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THE PLAGUE.
A PROSPECT AND A RETROSPECT.*

BY

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Studying the history of the Plague in Europe it has been perhaps natural to infer that this dread disease has receded from the civilized areas of the Temperate Zone never to return in epidemic form. We see

* NOTE :—In the following pages I have attempted to bring together matters of direct use to those desiring to have a general idea of our present stand-point in connection with the Plague. I am indebted more especially to :—

The Plague in India, 1896-97, compiled by R. Nathan, Indian Civil Service, IV. Vols., large 8vo. with maps and diagrams. Printed at the Government Central Printing Office, Simla, 1898. Price per set of four Vols., 15 Rs. or £1. The first volume of these more especially gives a most valuable account of the previous history of the Plague in India, description of the Plague, its course and characteristics, and of the measures taken in India to prevent the spread of infection.

Müller & Pöch, Die Pest. Nothnagel's Specielle Pathologie, Vol. No. V., Pt. 4, Vienna, 1900. This is on the whole a most valuable study on the subject, but is in its earlier part based perhaps a little too much upon the work of previous Austrian and German writers, Griesinger for example, and does not sufficiently acknowledge the studies of those of other nationalities—a fact which may in part possibly be explained by the fact that Dr. H. F. Müller, the original author, died of the disease in Vienna before he had revised, or indeed, had nearly completed the work.

Daniel Defoe. A Journal of the Great Plague in London (1665), first printed, London, 1720, reprint, Temple Classics Series, Dent & Co., London, 1900. 75 cents.

Report of the Indian Plague Commission on Haffkine's Anti-Plague Inoculation. Abstr. and editorial in *Brit. Med. Journ.*, Feb. 24th, 1900, p. 455.

Lustig & Galeotti. Remarks on Preventive Inoculation Against Bubonic Plague. *Brit. Med. Journ.*, Feb. 10th, 1900, p. 311.

its last great outburst in England in 1665,* the last outburst in Western Europe at Marseilles in 1721, and in Eastern Europe at Moscow in 1771, and until the closing years of the century in South-Eastern Europe alone—in Turkey—has the plague shown itself epidemically.

But at the present juncture it is right and reasonable to keep in mind that ours may be a false security. We ascribe our immunity to improved hygiene and superior cleanliness, together with (as it would seem from the relative mortality among those of different nationalities stricken of late years in Hong Kong and India) a superior power of resistance in the individual, this resistance or relative insusceptibility being possibly the outcome of better food and consequent more robust health. A more careful study of the facts in relation to the incidence of the Plague may well make us pause. If there is one feature in the history of the disease standing out more than any other, it is the remarkable diversity in the symptoms. In all epidemics there has been the one feature of bubonic enlargements, if not in every case, at least in a considerable proportion of those affected, and the mortality has varied greatly. Now, as in the Black Death, the disease has been of the most virulent septicæmic and hæmorrhagic type; now, as at Bombay in the present epidemic, pneumonic disturbances have been more prominent, and now, as in what the Germans call the "Schlundpest," laryngeal disturbances; indeed, as Cantlie states, a succession of outbreaks in the same city seldom preserves the same type. Bacteriological study of the germ shows us that we are dealing with a microbe peculiarly polymorphic and variable in all its properties. Hence, even if certain races are relatively refractory to the germ in one epidemic, it is well

T. J. Simpson. The Plague in India. *Brit. Med. Journ.*, Sept. 24th, 1898, p. 853.

Haffkine & Bannerman. The Testing of Haffkine's Plague Prophylactic in Plague-stricken Communities in India. *Ibid.*, p. 856.

L. F. Childe. The Pathology of Plague. *Ibid.*, p. 859.

Hankin. Note on the Relation of Insects and Rats to the Spread of Plague. *Cbl. f. Bakt. 22*, 1897, p. 437.

Hankin & Leumann. A Method of Rapidly Identifying the Microbe of Bubonic Plague. *Ibid.*, p. 438.

Bennett & Bannerman. Inoculation of an Entire Community with Haffkine's Plague Vaccine. *Indian Medical Gazette*, Vol. 34, No. 6, June, 1899.

James Cantlie. The Plague, *The Practitioner*, November, 1899, p. 522. I did not come across this article, having mislaid the reference, until my article was practically complete. In a most clear manner Cantlie takes up the matter very much after the lines here followed and the article is well worth studying by those who wish to obtain a general idea of the nature of the condition written by one, who, in Hong Kong, had abundant opportunity of studying cases.

*As Simpson points out it is not correct to regard this as the last year of the Plague in England—for thirteen years after the great fire in 1666 cases of the disease continued to present themselves.

within the bounds of possibility that, by passage, for example, the germ may have its virulence increased to a point at which racial insusceptibility becomes an absent quality. In the epidemic at Surat from 1684 to 1689, no Englishman was attacked, but in Bombay in 1690, of 800 Europeans only 80 were left, among them 6 civilians, 6 commissioned officers and not quite 40 English soldiers.

What it is that causes variation in virulence and effects we are still very far from knowing—we have, however, to recognize its existence in the Plague as in influenza, and, to give a very present instance, in small-pox. For in this respect nothing can be more instructive than the curiously mild epidemic of small-pox which is now spreading through the Northern States and has made its appearance in Ontario and parts of our own Province of Quebec. Nor again does the fact that two centuries and more have elapsed since the Plague visited Atlantic shores, afford any absolute indication that it has retired never to return. As Dr. Simpson pointed out at the last meeting of the British Medical Association, even in the crowded, painfully insanitary and peculiarly vulnerable eastern cities, while the Plague when once it enters may linger for several years, periods of a century or more may intervