	11	8	8	7	72
Psoriasis	11	24	17	17	29	21	36	29	184
Seborrhœa	8	12	13	11	40	18	18	11	131
Eczema	7	22	18	11	37	22	33	31	181
Pediculosis	—	17	62	69	36	3	5	6	198
Erythema	3	7	5	—	4	1	—	1	21
Ecthyma	—	—	1	2	—	—	—	—	3
Pityriasis rosea	3	2	2	5	3	2	2	3	22
Folliculitis	1	11	13	9	8	2	5	1	50
Urticaria	2	4	3	3	2	11	8	1	34
Herpes zoster	2	2	2	—	3	3	1	—	13
Ichthyosis	—	—	1	—	—	—	—	1	2
Acne	6	22	19	12	8	6	10	7	90
Sycosis	4	2	4	1	3	2	5	7	28
V. D. S.	8	13	4	3	6	4	17	16	71
Carbuncle	2	4	3	1	4	2	1	2	19
Lichen planus	—	—	1	1	—	—	1	—	3
Sudamina	—	—	—	—	—	—	—	2	2
Erythema nodosum ...	—	—	—	—	—	—	—	2	2
Lupus	—	—	2	—	—	3	2	2	9
Erysipelas	—	—	—	—	1	--	1	2	4

The primary impetigo corresponds to an ecthyma, in the sense employed by Sabouraud—i.e., a dermic impetigo, of severe type and long duration. The legs and thighs are most frequently involved; sometimes the disease is very widespread, almost universal. The elementary lesion consists of an ulcer often astonishingly deep, covered

over by a thick black crust; if this be pressed upon pus can be freely squeezed out along the edges. A surrounding red halo marks the active extension of the process; indeed, when the crust has been removed a platinum loop can usually be passed under the skin for some distance, and this undermining makes treatment particularly difficult.

TABLE II.—ADMISSIONS TO HOSPITAL B.

	1916					1917			Total
	Aug.*	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	
Impetigo	268	729	849	388	305	287	444	655	3,925
Boils	129	258	396	116	85	62	130	168	1,344
Scabies	92	223	201	54	135	143	183	161	1,192
Dermatitis	21	91	92	54	44	42	67	61	472
Psoriasis	24	40	34	41	38	32	52	46	307
Seborrhœa	7	24	25	19	46	34	70	69	294
Eczema	22	69	83	41	48	52	62	76	453
Pediculosis	8	14	8	14	13	8	14	4	83
Erythema	—	3	2	8	2	5	1	1	22
Ecthyma	—	—	2	3	3	—	1	3	12
Pityriasis rosea	—	2	9	2	4	1	—	3	21
Folliculitis	—	1	1	—	1	2	1	2	8
Urticaria	3	9	11	15	5	6	5	2	56
Papular urticaria ...	2	—	—	1	—	2	—	—	5
Herpes zoster	11	20	19	6	2	3	8	8	77
Ichthyosis	—	—	—	4	1	3	5	3	16
Acne	4	10	11	6	7	5	9	7	59
Sycosis	3	11	5	3	4	10	5	9	50
V. D. S.	5	9	8	3	6	11	6	7	55
Carbuncle	22	26	43	6	1	—	1	6	105
Lichen planus	1	1	—	1	—	—	—	—	3
Sudamina	—	—	—	2	—	—	1	—	3
Lupus vulgaris and scrofulodermia	2	2	2	2	—	2	3	2	15
Erysipelas	—	—	2	—	—	—	—	—	2
Ringworm	4	1	1	1	3	5	5	5	25
Hyperidrosis	2	1	—	—	—	—	—	—	3
Hyperkeratosis—palm ...	1	—	—	—	—	1	—	—	2
Rosacea	1	—	—	—	—	1	—	—	2
Alopecia	—	—	1	—	—	—	1	—	2
Lupus erythematosus ...	—	—	—	1	—	—	1	—	2

* From August 9.

From the lesions it is possible to obtain a streptococcus, usually with ease, and, as might be expected, this is of the fæcalis type. Captain Henry, R.A.M.C., kindly examined strains from three different cases.

In Cases 26 and 28 two varieties of streptococci were found. Below are given their cultural characters :—

		Broth	Agar	Milk
26	Type A	Turbidity	Diffuse	A
	Type B	Flocculent	Diffuse	A and C
27		Turbidity	Diffuse	A and C
28	*a*	Turbidity	Diffuse	A and C
	b	Flocculent	Diffuse	A (and C)

On sugars, the following reactions were obtained (five days' growth) :—

	Saccharose	Lactose	Raffinose	Inulin	Mannite
26*a*	++	++	++	−	(+)
26*b*	++	++	+	−	++
27	++	++	−	−	+
28*a*	++	++	(+)	−	+
28*b*	++	++	(+)	−	++

These reactions correspond to the fæcalis type and exclude such forms as pneumococcus or pyogenes.

The following series of photographs illustrate fairly well the more typical forms of this primary ecthyma.

The first shows both active lesions and pigmentation about the knee. Onset six weeks before admission ; another forty-one days in hospital were required to effect a cure (fig. 3, p. 141).

The second illustrates the condition as met with on admission to hospital ; the disease having been present fourteen days. Extensive crusted lesions are shown and the erythematous halo is visible around the more active sores. This man was cured after twenty-nine days in hospital (fig. 4, p. 142).

The third case, although apparently similar to the previous one, shows how resistant the disease may sometimes be. The patient remained sixty days in hospital and was then evacuated to England, still uncured. The reason for the obstinacy of some cases I have been unable to determine (fig. 5, p. 142).

In many cases marked pigmentation, and often scarring, are left behind. This is shown in the following photograph, taken when the disease had been present six weeks, and two weeks before complete cure (fig. 6, p. 142).

Not infrequently the disease is followed by papillomatous or warty growths having a slight resemblance to verrucose tuberculosis ; a photograph of this condition affecting the knuckle (fig. 7, p. 143), and

a painting of a similar lesion on the buttocks (Plate I), are shown. These growths may occur after any form of ecthyma, either primary or secondary to some other condition such as scabies, as in the painting. They are not uncommonly found on the eyebrows, neck, or chin, following impetiginized seborrhœa, in those situations.

The next three paintings serve further to illustrate the appearances of ecthyma. They show healing lesions with pigmentation (Plate II), a recent sore surrounded by an angry halo indicating progressive streptococcal undermining of the adjacent skin (Plate III), and an intermediate stage where the process has been arrested, the halo then fading to a dark purple-red colour (Plate IV).

The above series of photographs and paintings serve to indicate the course and aspect of primary ecthyma. Since it originates on the legs, and is associated with *Streptococcus fæcalis*, it is justifiable to assume that it begins by some slight abrasion or scratch becoming infected with soil or water which has been contaminated with excrement. It would appear to be rare among troops fighting in the clean sand of the desert. Captain Barber, R.A.M.C., did not meet with such cases when in the East. Although it is to some degree increased by scratching, and the friction of garments, the disease is in no sense self-inflicted. One soldier made an attempt to copy it. He had been discharged cured of some other complaint, but, wishing to return to hospital, produced a condition seen in the next photograph; the fraud was obvious (fig. 8, p. 143). Taxed with his fault, he confessed deception, and is now I hope distinguishing himself in another manner.

Treatment is difficult; healing is slow and tedious, and new lesions appear in the most disappointing manner. The employment of fomentations is indicated at the beginning; they act, I suppose, by bringing up reinforcements of antibody—certainly at this stage no local antiseptic applications can affect the burrowing and undermining streptococci. Fomentations should be continued for a few days only and then perchloride dressings used so long as the skin will stand it. Recently I have found that painting with 3 per cent. silver nitrate in sweet spirits of nitre has an extraordinary and in some cases almost specific action, either alone or in combination with the above treatment. Its action in coagulating albumin dries up the sores and in this way limits infection. I may add that I have tried both autogenous and stock streptococcal vaccines with little if any benefit.

The next type of impetigo, a linear variety, was independently noted both by Captain Small and myself before we became associated.

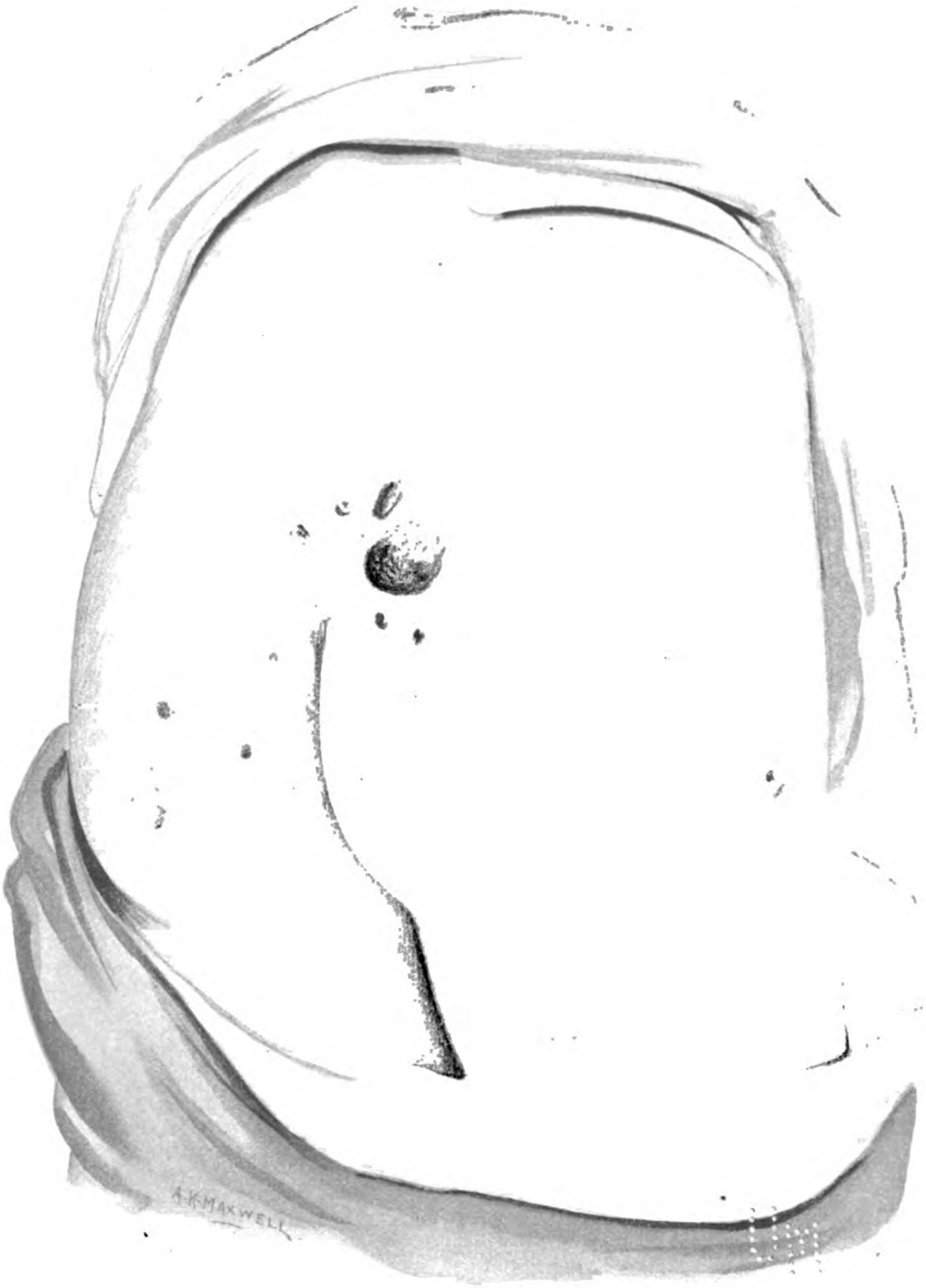


Plate 1.—Painting of buttock showing ecthyma, and one warty growth secondary to ecthyma.

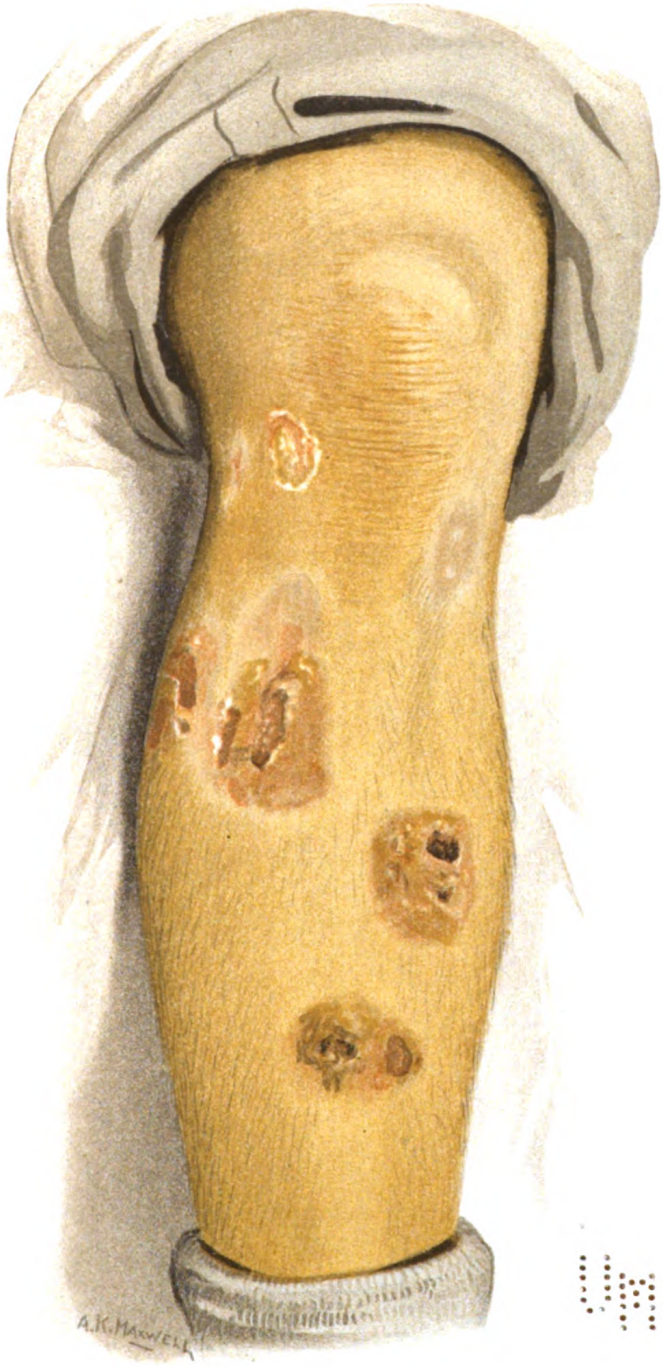


Plate II.—Ecthyma: healing lesions with commencing pigmentation.

It is fairly common, and characterized by the presence of longitudinal lesions. As in ordinary ecthyma the legs are chiefly affected. The earlier stage is represented by tiny lines of grouped blood-crusts; ulceration follows, the condition then pursuing a course similar to the ecthyma just described. The next three photographs (figs. 9, 10, and 11, pp. 144-45) illustrate pretty well the early and late appearances of this condition.

The third photograph is of a patient who admitted to three similar attacks during nine months. The sensibility of the palate was considerably blunted, and this condition, associated with a slight degree of patchy anæsthesia of the legs, is fairly common in these cases. Too much stress should not be placed upon the palatal phenomenon, for I have found this change frequently present amongst soldiers who have been under fire for any length of time. Whether linear impetigo should be classified as an artefact or not, I am in doubt; its course and appearance closely correspond to such a condition, although its occurrence in males is contrary to the general rule; on the other hand, the war has occasioned types of neurosis unknown in civil life. I am inclined to consider this condition of linear impetigo as a combination of traumatism and secondary infection.

Seborrhœa.

The next important disease, seborrhœa, has given more trouble and proved more resistant to treatment than any other class of cutaneous affection met with in the Army. Since relapse is so frequent it would appear that many of these men are only fitted for employment in some special capacity. The following case is selected to illustrate the typical features and course of this complaint:—

Private D., aged 29; two years' service. Civil occupation, farm labourer. He states his scalp has always been scurfy. Present attack, the fifth, began two months before admission. The scalp and body were affected to a considerable extent. On the head three phases could be distinguished—impetiginized areas on frontal regions and ears, eczematization of occiput, vertex and frontal regions; the rest of the scalp showed general dry seborrhœa and this was also present on the chest (back and front), shoulders, flexures of arms, pubis and thighs. I kept this patient in bed; he was put on a special diet with limitation of protein; he was dressed regularly. In spite of all this care, after he had been thirty-three days in hospital, so slow was progress that it was decided to send him to England; there he made a rapid recovery and will no doubt return to France, where in a short time the disease will break out again.

The diagnosis of seborrhœa is not always easy. When well marked, the characteristic distribution—scalp, eyebrows, beard, moustache—presents a picture easily recognized. The presternal and interscapular regions are also frequently involved, and "eczema" of the flexures is always seborrhœic.

The disease tends to pass through three phases, any or all of which may be represented. First, a dry erythemato-squamous condition. Secondly, eczematization characterized by the presence of weeping surfaces, usually limited to the scalp. Thirdly, from contamination with streptococci, a condition of impetiginization. This last phase may cause considerable confusion, the purulent areas or "stuck on" crusts bearing a striking resemblance to impetigo contagiosa. I shall refer to this later.

The following series of photographs are selected as examples of the types of seborrhœa met with.

The first shows impetiginized seborrhœa of the scalp and ears, with dry seborrhœa of the chest. This man noted the onset three weeks before admission. A streptococcus and *Staphylococcus albus* were obtained from the scalp by culture (fig. 12, p. 146).

Typical cases are illustrated in three other photographs of this disease. Since the histories are similar to those described above, no detailed account need be given (figs. 13, 14, and 15, pp. 147-49).

These photographs illustrate how severe a disease seborrhœa may become under service conditions. Most striking is the susceptibility of the affected individual to secondary bacterial infections. Streptococci and staphylococci appear to be invariably present; and a diphtheroid bacillus was found in five out of nineteen cases examined; morphologically it closely resembled the Klebs-Loeffler organism, even to the production of involution forms and beadings, but differed in its ability to ferment saccharose. It may only be a mere coincidence, but it is interesting to note that small epidemics of diphtheria were of common occurrence in the skin wards but in no other part of the hospital.

Among the nineteen cases examined, in three instances a curious Gram-negative coccus was detected both in culture and by direct examination. This organism fermented glucose, arabinose, and saccharose, and only grew at body temperature on agar.

In the light of these observations, it is not surprising to note that conjunctivitis, boils and impetiginization are such frequent complications of this disease. Sometimes a streptococcus plays a more serious rôle, producing severe adenitis of the neighbouring glands.

The resemblance of localized patches of this impetiginized seborrhœa to impetigo contagiosa is close and confusing. This is particularly true when the ears alone are affected, for in such cases a secondary seborrhœa of the meatus is set up with purulent discharge. A correct diagnosis is easily made from the history, for in these cases the ear discharge follows the skin affection and does not precede it, as in impetigo contagiosa associated with otitis media.

The impetiginization may also be localized to the chin, or eyebrows; a photograph is shown illustrating this (fig. 16, p. 149).

Treatment.

It is essential that the remedies employed in seborrhœa, especially the impetiginized form, should come into *intimate* contact with the affected skin surface; for this reason when the disease attacks the scalp this region must be shaved as a preliminary measure. The same rule applies to the beard and moustache areas. Although secondary coccal affection with impetiginization is so regularly present as a complication, treatment should be directed against the eczematous condition; indeed, it has been found that antiseptics, no matter how mild, almost invariably aggravate the disease. In the early stages calamine liniment acts admirably; the mode of employment is important. After the preliminary shaving lint soaked in this substance is applied to the head and face; not only does it allay the disease, but as it is of an oily nature crusts are at the same time softened and removed. The ears require particular attention. After gentle syringing of the meatus with boric lotion, pledgets of wool soaked in the liniment are packed into all crevices; soaked wool is also moulded behind the ear in such a manner that the skin surfaces are kept apart. The whole area is then covered with dry wool and bandaged, thus "splinting" and preventing movement. Later more stimulating remedies may be cautiously tried.

On the body, weak sulphur ointment and strong perchloride lotion have proved satisfactory; treatment of the disease away from the face presents no difficulty.

The striking resemblance of this condition to impetigo contagiosa tempts medical officers to use mercurial ointments, with invariable failure. The rapidity with which calamine liniment effects improvement in these cases is astonishing.

General tonic treatment is indicated; practically all these patients complain of feeling ill, and many have told me that the disease breaks

out after a preliminary few days of slight malaise. Most of them appear anæmic, and examination of the blood shows a slight degree of secondary anæmia. Two examples may be given:—

Sergeant R.: Red blood corpuscles, 4,200,000 per c.mm.; white blood corpuscles, 9,500 per c.mm.; hæmoglobin, 90 per cent.

Private B.: Red blood corpuscles, 4,526,000 per c.mm.; white blood corpuscles, 9,100 per c.mm.; hæmoglobin, 90 per cent.

The differential count shows no unusual features.

Other Varieties of Skin Disease.

A brief reference should be made to some of the other varieties of skin affections met with. During last summer pityriasis rosea assumed almost epidemic proportions. The type was peculiarly extensive, even affecting the extremities and face, and was usually accompanied with glandular enlargements. It was frequently followed by multiple pityriasic areas, and this sequela in many cases prolonged the course considerably. In a few instances the disease assumed an unusually acute form, characterized by extensive erythemato-squamous areas of trunk and limbs closely resembling seborrhœa. The discovery of the characteristic ringed desquamation enabled a diagnosis to be made.

A curious papular urticaria appears to be fairly common; its distribution—anterior axillary folds and abdomen chiefly—together with the associated itching, produce a picture closely mimicking scabies. The course is different; it tends to subside spontaneously after a few days; relapse is frequent. Sometimes it may be associated with definite wheals which clearly point to its nature, and this observation was confirmed by a series of sections of the papules. It is not common in base hospitals, being more often found in those institutions where scabies is treated. Apart from its resemblance to scabies it is of no consequence.

As has been seen from the tables of admission, psoriasis accounted for 494 cases. The type met with was severe, almost invariably affecting the scalp. Chrysarobin proved most effectual in removing the disease from the body, and although extensively employed has occasioned no ill-effects. While obtainable resorcin was employed for the scalp; latterly salicylic acid has been used as a substitute.

Now, although psoriasis cannot be said as a rule to affect the soldier's health or prevent him from carrying out his duties, it is

desirable to treat this disease for two reasons. In the first place, so long as it is present he has a ready excuse for "going sick." Secondly, his comrades imagine the disease is syphilis and resent his presence among them.

Although special hospitals are provided for the treatment of syphilis, 126 men with this disease have been received. These have been mainly tertiary or have presented unusual or difficult secondary manifestations. When non-contagious—that is to say tertiary—they have been kept. I do not think any harm results from this procedure. When late manifestations are found in the skin, I have never discovered the presence of nervous or vascular lesions, and I think the opinion held in many quarters may be accepted as a general rule that patients with skin gummata never develop tabes, general paralysis of the insane, or aortic regurgitation. Of course, where the tongue is involved the outlook is entirely changed, and some form of intensive treatment should be adopted.

Before ending I should like to say a few words upon the organization of a skin hospital in France. Let it be remembered that a large part of the treatment has to be carried out by orderlies, unskilled in this particular work; that many of the sisters possess no special knowledge of skin diseases, although their general training enables them to become rapidly expert, and that the services of few dermatologists are available. Each medical officer has about 300 cases under his care, and about fifty cases are allotted to a sister and orderly, with additional help.

To meet these difficulties the hospital was divided into sections, to which special dressing and barbers' tents were allotted. The patients bring to these the medical officer's instructions written on special treatment forms; this is signed daily by the sister or orderly, thereby checking and ensuring regularity of attendance; otherwise some men are apt to neglect their dressings. Each medical officer pays a daily visit to his wards, but the work of diagnosis and prescription is carried out in a special hut. Here a man comes on arrival and returns at regular intervals, according to the needs of the case. This plan enables each medical officer to deal thoroughly with a large number of patients which would under any other system be difficult or impossible.

In the arrangement of all these things I have had the greatest help and consideration from the responsible authorities. Looking back on the early days when with two colleagues I sat shivering in a tent the sides of which had to be open to permit of a little light, with snow or

rain descending upon us, I am more than thankful for things as they now exist. I remember with horror the well-meant but trying efforts of the orderlies to whom one ointment or lotion seemed as good as another. But all that is now changed. We have a staff of expert dermatologists, we have trained and expert orderlies, and the routine of the hospital proceeds in a regular and methodical way. The establishment of this special centre is, I believe, due to the foresight of the Director-General of Medical Services. Its results have already justified its existence.

It would be ungracious to conclude without expressing my gratitude to Colonel Copeland, my Commanding Officer. His sympathetic assistance and advice have been of the greatest value. It is not everyone who is able to appreciate what may be done for men with skin complaints, and how considerable a number of them can be quickly returned to duty. They are not merely "uninteresting cases." There is not perhaps the glamour and excitement associated with their treatment that some appear to derive from attendance upon wounds. Surely they have suffered for their country as much as others; surely it is our duty as well as our privilege to give them of our best without stint and without reserve.

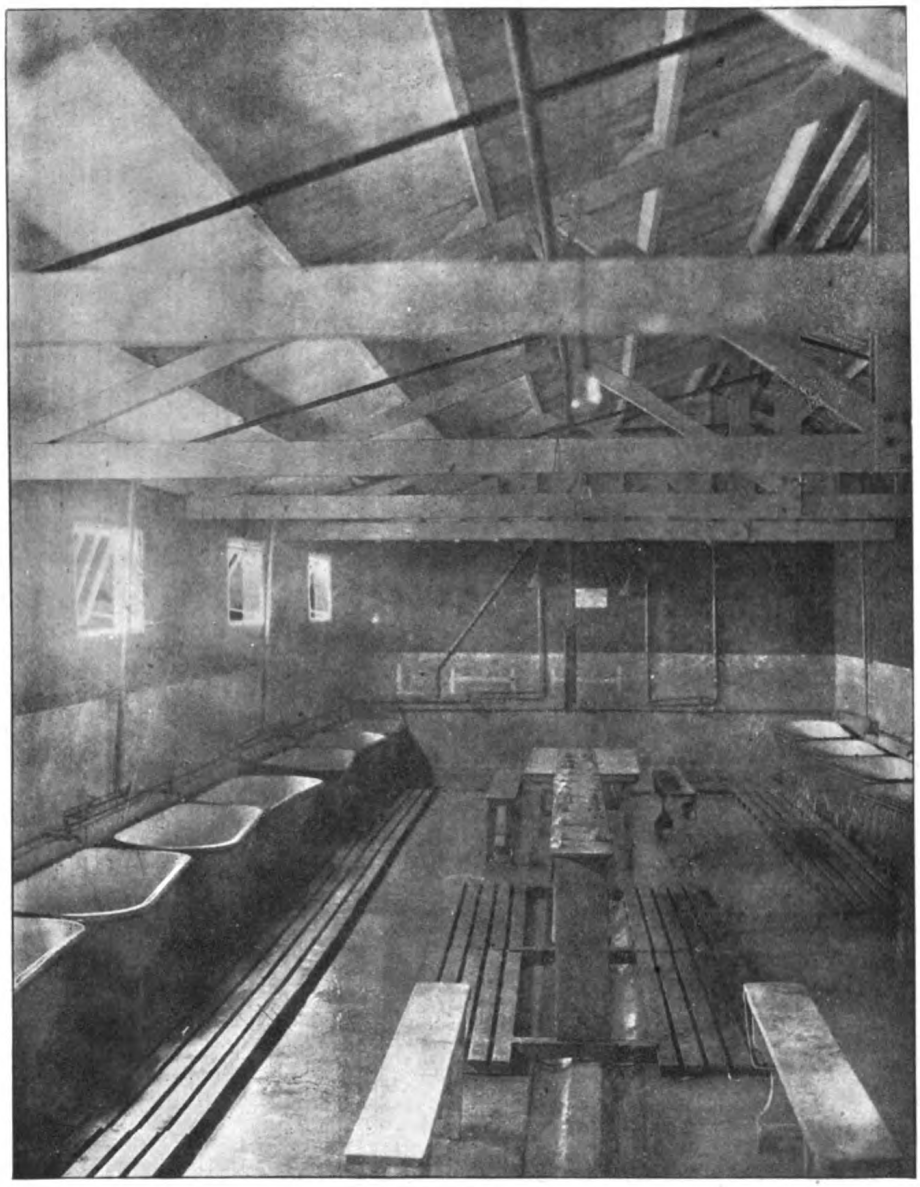


FIG. 1.

Treatment room for scabies.

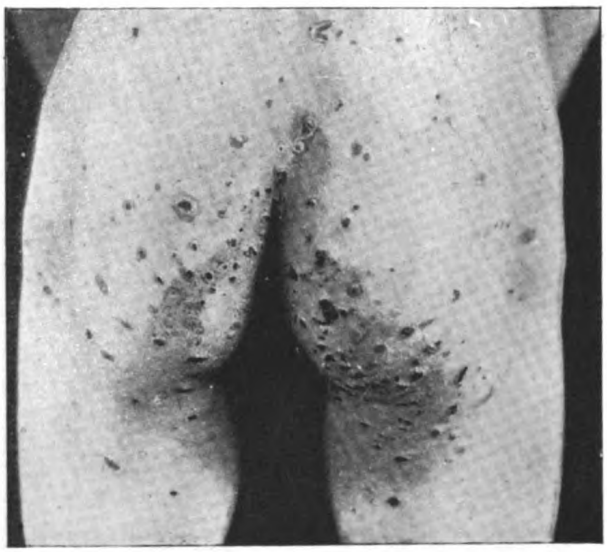


FIG. 2.

Photograph illustrating characteristic buttock distribution of impetigo, secondary to scabies.

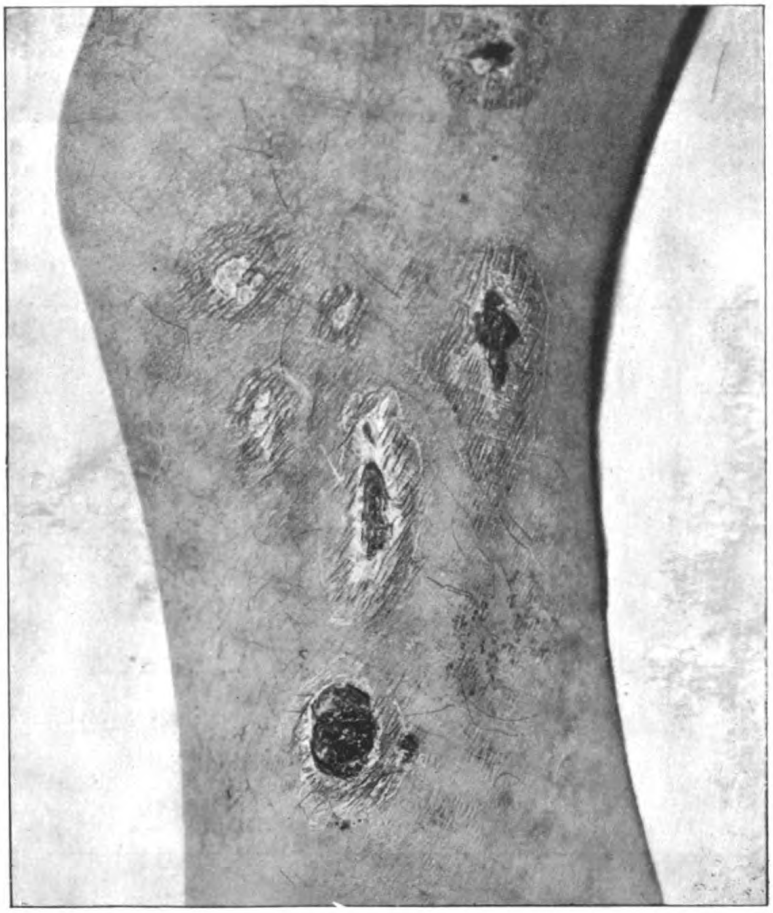


FIG. 3.

Ecthyma – active lesions and pigmented areas.

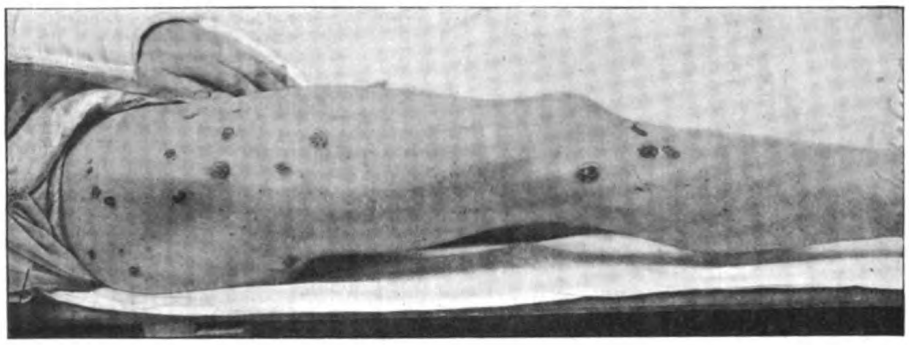


FIG. 4.

Ecthyma.

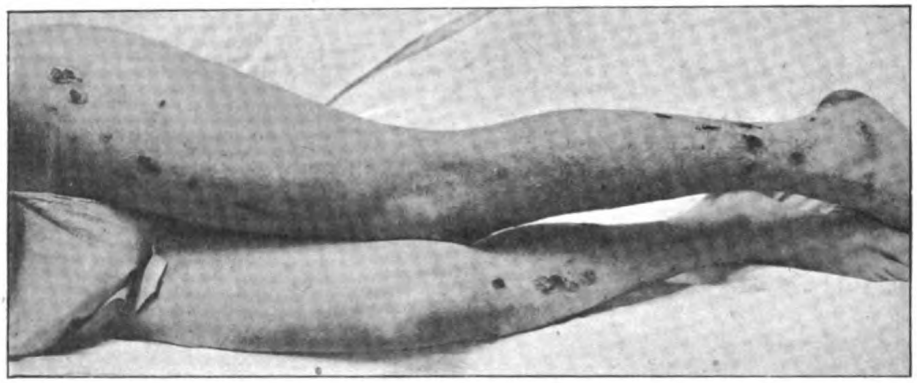


FIG. 5.

Ecthyma—uncured after sixty days in hospital.

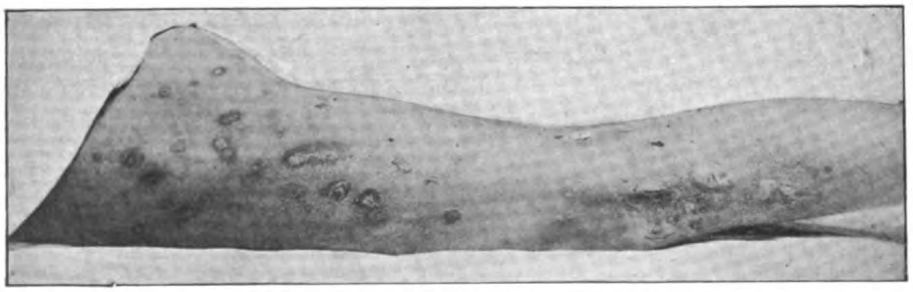


FIG. 6.

Ecthyma—late stage, showing pigmentation and scarring.

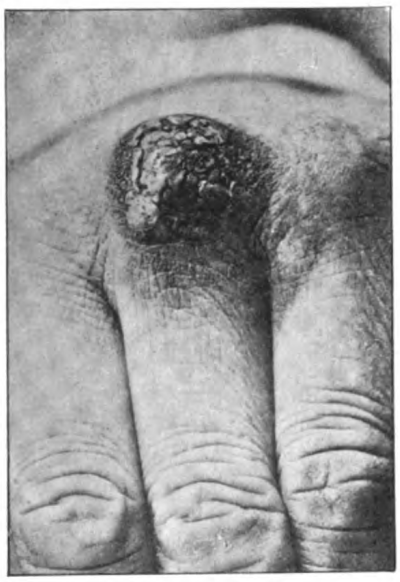


FIG. 7.

Warty condition following ecthyma.

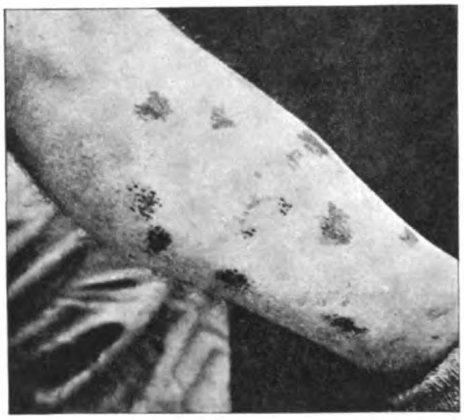


FIG. 8.

Photograph showing result of attempt to imitate ecthyma.

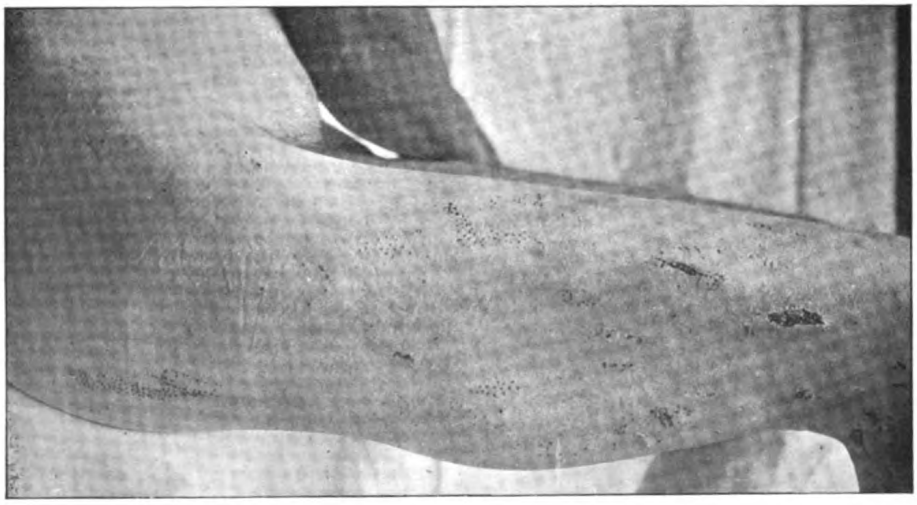


FIG. 9.

Early linear impetigo.

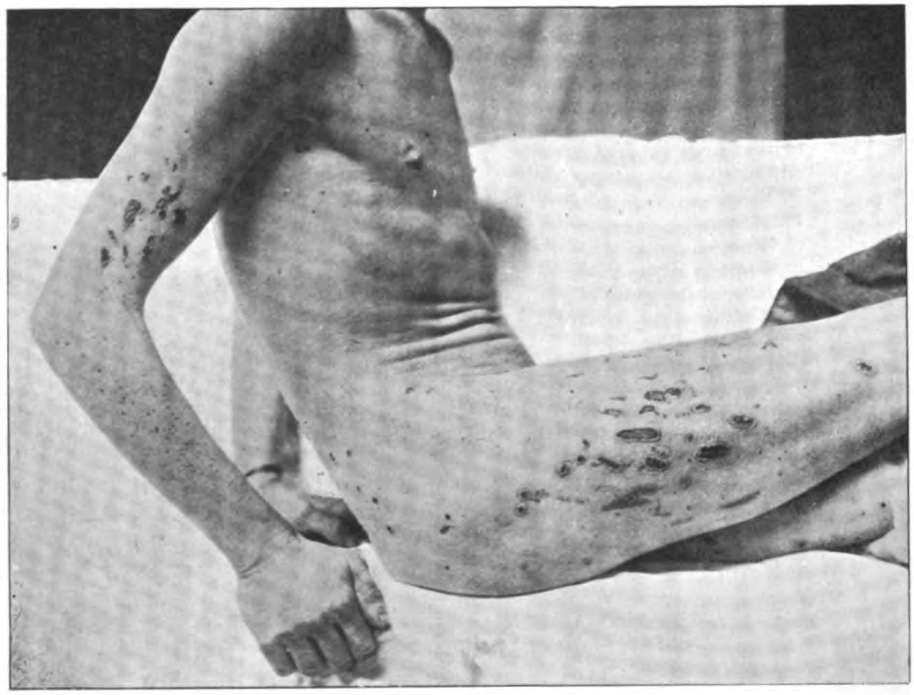


FIG. 10.

Linear impetigo—late stage.

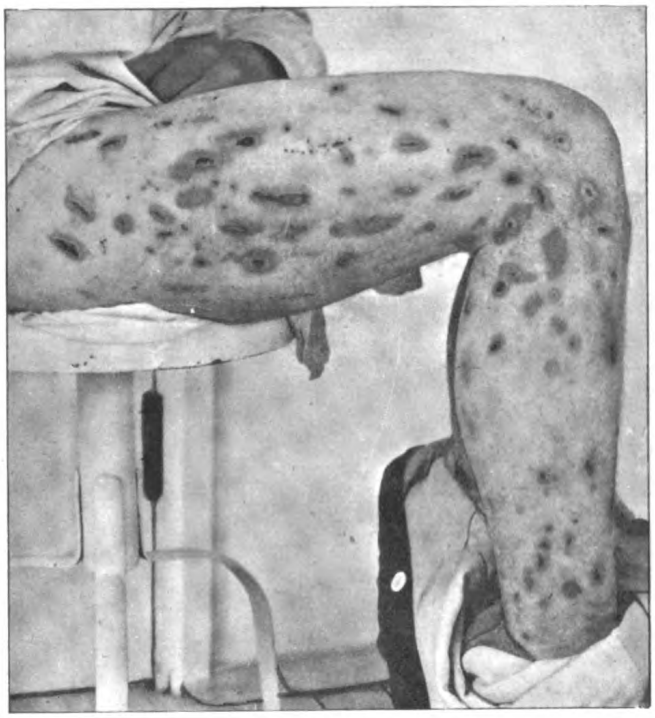


FIG. 11.

Linear impetigo—late stage.

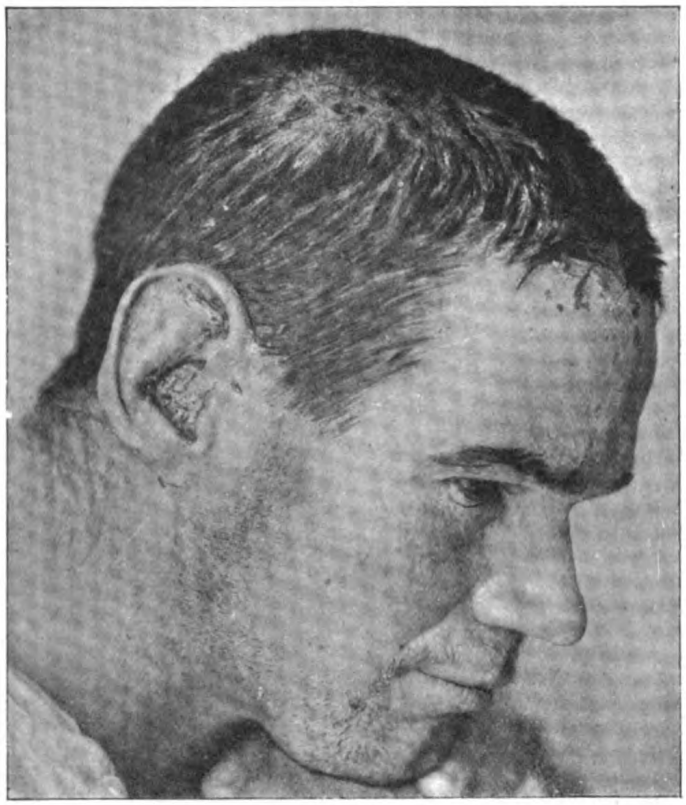


FIG. 12.

Impetiginized seborrhœa, chiefly affecting ears and scalp.

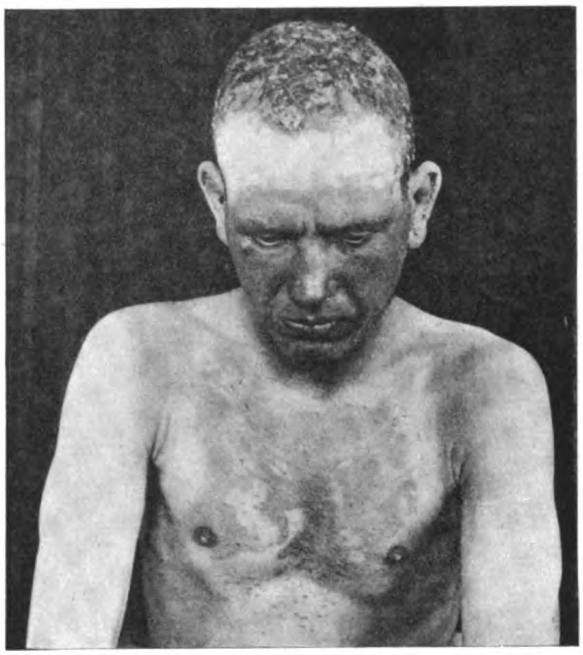


FIG. 13.

Impetiginized seborrhœa of scalp and "dry" seborrhœa of presternal area.

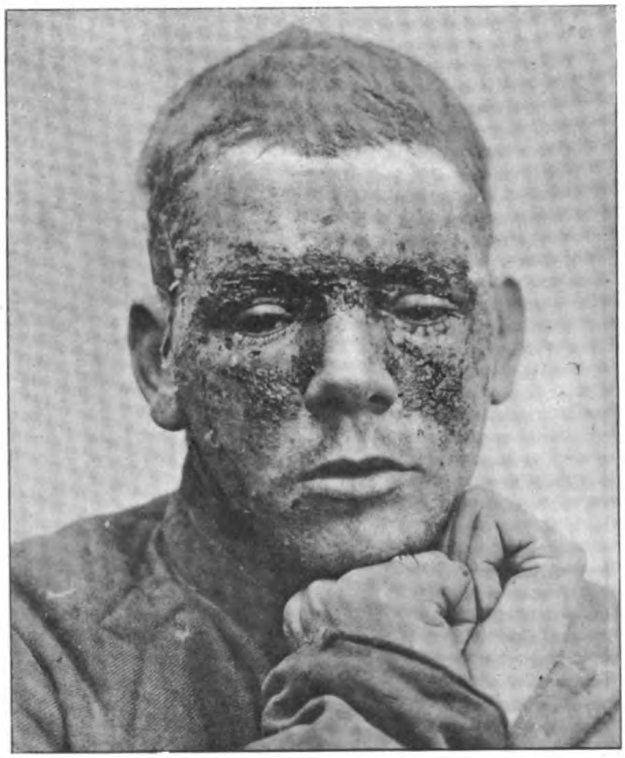


FIG. 14.

Impetiginized seborrhœa—eyebrows distinctly affected.

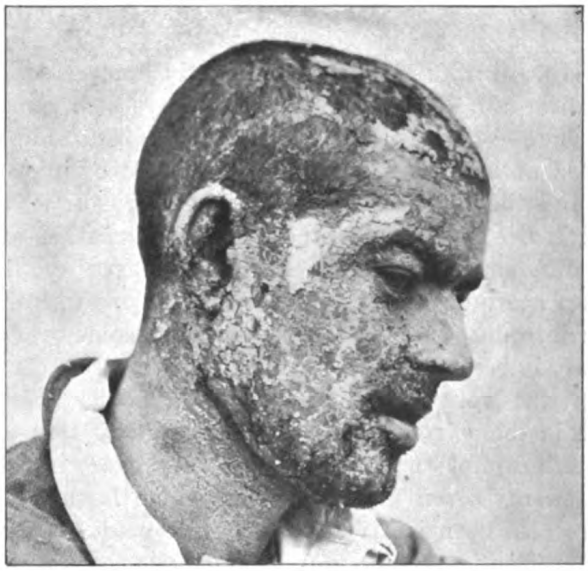


FIG. 15.

Severe impetiginized seborrhœa of scalp, face, &c.

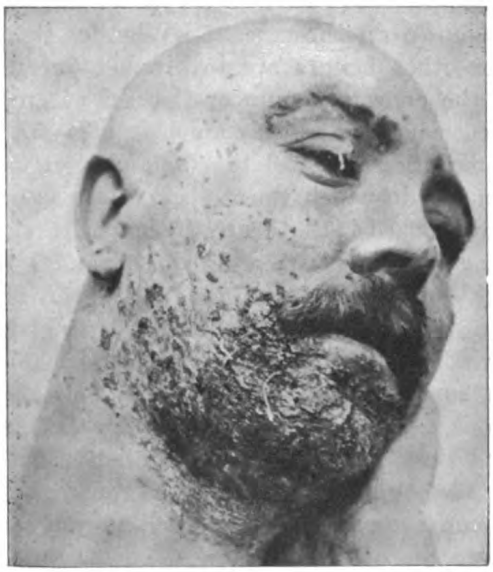


FIG. 16.

Photograph illustrating resemblance of impetiginized seborrhœa to impetigo contagiosa.

DISCUSSION.

Dr. J. H. SEQUEIRA: I was particularly interested to hear Major MacCormac confirm an observation of my own — also experienced, I am sure, by many here — namely, the difficulty in diagnosing some cases of scabies contracted abroad, especially in the absence of inter-digital burrows and of itching, and the difficulty in placing the acarus under the microscope. Dr. Pringle and I discussed, some time back, the question whether we were dealing with a different kind of scabies in these cases, and I have heard it suggested that an acarine parasite, probably of rat origin, from the trenches, might have been introduced by the troops who have come over to this country. I was also greatly interested in the ecthyma and impetigo cases. Those who have been doing war work will appreciate the difficulty there is in treating these conditions in many soldiers. I have under my care a man who has been in and out of hospital with dermatitis and secondary impetigo for twenty-four out of the twenty-seven months during which he has been serving his country. I have also been instructed on another point—namely, with regard to the failure of antiseptics to cure many seborrhœic cases which have become impetiginized. It is interesting to know that Major MacCormac's experience confirms my own as to the efficiency of calamine liniment after fomentation in this type of case. Another point I would mention is that these impetiginized seborrhoids have been unusually common and severe among the civilian population during the past autumn and winter. In my women's ward I have had cases which almost approximate to the type of impetiginized seborrhoids we have just been shown on the screen. Whether the infection has been imported or whether other factors are involved I am unable to say. An important matter is the enormous number of cases of groin ringworm which are coming under treatment, particularly amongst officers. One would like to know that proper precautions for isolation and disinfection are taken in the hospitals in this country in which these diseases are so prevalent. One fact which must not be overlooked is that many of the patients, particularly officers, are afraid of reporting that they have groin ringworm. I recall an experience of my own, in which I was asked to see a patient, an officer who had seen service in India, who was in a private hospital. After he had been in hospital a few weeks, he developed what he recognized as "dhobie itch," and I was asked to see him in consultation with the medical officer. I suggested that it would be wise to look round the ward for other cases, and in that ward of twenty beds I found three other cases, the patients having been afraid to mention the matter, as they thought it might be venereal, and that they would get into trouble in consequence. I think a large number of cases of groin ringworm, such as we see over here, are hidden for the same reason, and it should be the duty of the medical officers attached to hospitals, at any rate on this side, to examine all patients, and not wait until they are informed about this parasitic affection.

Dr. J. J. PRINGLE: I have been in close touch with Major MacCormac during the whole of the time he has been in France, and I have been cognizant of much of the work he has been doing there. I want, at present, to say only this about it, that the opportunities afforded me of seeing skin diseases amongst soldiers have convinced me that in practically every point Major MacCormac's observations are accurate and extremely valuable. Many of these soldiers have returned from France, but similar types arising in parallel circumstances in this country have been observed by me. With regard to what Dr. Sequeira said about ringworm of the groin, of course we all have seen an enormous amount of it. At the military hospital to which I am attached every officer and man is now examined for it on admission, and I think that ought to be a general rule in every military hospital, as the disease is immensely contagious, and obviously so in many different ways. I think it may not be without interest if I hand to you a French translation of the second edition of the book on the diseases of armies in camps, by Sir John Pringle, which translation was published in Paris in 1793. I have been unable to find, anywhere, a copy of the first edition of the book which appeared in 1752,[1] nor can I in this country find a copy even of the second edition. I am, therefore, proud and fortunate to possess, as I have all my life, this French translation of the second edition. It is very interesting to note in the chapter which deals with scabies, that the presence of "animalcules" in this disease had been observed, prior to 1730, by Dr. Bonomo who, on the ground of his discovery, advocated treatment of the itch by external remedies only.

Dr. G. PERNET: I am very interested to hear what Dr. Pringle has just said with regard to the historical part of this discussion, because the credit of having discovered the acarus has always been attributed to a Corsican named Renucci, who studied in Paris in the earlier part of the nineteenth century. It is also interesting to know that Napoleon himself suffered from itch in his campaignings. With regard to scabies in soldiers, the difficulty we had at the West London Hospital was in the adequate supervision of the treatment. It was often very inefficiently carried out by the patient whilst in the bath. These cases are now side-tracked to a military hospital. A point which is often lost sight of is the period of incubation of scabies, which is from three to six weeks. This may enable you to put your finger on the origin and source of the original scabies infection. With regard to pityriasis rosea, I have seen a few cases in men back from the Front, chiefly officers. The eruption was more severe than usual. I agree with Major MacCormac as to the difficulty of treating cases in which there are many impetiginous and bad pus lesions. These may hang fire for weeks. I have not, however, had under my care such severe cases as some of those which Major MacCormac has shown on the screen. I shall certainly try the 3 per cent. silver nitrate in sweet spirit of nitre in cases of that type.

[1] Pringle, Sir John, "Observations on the Diseases of the Army in Camp and Garrison. In three parts, with an appendix containing some papers of Experiments read at several meetings of the Royal Society," 8vo, Lond., 1752.

Dr. S. E. DORE: It is only possible, now, to deal with one or two points. With regard to the vapour treatment of scabies, I think the views of this Section were definitely expressed when the paper on the subject was read by Colonel Bruce. I suggest, however, that if the sulphur vapour treatment of scabies is of value, it might be more simply carried out by using an impermeable mackintosh bag, which could be tied round the neck, the patient being seated on a chair, and means taken to prevent the escape of the sulphur vapour after the fashion of a home-made Turkish bath, instead of the cumbersome and expensive wooden boxes. But I agree with the view expressed by the majority of speakers at that meeting, that the ordinary method of using soft soap baths and sulphur ointment, or the continental method of soft soap baths followed by Vleminckx's solution, is more likely to be of value in treating large numbers of soldiers. Sulphur, however, is not a *sine qua non* in the treatment of scabies. Beta-naphthol and balsam of Peru are equally efficacious, and can be used continuously without setting up a dermatitis. Beta-naphthol alone is apt to be painful, and I recently had an instance of this when I ordered the mixture at a military hospital and balsam of Peru could not be obtained; the beta-naphthol was so painful that its application had to be stopped, but when balsam of Peru was added there was no further complaint. I have lately seen several cases of scabies in which there has been a total absence of itching. The first was in a soldier who had a severe and typical attack of scabies, and was also suffering from shell shock. I thought that the shell shock probably accounted for the absence of itching, but since that time I have seen five or six cases of well-marked scabies, from which I have been able to extract acari, in which there was no itching whatever. I was surprised that Major MacCormac did not lay more stress on the subject of pediculosis. An officer from the Front told me that by wearing cotton underclothing and soaking an alternative set in petrol every day, it was possible to keep almost entirely free from pediculi. It has also been reported that the wearing of silk underclothing is inimical to the pediculus. Of course the supply of silk underclothing to troops is out of the question, but it is conceivable that something might be done by supplying a cheap continuous garment, with elastic material at the neck and arms, to protect the body mechanically from the ravages of pediculi. Major MacCormac mentioned that Captain Barber had not met with ecthyma in the East. I have seen a few instances of ecthymatous lesions in soldiers from Gallipoli; they were attributed by the men to slight injury by the scrub, and were termed "Dardanelles sores."

Dr. G. H.-H. ALMOND (Bath): Has Major MacCormac had any experience in the use of B.I.P. in the deep undermining ulcerations associated with ecthyma following scabies? I have seen cases of whitlow opened up freely, and the whole surface and pockets swabbed with spirit and packed with B.I.P., and then allowed to go for a week without dressing, the only further treatment being a little dusting powder. I have also seen other more superficial ulcerations treated successfully in the same way. And I can affirm that Mr. Forbes Fraser, from whom I received the suggestion, employs it

successfully in many conditions where the whole ulcerating surface can be reached. It occurred to me, when Major MacCormac was reading his paper, that this method might be well applied to the obstinate cases of ecthyma about which he spoke.

Dr. ALFRED EDDOWES: For a long time past I have been using for these rebellious cases of impetigo (particularly when they occur on the scalp), a little carbolic dissolved in spirit, and then applying boric acid fomentations. Probably the reason the carbolic and spirit lotion has been efficacious is that it gets at the undermined edges. I have sometimes found that, no matter how carefully one removed the impetiginous crusts on the scalp, they accumulate again in large quantity, but that when one cleaned them with spirit and carbolic, and then used boric acid fomentations, the cases did well. I have for many years advocated the use of spirit as an antiseptic. I do not believe in the long incubation period of scabies mentioned by Dr. Pernet. The results of infection might be seen in a much shorter period, sometimes in a few days.

Major GRAY: One question which does not seem to have been discussed is the administrative one. Major MacCormac suggests the establishment of a Corps scabies station. That would mean the setting up of a new unit in the field. I should have thought the matter could have been dealt with more simply if scabies treatment had been allotted to Divisional bathing centres. I believe that at the present time these are, more or less, in charge of Divisional Sanitary sections. The treatment of pediculosis has now become a routine matter under divisional arrangements, and there seems no adequate reason why the treatment of scabies could not be dealt with similarly. It would also be of advantage for the cases to be treated in the division, because they could then be kept under observation, while if the Corps scabies station were established this would not be possible. There is one point about seborrhœa which I should like to mention. Probably many of those people who have gone into camp in peace time, and who are subject to mild seborrhœa, have realized the very bad effect of even a fortnight of camp life on their seborrhœa. I believe that the cause of this exacerbation is the continuous wearing of a tightly-fitting cap on the scalp. The scalp sweats very much, especially in hot weather, and the organisms there grow very freely. Frequently at the end of the day there is irritation and scratching, and secondary pyogenic infection may be set up and spread in that way. After these conditions have been endured for months, very bad seborrhœa may arise if some means be not taken to control it in the early stages. I think that is the reason more cases of the disease are noted now than formerly.

Lieutenant-Colonel J. BRUCE (communicated): At the Skin Depot we receive cases of scabies and impetigo. The two are almost invariably combined—the man gets scabies, he scratches; the wound or abrasion becomes infected, and he develops an impetiginous condition. A "clean" case of scabies is rarely seen—generally there is much crusting. The sites in order of frequency and of severity of the impetigo are the buttocks, elbows, legs, wrists, thighs,

penis and scrotum. The lesions vary in size from a pin's head to a walnut. Large crusts are heaped up on an inflamed base, and removal of the crusts shows a raw oozing surface. In many cases there is a deep pit or depression. Crops of small boils are frequent. The clothing is filthy in most cases, and lice are frequent. All cases, whether of scabies or impetigo, are first put through the sulphur cabinet (recently described by me at a meeting of the Dermatological Section). If no impetigo complicates the case—which is seldom—the patient is sent back next morning to his unit. All clothing, kits, boots, blankets, &c., are passed through a Thresh disinfector, or through the sulphur cabinet if they are liable to be injured by heat. The impetiginous cases are next taken in hand and dressed daily. We have tried various forms of treatment for this condition, and find that a mild mercurial ointment combined with zinc oxide gives the best results (hyd. am. chlor. 5 gr., zinc ox. 30 gr., vaseline 1 oz.). Iodine we found useless. Solution of picric acid in sp. vini meth. has been painted on surrounding skin to harden it and render it less pervious. Scales are removed with olive oil. Deep cavities are filled up with B.I.P., after cleaning with carbolic lotion and sp. vini meth. and left for three or four days, when a healthy granulating surface is found, which soon heals under the mercurial ointment. When the impetigo is cured, we give the patient another bath in the sulphur cabinet to destroy any re-infection with scabies from fresh cases, as it is very difficult to keep the patients separate in the camp, and then discharge to duty. The sulphur vapour treatment of the scabies is proving successful, but the impetigo is our great obstacle to rapid evacuation of cases, and if the meeting can suggest any method of treatment not entailing too much dressing (as dressings are scarce) which will give rapid results, I shall be glad to hear of it. Many cases have to be kept in from four to six weeks. The treatment by fumigation has reduced our average number resident from troops in this area by one-half. There are two administrative difficulties with which we have to contend: (1) Malingering. After a man has been returned to his unit he may complain to his medical officer of itching, and point out his old scars of impetigo, which perhaps have become irritated by friction with clothes. The medical officer then sends him down to a Field Ambulance, and back he comes to us— often with no signs of scabies. We have also had more than one instance of men in the skin depot rubbing their impetigo spots to prevent them from healing. (2) When a unit is in rest billets for four days the men have blankets issued. These are collected when that unit goes for its spell of duty in the trenches. In the trenches men report to the medical officer that they are suffering from scabies and impetigo, and they are sent back to the skin depot. There is no possibility of getting their blankets. They are re-issued to other men when the unit comes out to rest. The dirty clothing of the men is one of the main factors in causing the impetigo—the primary irritation being due either to scabies or lice.

Dr. AGNES SAVILL: Zinc ionization is well worth trying in these cases of inveterate impetigo. I say so because we have had in our hospital cases of wounds in which, after the wounds have healed, skin areas, moist and slightly

undermined, and most resistant to treatment, have been left behind, found to be due in all cases to streptococcal infection. No matter what the surgeon tried, the skin area would not heal, and the cases were handed on to me. Usually they yielded in a week or two to zinc ionization. You cannot use it, of course, if there are many separate impetiginous patches on limbs; but if it is a question of invalidism for months, or even for years, the ionization is worth the trouble involved. The limb might be put in a bath, with copper or zinc sulphate, 2 per cent. solution, and the positive pole attached. In whitlows salt in a positive bath is very efficacious. Internally, 20 minim doses of dilute sulphuric acid, thrice daily, is the best remedy I know for pustular skin conditions.

The PRESIDENT: The author hardly mentioned tuberculosis cutis. In civil practice we see a large number of men who have been in France and elsewhere and who are subjects of that disease: some slightly and some extensively. The point is always being raised as to whether men suffering from lupus at all should be accepted for active service. If the disease is extensive over the face, there can be no question about it. But men are, not unnaturally, inclined to take refuge under the impression that tuberculosis of the skin is much more serious to other persons, in the matter of contagion, than it really is. It is a matter of considerable importance, and one which, I think, should be settled definitely. I should like to ask also about so-called tinea of the beard, which I do not think was mentioned. In civil practice we see much of this, and I should have thought it was fairly frequent in the Army, owing to the conditions in which the men live. I take it the author has not met with erysipelas during the time he has been in France. If that be so, I think we may congratulate him, and others, on the success of the campaign. [Major MACCORMAC: I have seen it, but only in a limited number of cases.] What are the plans adopted for the carrying out of the detail of treatment? Major MacCormac said in his paper that the men were helped in the rubbing. One or two members have spoken as if a man can rub soft soap over the *whole* of his body—back and front—which, we know, is quite impossible. But one notices in London that orderlies and others are not always so ready to afford such assistance to the patients as they require, although it has been explained that there is no risk in the help they are asked to give. But I think patients themselves might be induced to help each other, for if this were done one of the chief difficulties of application would disappear. To prescribe is one thing, but to get the detail of treatment thoroughly carried out, at all events in hospital, is a very different matter.

Major MACCORMAC (in reply): Dr. Sequeira has asked if groin ringworm is common among the troops in France. There have been a few cases, almost all in men coming from Gallipoli or Egypt. Since every patient is completely stripped for inspection, it may be assumed that the condition has not been overlooked and that it is really of infrequent occurrence. The seborrhœic eczemas have assumed a proportion and severity unusual in civil practice. Dr. Sequeira has, of course, an enormous experience of skin diseases, but I do not think that, even among his large number of cases, such severe types can be

as common as they are in France. They are certainly very rarely observed at the Middlesex Hospital, and I do not recollect coming across them at the St. Louis Hospital in Paris.

Dr. Pernet spoke about the diagnosis of scabies. Of course, I do not intend to suggest that an expert dermatologist would experience any difficulty. My remarks were directed towards that medical officer who has no special knowledge of skin disease, and who is naturally puzzled by the unusual type met with. Over-treatment is very common; the practice of giving a supply of ointment to a man with instructions to continue using it until cured is responsible for many instances of severe dermatitis.

I am not quite sure from Dr. Dore's remarks whether he approves of the sulphur vapour apparatus for the treatment of scabies. A modification has recently come under my notice in which the man, with his clothing on, got into a bag into which sulphur vapour was pumped. This was supposed both to cure the disease and disinfect his clothing at the same time. The whole point about this form of treatment is that unless pushed to the extent of causing dermatitis, it fails to cure, and in fact, manufactures a class of "scabies carrier." No doubt balsam of Peru and beta-naphthol ointment will cure scabies, but their price is a great handicap. Balsam of Peru is listed at 1s. 1½d. for 2 oz. The same amount of beta-naphthol ointment in the form usually employed costs about 2½d. Contrast with this sulphur ointment at 1¼d. Where large numbers of men are to be treated, these differences in price amount to a considerable sum. I think the importance of pediculosis has been much over-rated. A great deal of attention has been given to this question without any very striking results. Since it is almost universal at the Front, whereas ecthyma only occurs in a certain proportion of men, I do not think one is justified in assigning to pediculosis more than a rôle of modified importance, in the causation of this disease.

Major Gray suggests that Divisional baths might be employed in the treatment of scabies. Now, the whole point in having the treatment of this disease carried out by Corps Stations is that by this arrangement the personnel becomes fixed; this does not happen in a Divisional centre when it is, as it would be, staffed from a Division.

I quite agree with Dr. Savill that ionization would prove excellent for many of the cases, but where over 1,000 men have to be dealt with, each man presenting multiple lesions, the amount of time required makes such a form of treatment impossible.

In reply to the President's questions, I may say that we get a few cases of lupus, but unless extensive or obviously getting worse, we do not deal with them, as it is impossible to detain such men in hospital sufficiently long for thorough treatment. Quite recently a number of men with beard ringworm have been met with. They all came from mounted branches, such as cavalry or artillery. On the whole, beard ringworm and erysipelas have been rare. In treating scabies, the patients are treated in pairs; each man helping the other to rub the ointment into inaccessible regions. An orderly superintends and assists in the rubbing.

Section of Dermatology.

President—Dr. J. H. Stowers.

(*June* 21, 1917.)

Case of Maculo-anæsthetic Lepra.

By George Pernet, M.D.

The patient is a man aged 52, who had been to West Africa for fifteen years at intervals, staying there, on the Gold Coast and up country for a year at the time. About two years ago a small round spot appeared on the middle of the left cheek and gradually enlarged centrifugally. It is now about the size of a florin. A year ago the left elbow became affected, where a large oval patch involving the lower part of the right arm can be seen. It presents an incomplete ribbon-like border of a pale bluish-violaceous tint enclosing an area that is paler than the normal skin beyond and very slightly atrophic to the eye and to touch. In the early stages this area was painful (hyperæsthetic) when he knocked the elbow. But when I saw him first on March 6, 1917, the area exhibited distinct anæsthesia to usual tests, and also dissociation of sensation to heat and cold. There are also small circular patches on the right side of the face, forehead, neck, forearms, buttocks and thighs. These appeared subsequently to the patch on the left elbow. The patient has also noticed numbness about the end of the left index finger. No definite swelling or enlargement about the ulnar, auricular and external popliteal nerves can be made out, but on rolling the left ulnar nerve under the finger at the elbow it was found to be numb. Additionally, the patient stated he had had a recurrent eruption of watery blisters over the left buttock, but I have not seen them myself. He has had malaria, and four years ago syphilis, which was treated by salvarsan by Dr. Dobson. About three months ago the Wassermann reaction, I am told, was negative.

The serum squeezed out from a likely patch about the neck was

examined (three preparations) by Dr. Sydney Graves, pathologist to the West London Hospital, but no acid-fast organisms were found.

The patient is under his own doctor, Dr. Leonard Dobson, who sent him to the West London Hospital for my opinion, and he is having on my recommendation chaulmoogra oil by the mouth and intra-muscular injections of benzoate of mercury. The patient has distinctly improved on this all round. He has lost the puffy swollen look of the face, the patches are paler, the elbow-area does not respond to tests quite as definitely as it did a little time ago (this may to some extent be subjective, I admit), and the general health has much improved.

DISCUSSION.

Dr. P. S. ABRAHAM: I agree with Dr. Pernet that this is an early case of leprosy. The lesions that the man shows, and the early history, quite fit in with that diagnosis. It is interesting to me that the man has come from West Africa, because leprosy is not common among Europeans there: I do not know of any European case which has come from West Africa. Among natives, of course, it is very common there as in most parts of Africa. The fact of not having found the bacilli in the early skin lesions is of no particular importance: Dr. Pernet has probably not looked for them in the nerve sheaths. Thirty years ago, at the Westminster Hospital, I had a case of a boy with apparently similar lesions; he was sent over from the West Indies by one of our best authorities on leprosy, the late Dr. Beaven Rake, who was under the impression that the disease was syphilis, not leprosy. Dr. Rake afterwards saw the boy with me at Westminster Hospital, and even then he adhered to that opinion. We could not find any of the bacilli in the scrapings from the erythematous patches. I put the patient under tuberculin, and he seemed to improve immensely, so that at the time I thought we were going to have a cure of leprosy by tuberculin. He subsequently went to a boarding school in the country, where the disease gradually developed, and the lad became so badly disfigured that we could not keep him in England. Dr. Unna, of Hamburg, then took charge of him, thinking he would cure him with baths of hydrochloric acid and other measures; but he did not; the boy became insane, and we had the greatest difficulty in getting him back to the West Indies. He died there, some ten years after the disease started. I advise Dr. Pernet to try gynocardate of soda, by injection, for this case. A case was seen by a member of the Section two years ago, and was diagnosed as a tuberculide of the face, the patient being an English lady who had for many years lived in India. Since coming home she has developed numerous small erythematous swellings on the face. I am sure it is leprosy, though I have not found the bacillus. She has improved very much under gynocardate of soda.

Dr. PERNET (in reply): I know of the gynocardate of sodium intravenous method advocated by Sir Leonard Rogers, but that we are holding in reserve.

(*June* 21, 1917.)

Cystic Rodent Ulcer of the Ear and Cheek.

By E. G. GRAHAM LITTLE, M.D.

THE patient is a man, aged 51, and his history is that while yachting off Morocco some six years ago he was bitten by some fly on the lobe of the right ear. There was swelling and much irritation immediately after the bite, and from this beginning developed the condition now shown. The lobe of the ear, the lower and anterior floor of the concha leading to the meatus and right up to its entrance, and the contiguous border of the cheek in front of the lobe are the seat of a continuous sheet of cystic elevations varying from the size of a split pea to that of a fine pinhead, the site so affected being very slightly raised above the level of the skin. At the lower end of the lobule, which is considerably swollen, the cysts are largest, and here there is further a small superficial erosion. There is also a deep induration underlying the portion of the affected skin on the cheek, a hard oblong swelling about $\frac{1}{2}$ in. by $\frac{3}{4}$ in. in size being felt here. There are no subjective sensations in connexion with these lesions, but bleeding from the small ulcerated area is somewhat free at times. There is no glandular enlargement in connexion with the site affected.

I suggest the diagnosis of a cystic rodent ulcer, an admittedly rare variety of the disease, but I have seen a very similar but much larger growth of this character, which also occurred in a very uncommon position, the middle of the back of the trunk. In that case the diagnosis was settled by the characteristic histology. This latter patient was seen by me eleven years ago, and the growth has receded rather than advanced in that long time, apparently as the result of continuous applications of salicylic acid plasters, which I prescribed with a view to softening the area as a preliminary to further measures. These the patient declined, satisfied with the result of the plasters alone, and he has recently reported himself as still satisfied with the treatment.

DISCUSSION.

Dr. MACLEOD: I think it is a superficial cystic rodent.

The PRESIDENT: The diagnosis of this case cannot be accurately determined without a microscopic examination. The lobe of the ear has

appearances closely resembling a localized tuberculosis and this was my impression of the nature of the case when I first saw it. If Dr. Little's diagnosis is confirmed I presume he will try the effects of radium treatment.

Dr. GRAHAM LITTLE (in reply): I will try to obtain a section. My treatment will depend on what I find from an examination of the section. I had thought of radium. If one flattens out the ear, and brings the ear more or less into the plane of the cheek, there is, I think, a typical "rodent" edge evident.

(*June* 21, 1917.)

Syringomyelic Affection of Two Fingers.

By F. PARKES WEBER, M.D.

THIS case illustrates, I believe, a lesser form of syringomyelia than those associated with "cheiromegaly" and the so-called Morvan's disease (or as Charcot called it, the "Morvan type of syringomyelia"). The symptoms appear not to be quite stationary, and may therefore merely represent a stage in the development of a more advanced form of the disease characterized by one of the above-mentioned conditions of the hands.

The patient, M. W., a well-nourished young woman, single, aged 20, complains of "uselessness" of the index and middle fingers of the right hand. The "uselessness," or what she speaks of as "uselessness," is due to the fact that in both these fingers, from near the metacarpo-phalangeal joints to their tips, she has practically complete loss of sensation. This cannot be called "a dissociated anæsthesia" in the usual sense of the term, as in addition to loss of simple tactile sensation there is no perception of temperature or pain; deep firm pressure is all that the patient can feel in the affected fingers. The fingers in question are often cold when the others are hot, and sometimes they "go white" at the tips. A similar kind of anæsthesia is present in the tip of the great toe of the left foot.

I can find nothing else abnormal about the patient, excepting very slight spinal scoliosis and bilateral exaggeration of the knee-jerks. The plantar reflex is of the ordinary flexor type in both feet. No ankle clonus can be obtained. The pupils are of medium size, round and equal, and react promptly to light and accommodation. There is nothing of special medical interest in the family history, excepting that her

father and her paternal grandfather are both said to have suffered from "cramp in the hands." She was born in England (Stratford, Essex), and has never been out of England. She has mostly enjoyed good health, and is now employed as a clerk in a business office (cashier's department). Menstruation commenced at the age of 14, and is regular. The anæsthesia in the right middle finger was first noticed when she was about the age of 14, and in the index finger a year or two later, when she was aged 15 to 17. The sensory disturbance in the left great toe seems to be of only three months' duration. She has had no whitlows nor "festerings" in the fingers or toes, but at about the age of 18 she burned her right index finger by mistake, without feeling any pain. Quite recently she has sometimes had pain on the ulnar side of the right upper extremity, from the shoulder-joint to the hand. Röntgen ray examination (Dr. James Metcalfe) shows absence of cervical ribs on either side, and skiagrams of the hands show nothing abnormal; there is no bone-atrophy nor other osseous change in the affected fingers.

In some respects the case may be contrasted with the pronounced example of the Morvan type of syringomyelia shown by Dr. G. Pernet at the meeting of the Section on March 15, 1917.[1]

DISCUSSION.

Major GRAY: When Dr. Pernet showed a case here two or three meetings ago, I expressed the opinion that the thickening in the fingers in cases of syringomyelia was probably due to a lymphangitis set up by trauma in the finger, and, I think, Dr. Parkes Weber said that was not so, and that cases have been shown in which the thickening was independent of local infection. But it seems to me that when a case has been going on a long time, the opportunities for infection must have been very numerous, and it is difficult to exclude the possibility of septic infection. I ask whether any work has been done on the pathology of the thickening of the fingers. What are the changes, and how are they set up?

Dr. PARKES WEBER (in reply to Major Gray): In the joint and bone disturbances of syringomyelia, in which there is no wound nor infection at all, a notable feature is the hypertrophic tendency, which is more decided than in the analogous joint and bone disorders of tabes dorsalis (tabetic arthropathy and tabetic osteo-arthropathy). When the soft parts of the hands are affected in the Morvan type of syringomyelia there is likely to be a similar hypertrophic tendency shown, even when there has been no wound nor infection of the skin to induce the formation of new connective tissue.

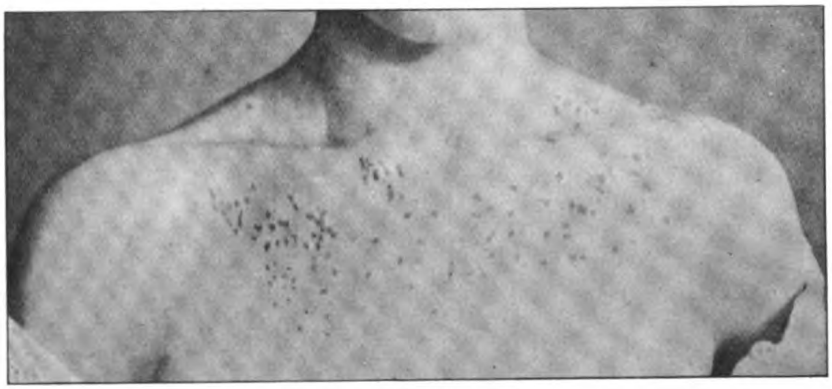
[1] *Proceedings*, 1917, x, p. 105.

(*June* 21, 1917.)

Case of Syringocystoma.

By J. L. Bunch, M.D.

The patient, a woman, aged 27, has a number of pinkish raised lesions on the chest below the clavicles, varying in size from a millet seed to a pea. They have made their appearance during the last two years, and are gradually increasing in number and size. They cause



Case of syringocystoma. To show distribution of lesions.

hardly any subjective symptoms. The lesions are papular or follicular, and hard to the touch; there is no definite sensation of elasticity. Sections show a mass of connective tissue and dilated sweat ducts, with a well marked cyst in the sub-epithelial tissue. There is an entire absence of epithelial downgrowth, or of scattered epithelial cells in the tissue below the epithelium. Sections show no pigment cells. The essential lesions are obviously a cystic change, or degeneration of the sweat glands. In my opinion, the sections show no resemblance to epidermal inclusion cysts.

The question of treatment involves, I take it, individual destruction of the lesions.

DISCUSSION.

Dr. PERNET : In a case of the same kind,[1] I curetted the growths with a sharp spoon under an anæsthetic. On looking up my notes I find that the doctor who sent the case on in 1905 reported in 1909 that she had done very well.

The PRESIDENT : Apart from X-ray treatment, which is uncertain in its results in such a case, I think electrolysis or the application of CO_2 would prove efficient. I have seen good results from these methods in a similar case.

Dr. GRAHAM LITTLE : While I admit that the clinical aspect of this case justifies its classification with the disease first described by Darier and Jacquet under the name " hidradénomes éruptifs," I am not entirely convinced by the inspection of the single section shown that this diagnosis is corroborated. The nomenclature of this group of diseases (for it is at least probable that diverse affections have been confused and described under names now regarded as more or less synonymous), should be revised, and as experience shows that it is impossible to differentiate, clinically, members of the group, more reliance must be placed on the demonstration of histological differences. On this basis it is at once apparent that this case is not an example of epithelioma adenoides cysticum, for there are no downgrowths of epidermis so characteristic of that disease. Nor, in my opinion, should it be described as a syringo-cystadenoma, or syringoma, for as far as one can judge from a very imperfect examination of a solitary section, the single cyst seen in that section is quite superficial, almost impinging on the epidermis, its contents stain like horn cell débris, and its wall consists of epithelial cells indistinguishable from those of the epidermis. In fact, from the histological appearances, I should suggest the possibility of this being another example of the very rare condition of which I reported a case—namely, multiple inclusion cysts of the epidermis.[2] In the case I described there were hundreds of tumours whose nature was completely obscure until the histological examination demonstrated their character. Tumours of the sweat glands and sweat ducts occur, and the term " syringoma " is a convenient one by which to describe these; it seems to me undesirable to use up that term for conditions in which a connexion with the sweat apparatus is not demonstrated. I do not think this connexion is as yet demonstrated here, and I would ask Dr. Bunch for some further histological investigation before affixing this label to his most interesting case.

Mr. J. E. R. MCDONAGH : Both clinically and histologically this case is in my opinion a typical one of syringoma, or syringocystadenoma. The term " lymphangioma tuberosum multiplex " used to be applied to it, because what are now recognized as sweat ducts, were erroneously thought to be lymphatics.

[1] Pernet, "Nævi cystepitheliomatosi disseminati (Lymphangioma tuberosum multiplex of Kaposi: Hidradénomes éruptifs of Jacquet and Darier)" *Brit. Journ. Derm.*, 1907, xix, p. 67.

[2] *Proceedings*, 1915, viii, p. 253.

Pathological Report on Dr. Bunch's Sections.—"I have referred to Dr. Graham Little's reported case of 'Multiple Inclusion Cysts of the Epidermis,' and the description he gives is totally different to yours in every respect. He describes the lesions as nodules containing cheesy material. Also that they reach to ¼ in. diameter. Pigmentation was also present. In your case the lesions were more papular and were hard, and did not reach to the diameter described. No pigmentation was present. Histologically, the picture of his section bears no resemblance to yours. His cysts are inclusive in the epidermis. In your case the cysts are distinctly below. In his case the sweat glands are apparently normal. In your case there is a marked change, usually of a cystic nature."

(*June* 21, 1917.)

A Remarkable Case of Xanthoma Tuberosum Multiplex.

By F. Parkes Weber, M.D.

The patient, Mrs. S. W., aged 66, Russian Hebrew (born in Odessa, but resident for the last ten years in London), has a chronic eruption of nodules in the skin of the upper and lower extremities (*see* figs. 1 and 2) and likewise a few on the trunk and face. The eruption commenced gradually about eight years ago. There has been no local itching nor pain with it, but the patient has for some time had a little general pruritus, especially during the nights. She has, I think, had a good deal of mental worry, which has tended to produce nervous exhaustion.

The nodules, which are obviously nearly all of them situated in the corium, vary considerably in size and are mostly yellowish-brown or reddish-brown in colour, but a few are more red than brown. They are specially numerous on the legs below the knees, and at the olecranon regions of the upper extremities. In some parts of the legs (*see* fig. 2) the nodules are grouped together in clusters with cutaneous pigmentation between and about, as well as over, them; they appear at these sites to be slowly spreading in a centrifugal manner, undergoing a process of gradual involution in the older, central, portions of the areas involved. As above mentioned, the pigmentation of the skin is not entirely limited to the actual nodules.

Some of the nodules (for instance, in the upper arms) are more deeply situated and are in fact almost entirely in the subcutaneous

tissue; the epidermis is movable over these deeper nodules and the skin appears not at all, or only very slightly, pigmented. There are a few yellow slightly (or hardly at all) raised patches of skin, notably over the left scapula, which have a different appearance to the above described eruption, but somewhat more resemble the areas of pigmented skin between the grouped nodules on the legs. The lesions on the legs are

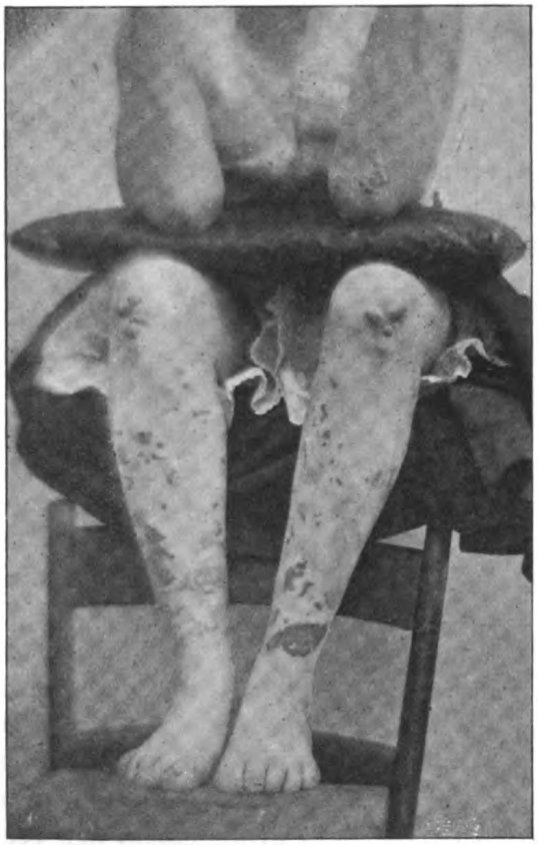


FIG. 1.

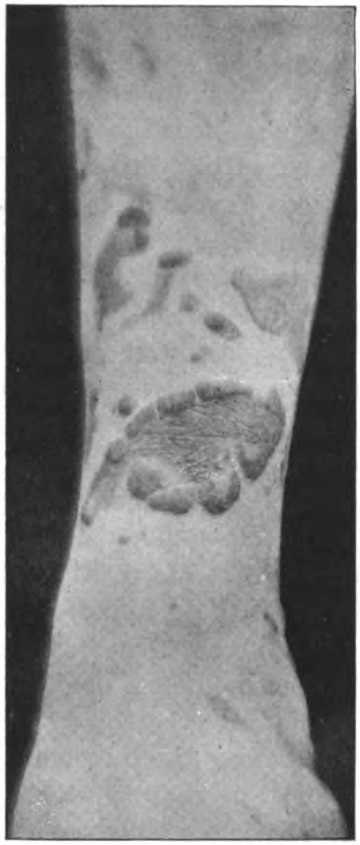


FIG. 2.

Fig. 1.—Dr. Parkes Weber's case of xanthoma tuberosum multiplex. Photograph (June, 1917) to show distribution of the lesions on the legs and at the elbows.

Fig. 2.—Photograph (June, 1917) to show a ring-like group of the cutaneous nodules in front of the left leg.

more pigmented and more congested with blood than those on the upper extremities and elsewhere.

In other respects the patient seems to have enjoyed good health, excepting that in the summer of 1916 she had a kind of vesicular

keratitis in the right eye, which has left slight scarring. She has never had jaundice or (typical) gout. She has had one child (her only pregnancy), which died soon after birth. Menopause, ten years ago. There is no enlargement of the liver or spleen, nor of the superficial lymphatic glands. A blood count (May, 1917) gave 5,200,000 red cells and 8,750 white cells to the cubic millimetre of blood; of the white cells 75 per cent. were polymorphonuclear leucocytes. Wassermann reaction (May, 1917) negative. Brachial systolic blood pressure (May 19, 1917), 160 mm. Hg. Urine (May 16, 1917) free from albumin and sugar.

Two nodules were excised for "biopsy" purposes from the left upper arm near the elbow: (1) a raised brown superficial nodule in the skin, of about the size of a pea; (2) a deeper rather larger nodule situated chiefly in the subcutaneous tissue (*see* fig. 3), with the skin movable over it and not pigmented. Microscopical sections from both of them were stained with hæmatoxylin and eosin, and also by the Unna-Pappenheim (methyl-green-pyronin) method for plasma cells. The microscopical structure of both nodules is identical. They are cellular masses, consisting, according to Mr. S. G. Shattock, who kindly examined sections with me, of fibroblasts, together with lymphocytes and plasma cells. The plasma cells, though morphologically characteristic (*see* fig. 3), did not properly take on the correct differential coloration by the Unna-Pappenheim method of staining (possibly a question of technique). Mr. J. E. R. McDonagh has kindly given me the following report on the sections:—

"In one section a space exists between the epidermis, which shows no alteration, and the cellular mass, which extends into the subcutis. In the intervening space the vessels are surrounded by a cellular infiltration, which in some places is continued into the cellular mass below. In another section the cellular mass has reached up as far as the epidermis with the result that its papillary arrangement has been reduced to a straight line. In the latter section the cellular mass is more diffuse and not so distinctly perivascular. The cellular mass consists mainly of endothelial cells and of cells which form the walls of the cutaneous capillaries. These cells are undergoing degeneration, since the chromatin in the nuclei is not apparent and the nuclei as a whole are swollen, and since the protoplasm of the cells has in many instances disappeared, and in others is swollen, as one sees it in the endothelial cells in xanthoma. Scattered about the cellular mass are many lymphocytes and plasma cells. In some respects the sections resemble those from a case of nævo-xantho-endothelioma which was

undergoing metamorphosis.[1] The histological characters of the sections suggest that the condition is a chronic inflammatory one which affects the endothelial cells and the cells in the walls of the tiny capillaries.

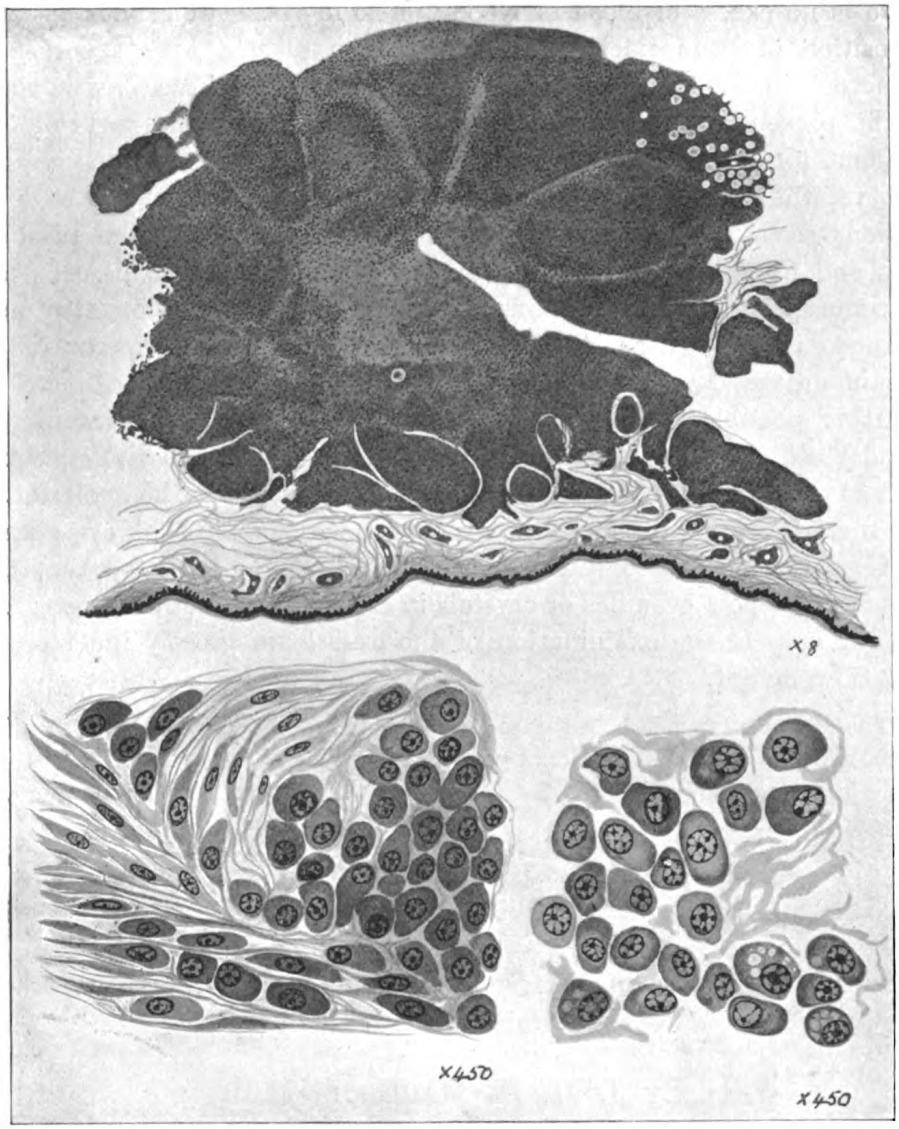


FIG. 3.

Dr. Parkes Weber's case of xanthoma tuberosum multiplex. To show the appearance under low magnification (× 8) of one of the deeper nodules from the left arm, situated more in the subcutaneous tissue than in the corium. Parts of plasma-cell infiltrates are represented separately under high magnification (× 450).

[1] J. E. R. McDonagh, "A Contribution to our knowledge of the Nævo-Xantho-Endotheliomata." *Brit. Journ. Derm.*, Lond., 1912, xxiv, pp. 85-99.

There is nothing to suggest that the capillaries are newly formed or that there is anything in the nature of a new growth."

In certain respects the present case reminds me of some cases of so-called "multiple idiopathic hæmorrhagic sarcoma" (Kaposi),[1] but there is no excess of blood or blood-vessels in the nodules, nor is there deposition of hæmosiderin. Moreover, the plasma cells are not so numerous in the "idiopathic hæmorrhagic sarcoma" cases as they are in the present case, in which they (*see* fig. 3), in some parts of the sections, form dense plasma-cell infiltrates, so that the lesions almost deserve the name of "plasmomata" or "plasmocytomata." The sections seem distinctly to show transitional forms between plasma-cells and fibroblasts, that is to say, cells resembling plasma-cells are in some parts of the sections apparently becoming elongated and arranged in strands, as if an attempt at the formation of scar tissue was in progress.

It is possible that in cases of chronic xanthoma tuberosum the lipoidal cells, termed "xanthoma cells," may be derived from plasma cells as well as from endothelial cells by infiltration with the cholesterin-like material which produces the granules or crystals in their cytoplasm. In regard, however, to the present case, it should be noted that the presence of lipoid granules or crystals in the cells was not demonstrated.

For help in the examination of the case I am greatly indebted to Dr. H. Schmidt.

The PRESIDENT: The last case I saw which approached this in severity was associated with constitutional gout of many years' duration. The patient was a man, aged 57, who had led a sedentary life and whose father was the subject of gout at an early age.

(*June* 21, 1917.)

Case of Dysidrosis in a Girl with Hemiplegia, most marked in the Paralysed Hand.

By J. M. H. MACLEOD, M.D.

THE patient is a girl, aged 14, with partial left hemiplegia. Before coming to the Skin Department at Charing Cross Hospital she had been under the care of my colleague, Colonel Gordon Holmes. Accord-

[1] *See* F. Parkes Weber, "Three Cases of so-called Multiple Idiopathic Hæmorrhagic Sarcoma (Kaposi)." *Brit. Journ. Derm.*, 1916, xxviii, pp. 309-316.

ing to the statement of the mother the patient had had two strokes when she was aged 10 months; these were followed by an almost complete hemiplegia of the left side, which has cleared up to some extent, but is still well marked on the left shoulder and left arm, which are much wasted. At present she has an attack of dysidrosis of the hands, very much more marked on the paralysed than on the healthy side. There, practically, the whole hand is covered with blisters, some of them as large as a penny, while on the healthy side the dysidrosis is characterized by a few groups of small deep-seated vesicles between the fingers. On the healthy side the dysidrosis responds readily to treatment, while on the paralysed side it is proving most intractable. Two years ago she had a similar attack, and, according to Colonel Gordon Holmes's notes, it behaved in the same way.

Dr. F. PARKES WEBER: This case is of extreme interest, and a question which arises is, what was the nature of the so-called "strokes," of which the patient had two when she was aged about 10 months? I think that they probably formed part of a single illness, and that the illness was a severe form of polio-encephalomyelitis, or the Heine-Medin disease—in other words, a form of infantile paralysis. The ordinary form of this disease attacks the anterior (motor) horns of the grey matter of the spinal cord (acute anterior poliomyelitis), and not the brain. It is this form from which, I believe, the patient suffered, and not from polio-encephalitis—in spite of the hemiplegic distribution of the paralysis. This view best explains the persistent muscular atrophy in the left hand and arm, and, inasmuch as the motor origins of the nerves have been permanently damaged, one can understand that the girl still has a tendency to trophic disturbances in the left hand. This also explains why she suffers during summer more severely from the results of hyperidosis in the left than in the right hand; and the fact that she does so may be used as an argument, I think, that the original nervous disease was an attack of poliomyelitis, and not polio-encephalitis.

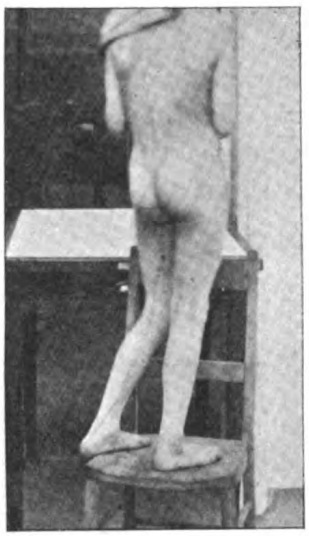
(*June* 21, 1917.)

Case of Linear Lichen Planus of Unusual Extent in a Child.

By E. G. GRAHAM LITTLE, M.D.

THE patient is a girl, aged 9. The eruption began three months ago, and rapidly extended to occupy the present site, shown in the accompanying photograph. It consists of a practically continuous line, about ½ in. broad, made up of fairly typical lichen planus patches

and papules, beginning with a patch on the buttock, merging into a broad line down the back of the thigh and leg, and spreading out into a terminal patch on the inside of the foot. There are no lesions whatever elsewhere, either on the skin or mucosæ; the itching is moderate, and the general health is undisturbed.



Dr. Graham Little's case of linear lichen planus. Linear streak of lichen planus, stretching from left buttock, along postero-internal aspect of thigh and leg, to end on outer surface of foot at base of small toe.

The PRESIDENT: I have a coloured drawing of a case which corresponds very closely with this. The patient was also a young girl in good general health. The cutaneous lesion was stated to be of rapid development, and it disappeared spontaneously in the course of months.

(*June* 21, 1917.)

Case of Early Mycosis Fungoides.

By GEORGE PERNET, M.D.

THE patient is a woman, aged 47, housewife, who came under observation on June 8 last. She stated that the cutaneous trouble started six years ago, after the birth of a child, as reddened and irritable areas about the face and body, the first one appearing on the

chin. These came and went at intervals for a time, and ultimately became established, the skin becoming involved generally about one year ago—rough, scaly and reddened, and extremely irritable. Six months ago or so (about Christmas, 1916), small lumps began to make their appearance, especially on the limbs. These lumps broke down centrally and discharged more or less purulent substance. When first seen the skin trouble was generalized. The face exhibited shiny, glazed-looking, reddened areas. The neck, trunk and limbs were rough, with lichenization, showing surface striations and quadrillations, with areas of flattened infiltration here and there. About the flexor surfaces of the forearms some of the small areas were distinctly of a lichen planus type. The remains of a small broken lump could be seen here and there. Under treatment—viz., X-rays to the right arm and a soothing lead and calamine lotion—some improvement has taken place. The application of the lotion has much diminished the irritation. A citrate of soda mixture may have helped, too, in this direction. One feature of the clinical picture consists in the areas of pigmentation, sprinkled with white atrophic spots, $\frac{1}{4}$ in. across or so, this giving rise to a vitiligo-like appearance. These areas are especially marked about the loins, where they are the size of two palmar surfaces or more. They are also present on the chest and elsewhere.[1] There are infiltrations here and there in these areas, as well as on the lichenized parts. Urine: No albumin, no sugar. Father died at the age of 82 and mother at the age of 54.

It is proposed to deal with the case systematically by means of the X-rays—a sheet-anchor here—with the hope that the development of tumours may be prevented and the evolution of the disease checked if not cured, as cure seems to be beyond our reach at the present moment. I do not propose to give any arseno-benzol treatment, as that appears to have made matters worse in some instances.[2]

DISCUSSION.

The PRESIDENT: There is no doubt as to the nature of this case. Experience proves that X-ray treatment is the most calculated to relieve symptoms and to reduce the nodules which are developing, but permanent curative effects are not to be expected.

[1] The consent of the patient to a photograph of body has not yet been obtained.

[2] *Vide* Pernet, "A Case of Mycosis Fungoides *à tumeurs d'emblée* treated unsuccessfully by Salvarsan and X-rays" (International Congress of Medicine, London, 1913, *Trans. Derm. Sect.*).

Dr. F. PARKES WEBER: In the present case it is most important to make a "biopsy" examination of the affected skin (under the microscope), and likewise to make a blood count, especially a differential count of the white blood cells. I think that it is only by these means that the clinical form of *leukæmia cutis* described by Kaposi as "lymphodermia perniciosa"—a leukæmic "permeation" of the skin with lymphocytes or other leukæmic cells, whether accompanied or not by obvious leukæmic changes in the circulating blood—can be excluded.

Dr. PERNET (in reply): The clinical features of the case establish the diagnosis. It cannot be anything else.

Addendum.—The following is a report of the blood-count (Dr. Sydney Graves, Pathologist, West London Hospital): "Hæmoglobin, 90 per cent.; white blood cells, 8,600; red blood cells, 6,400,000; polymorphonuclear leucocytes, 85 per cent. (relative increase); large mononuclear leucocytes, 8 per cent. (relative increase); small mononuclear leucocytes, 5 per cent. (relative decrease); transitionals, 2 per cent."

(*June* 21, 1917.)

A Culture of Monilia Fungus from a Case of Dermatitis of the Feet.

By GEORGE PERNET, M.D.

IN scrapings from the deeper layers of the borders of a dermatitis of the feet, clinically like the usual ringworm in that situation, and occurring in an officer who had been in the trenches in Flanders, I found after some search in an extempore preparation in liq. potassæ B. P. (oc. 3, obj. 6), two groups or masses of round spore-like bodies, with a central dot, looking something like tinea versicolor and quite different from what I have usually found in ordinary ringworm (tinea tropica) of those parts. There was no trace whatever of mycelium. I am indebted to Dr. Sydney Graves, acting pathologist to the West London Hospital, for the culture on Sabouraud medium I am showing, and obtained from scrapings carefully gathered. Lieutenant-Colonel Castellani has identified it as a monilia.

Addendum.—Further investigation points to the non-pathogenicity of the fungus cultivated, that is by cultures on various media.

Section of Dermatology.

President—Dr. J. H. Stowers.

(*July* 19, 1917.)

Macular Atrophy of the Skin, showing the Early Raised Erythematous Stage, and associated with Ordinary Vitiligo.

By F. Parkes Weber, M.D.

The patient is a man, P. K., aged 64, who has typical vitiligo of the hands and penis. He does not know how long the penis has been affected, but in the hands he has noticed it for the last nine or ten years, always more marked in the summer than in the winter. He does not know how long he has had the macular atrophy of the skin; it gave rise to no pruritus nor subjective symptoms, and he was not indeed aware of its presence before he came to the hospital. It is, however, quite characteristic. The spots, which are mostly not larger than a threepenny piece, are of two main types, with some intermediate forms. Many of them are slightly raised and reddish or reddish-brown, but most of them are spots of colourless *anetodermatous* skin, with a loose, crumpled cigarette-paper-like surface, which is sometimes slightly depressed. It is clear that the raised erythematous spots represent an early (inflammatory) stage in the development of the colourless atrophic "anetodermia" stage, that is to say, the true *maculæ atrophicæ*, from which the disease derives its name. There are likewise a few spots representing intermediate stages (as already stated) between the erythematous (raised) and the colourless (atrophic) types. The spots (both types and also the intermediate forms) are distributed over the trunk and limbs, but the face, head and

neck are not affected. The spots are specially numerous over the waist region of the trunk, and the proximal portions of the limbs (thighs and upper arms) are more affected than the distal portions. In some parts the spots are arranged in groups or clusters of various shapes.

The patient likewise has old cardiac valvular disease (aortic reflux), without any definite history of rheumatism. There is lamellar (zonular) cataract, probably congenital, in both eyes (Dr. C. Markus), together with corneal opacities apparently dating from childhood. He thinks he never had syphilis, and the Wassermann reaction (Dr. H. Schmidt) is negative.

Macular atrophy of the skin (*maculæ atrophicæ*) is probably much more common than is generally supposed, but is not very striking, and patients do not usually pay any attention to it or seek any medical opinion about it. It is, indeed, perhaps as common as vitiligo, though the latter condition is very obvious and often annoys the patient and attracts the attention of his friends. The association of the two conditions—both relatively common ones—is probably therefore merely a chance coincidence in the present case. An ætiological connexion of both conditions with syphilis has been discussed by some writers on the subject, but syphilis is very common and therefore likely to be occasionally associated with such relatively not uncommon conditions as vitiligo and macular atrophy of the skin.

In the present case there is, as already stated, no history of syphilis, and there is no evidence pointing to it, such as a positive Wassermann reaction or syphilitic leucodermia of the neck. In a recent case (1916), however, the patient, K. P., a man, aged 62, had certainly had syphilis. The *maculæ atrophicæ* were scattered over his trunk—circular patches of loose anetodermatous wrinkled skin, like crumpled cigarette paper, mostly not raised, though some were slightly raised above the general surface. Their presence had been noticed during the last fourteen months or so, and at first they may have been slightly reddish. The patient had no typical syphilitic leucodermia of the neck, but he had a positive Wassermann reaction (tested on various occasions) and the remains of syphilitic iritis. In another case, recently (1916) shown me by Dr. G. F. Stebbing, at the Lambeth Infirmary, the patient, an elderly woman (with hemiplegia, probably due to cerebral hæmorrhage), had symmetrical clusters of anetodermatous *maculæ atrophicæ* on the front of her wrists and had likewise a similar group on the left mamma. They had apparently been present for some years. I do not know whether there was any evidence of previous syphilis or not.

(*July* 19, 1917.)

Congenital Hirsuties of the Simian Type in a Child.

By F. PARKES WEBER, M.D.

THE patient is a girl, E. W., aged 4, born in London. The hypertrichosis affects the forehead, temples, sides of face, the back (especially the upper and lower portions and the vertical line over the spinal column), and the upper and lower extremities. The regions of the axillæ, groins, pubes, and front of the trunk, and the neighbourhood of the mouth and nose, are not hairy. The child has corneal opacities from old phlyctenular keratitis, and has been treated for adenoid vegetations, enlarged tonsils and otorrhœa, but otherwise shows no signs of disease, and is mentally normal. There is no marked prognathism of either jaw, and, when the jaws are closed, the lower teeth come behind the upper teeth, as they do in ordinary individuals. The nose and lips and cheeks are thick, and the bridge of the nose is low. There is nothing to suggest the presence of a hypernephromatous tumour in the abdomen, and a Röntgen skiagram of the base of the skull shows nothing abnormal about the pituitary fossa. There is no sign of any precocious or abnormal sexual condition. The moderate degree of hirsuties present is rather of the "Simian" type (see further on), than of a type suggesting suprarenal or other endocrine disturbance. In the present case it is, according to the mother, congenital, but not familial. The mother's two other children (a girl and a boy) are said to be quite normal, and there is no history of hypertrichosis in any other members of the family. The mother is Irish, the father (deceased) was Austrian (not Hebrew Austrian). There is the usual history of "maternal impression." The mother says that whilst she was pregnant, about three months or so before the birth of this child, she used frequently to see a monkey, which belonged to a lady in the neighbourhood.

Excluding cases of local hypertrichosis of the "nævus pilosus" kind, I think cases of hypertrichosis or hirsuties may be roughly classified as approximating more or less to one or the other of two main types. In the *first*, which may be termed the "Simian type," the hypertrichosis is congenital or developmental, and sometimes familial, and may be regarded as an example of so-called "degenerative"

reversion. In spite of the absence of any similar condition in the family, I regard the present case as a minor example (that is to say, of relatively slight degree) of the "Simian type." The *second type* is associated with, and secondary to, disorders of the endocrine organs (suprarenal glands, &c.), and is generally not congenital and not familial.

(*July* 19, 1917.)

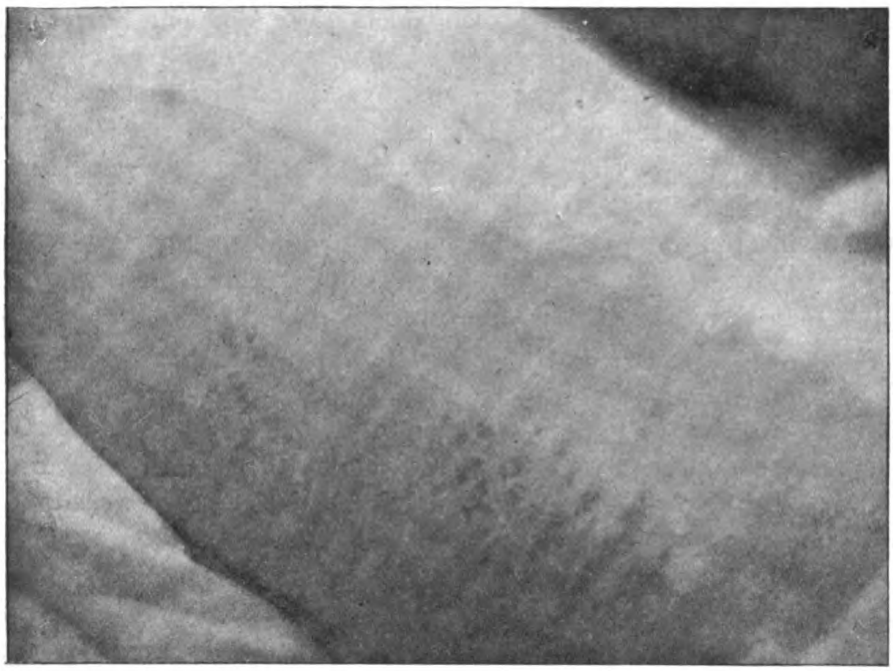
Unilateral Striæ Atrophicæ (Striæ Cutis Distensæ) of the Thorax.

By F. Parkes Weber, M.D.

The patient, A. G., a young man, aged 18, a tailor, was admitted to hospital on June 29, 1917, with severe pulmonary tuberculosis, more advanced in the right lung, in which lung there are extensive cavernous signs. He has moderate pyrexia, of the hectic type, and his sputum contains abundant tubercle bacilli. He himself says that his illness commenced with "influenza" in October, 1916, up to which time he had not been severely ill. Since the commencement of the illness, he says, he has been accustomed to lie on the left side (or rather, half-turned to the left side), because whenever he tries to lie on the right side he starts coughing, and lying on his back also brings on coughing. Over the left lower postero-lateral portion of the thorax he has a cluster of "cleavage" stripes, so-called *striæ atrophicæ* or *lineæ atrophicæ* (also called *striæ cutis distensæ*), which he states developed about one and a half weeks before admission to hospital, that is to say, about the middle of June, 1917. They are still purplish in colour and have not yet acquired the glistening white appearance of so-called *lineæ albicantes*, into which they may be expected to develop later on. Their shiny transparent surface allows numerous small blood-vessels to be seen in them on close inspection, but this gives them, when viewed from a little distance, their diffuse purple tinge. They are arranged transversely to the long axis of the body, as such striæ always are, when they occur on the thoracic or lumbar region of the back. In the present case they occupy, as already stated, the postero-lateral infrascapular area of the left ribs, that is to say, the area below the level of the lower angle of the scapula. Owing to the invariable

position of the patient, lying as he does half-turned towards his left side in bed, with his shoulders propped up on pillows, the convexity of this left postero-lateral region of the thorax is abnormally increased, and consequently the skin over it is kept distended. This explains why the cleavage lines (*striæ atrophicæ* or *striæ cutis distensæ*) have appeared in that situation, as I shall endeavour to make clear (*see* fig.).

Striæ atrophicæ or *striæ cutis distensæ* are the result of rupture, or rather "cleavage," of the deeper layers of the cutis, and when this cleavage is not caused by distension of the skin from pregnancy,



Photograph of the back of the patient, A. G., to show the position of the *striæ atrophicæ* over the area of increased convexity. The curved position of the trunk, such as is maintained by the patient when lying in bed, has been, as far as possible, likewise shown in the photograph.

ascites, large tumours, arthritic swellings, subcutaneous œdema, or excessively rapid growth of subcutaneous fat, it is nevertheless almost always due to distension or stretching in some way or other,[1] though

[1] For this reason, I think, the term, *linear atrophy of the skin*, sometimes applied to these cases, is a bad one. It suggests an ætiological analogy with the condition known as *macular atrophy of the skin* (*maculæ atrophicæ*)—a totally different condition.

the mechanism may appear obscure. It is this relatively obscure group (to which the present case belongs) that I shall now shortly consider. It may be subdivided under two headings :—

(*a*) Cases of striæ atrophicæ about the shoulders, elbows, hips, buttocks and thighs, due to rapid growth (local or general) at or about the period of adolescence, the growth of the skin apparently not being able to keep up with the growth of the long bones and of the muscles and subcutaneous tissue covering the long bones and joints. Nearly all the cases of so-called "idiopathic" *striæ atrophicæ* may be classed in this subdivision. Thus, several years ago, I saw a well-developed muscular young man, aged 17, who had recently developed typical striæ atrophicæ about the shoulders, over (and somewhat in the direction of the fibres of) the deltoid muscles. There had been no illness, accumulation of fat, nor œdema, to account for the skin cleavage, but the boy was growing rapidly. Similar cases are not very rare, I think. Dr. Arthur J. Hall, Major R.A.M.C.(T.), has kindly told me of an interesting case of "striæ" in the lower half of each breast in a young unmarried woman. The breasts had apparently never been bigger, and there had certainly been no pregnancy. Dr. Hall suspected that the striæ in that case were due to stretching of the skin by pressing the breasts upwards (by means of stays) so as to secure a "good figure."

(*b*) Cases, like the present one, associated with a febrile or wasting disease, starvation or grave inanition of some kind.

Cases of group (*b*) have been known to be connected with typhoid fever, appendicitis, colitis, dysentery, rheumatic fever,[1] severe pulmonary tuberculosis (as in my present case), pneumonia,[2] cerebrospinal meningitis, scarlet fever, diphtheria (not quite certain), mumps,[3] Hodgkin's disease, intrathoracic malignant disease, septic osteomyelitis, septic wounds, and various suppurative and other diseases and conditions of both medical and surgical interest. In these cases there is a kind of malnutrition of the skin, which forms part of the general malnutrition of the body, and it leads apparently to diminished distensibility (elasticity) and favours cleavage. Occasionally it may be connected with diarrhœa (as in some typhoid fever cases) and wasting discharges. But, apart from that, it is not quite clear why this special malnutrition of the skin should be present in some cases and not in others of equal

[1] Sangster, *Brit. Journ. Derm.*, Lond., 1907, xix, p. 96.
[2] Cf. F. Craven Moore, *Practitioner*, Lond., 1908, lxxxi, p. 397.
[3] Cf. E. G. Graham Little, *Proc. Roy. Soc. Med.* (Sect. Derm.), 1912, v, p. 77.

or even greater severity. That a peculiar nutritional condition of the skin is sometimes present during typhoid fever is certain. Thus, it is well-known that chronic psoriasis sometimes more or less completely disappears during typhoid fever, generally to reappear sooner or later after recovery from the fever. Little wounds made during the height of the fever (as in opening small abscesses) have a tendency to gape in a most peculiar manner before they ultimately heal up by granulation. Some time ago, in a grave case of typhoid fever under my care, a boil on the front of the thigh was incised, and I observed that in the course of the next day the skin retracted so much that the small incision came to appear like a big fissure in the skin, the wound afterwards healing by granulation. As mentioned above, excessive diarrhœa in typhoid fever may doubtless increase the ordinary febrile dryness of the tissues and possibly diminish distensibility (elasticity) of the skin. Anyhow, because typhoid fever and other febrile and wasting diseases do not usually give rise to striæ atrophicæ of the skin, it is certainly not right to argue that therefore these striæ, when they do occur in association with such diseases, must be causally unconnected with them. By a similar line of argument one might come at once to the conclusion that tabes dorsalis and general paralysis had no connexion with syphilis.[1]

Another ætiological factor that must be taken into account is that in young persons during typhoid fever and similar illnesses the growth in length of the skeleton is sometimes greatly accelerated. This increased rate of growth has been attributed to the fact that, owing to the illness, the patient is lying in bed and thus the normal retarding influence of the weight of the body on the growth in length of the vertebral column and (especially) the long bones of the lower extremities, is removed. Moreover, in such young persons, confined to bed owing to illness, the muscles and subcutaneous tissue about the shoulders, hips and thighs, seem sometimes to increase in size so as unduly to distend the skin over them, and thus give rise to "cleavage striæ," notably over the deltoid muscles, gluteal muscles and the great muscles of the thighs. Such striæ probably appear more frequently about the shoulders in males and about the buttocks in females, as has been emphasized by Craven Moore in regard to striæ associated with pulmonary diseases.[2] L. Bleibtreu[3] and L. Silberstein[4] have especially drawn attention to the

[1] Cf. F. Parkes Weber, "Remarks on Localised Flushing . . . also on Striæ Patellares," *Med. Press*, Lond., 1905, cxxx, p. 261.

[2] F. Craven Moore, loc. cit.

[3] L. Bleibtreu, loc. cit.

[4] L. Silberstein, *Münch. med. Wochenschr.*, 1905, lii, p. 2185.

occurrence of striæ over the nates in girls after scarlet fever, and it seems to me that in such cases the favourite position of the patient in bed may have been one in which the hip-joints were flexed, thus causing prolonged distension of the skin over the nates.

The sites of the striæ atrophicæ that develop during febrile diseases have been supposed sometimes to be connected with pressure of the bedclothes, but they are obviously nearly always determined by the position of the patient's body in bed. The striæ are, in fact, produced where the skin is kept distended. Thus, when the patient during the illness lies habitually with his knees flexed, the tendency is for the striæ atrophicæ to form over the convexity of the joint (that is to say, where the skin is kept abnormally distended), constituting the local condition known as "striæ patellares.[1] When one knee is flexed to a greater degree (or more frequently) than the other, the striæ patellares are likely to be unilateral and limited to that knee, or to be more numerous and more marked over that knee than over the other. Owing to the patient's shoulders being propped up with pillows the striæ not rarely occur where the skin is stretched over the convex part of the back below the shoulder-blade level (i.e., below the part of the trunk which is pressed forwards by the pillows). If the striæ are limited, as in my present case, to one side of the trunk, or are more numerous on one side than on the other, it will be found that the patient during the illness has been lying more or less on one side, propped up in bed. In such cases it is on the more convex side of the trunk (over which the skin is necessarily more distended) that all the striæ, or most of them, form. Thus, in my present case, owing to the active tuberculosis of the right lung, the patient has been lying with the right lung uppermost[2]—his shoulders having been, as usual, propped up with pillows. The striæ have developed over the abnormally convex part of the trunk, which in that position of the body is the lower left postero-lateral portion of the thorax (the outer part of the infrascapular region). Whilst the photograph of the striæ (*see* fig.) was being taken the curved position of the trunk in which the patient had been lying, was as far as possible maintained.

[1] On *Striæ patellares* and the whole subject of *striæ atrophicæ* and *striæ cutis distensæ*, cf. G. Fischer, *Münch. med. Wochenschr.*, 1904, li, p. 482: H. Köbner, *ibid.*, 1904, li, p. 928; K. Zieler, *ibid.*, 1905, lii, p. 1764 (with many references to older literature on the subject); L. Bleibtreu, *ibid.*, 1905, lii, p. 1767; J. L. Bunch, *Brit. Journ. Derm.*, Lond., 1905, xvii, p. 1; F. P. Weber, loc. cit.

[2] Patients with pulmonary tuberculosis mostly lie with the side on which the tuberculosis is more active uppermost.

Cases more or less like this one, in which striæ atrophicæ are more numerous on one side of the trunk than on the other, are not very rare. During the last few years I have had two cases of fatal Hodgkin's disease or "lymphogranulomatosis maligna" (with pulmonary complications, in young adults), in which striæ atrophicæ occurred on the trunk and were unilateral or more marked on one side than the other. H. D. Rolleston[1] published an illustration of a case in which there were striæ atrophicæ, more numerous on one side of the trunk than on the other, associated with malignant disease of the pleuræ and peritoneum. In another curious case demonstrated by Rolleston there were unilateral striæ of the back.[2] In a case shown by E. Laming Evans[3] the striæ were nearly unilateral, affecting the thoracic and lumbar regions of the right side of the back. The patient, a soldier, aged 19, had had a severe wound, with febrile complications and constitutional symptoms. This probably favoured the development of the striæ atrophicæ, in the same way that typhoid fever does, but the young man's position in bed doubtless determined the localization of the striæ by rendering the skin more tense on one side (i.e., the more convex side) of the back than on the other.

Note.—Dr. Arthur J. Hall, Major R.A.M.C.(T.), has kindly sent me the following notes of a remarkably similar unilateral case of striæ under his care in the Third Northern General Hospital. "The patient, a young man, aged about 20, was admitted on account of a pleural effusion of the left side. There were no striæ atrophicæ on admission. The left chest was distended with fluid, pushing over the heart and causing considerable respiratory distress. Paracentesis was performed and a large quantity of fluid withdrawn. It filled up again very quickly and the operation had to be repeated two or three times. He was altogether laid up in bed for several weeks and it was noticeable from the first that he always lay half turned on the right side, never flat on his back or on his left side. This fact was rather curious seeing that the right lung was alone expanding. Exactly at what interval after his admission I am uncertain, but probably three or four weeks, I noticed on examining the back of the chest a series of striæ atrophicæ, limited entirely to the right (sound) side, and extending more or less transversely from the level of the eighth or ninth dorsal spine to the top of the iliac crest. I can only give the levels approximately from memory. I think that they were caused by the constant stretching of the skin owing to his decubitus, described above. He was always

[1] H. D. Rolleston, "Remarkable Striæ Atrophicæ due to Cachexia," *Brit. Med. Journ.*, 1908, i, p. 494.

[2] H. D. Rolleston, *Proc. Roy. Soc. Med.* (Clin. Sect.), 1909, ii, p. 59.

[3] E. L. Evans, *Proc. Roy. Soc. Med.* (Sect. Derm.), 1915, viii, p. 230.

propped up with several pillows, and resting on his right scapular region above and his right sacrum and buttock below, so that the intervening skin was always stretched into a curve with the convexity downwards and backwards. There was not a trace of any striæ on the left side, although the chest had been much distended with fluid. I think it is probable that some of the cases in which these arise on the back and other parts after various illnesses, such as typhoid fever, &c., may similarly be due to continued strain on the skin from particular postures in bed."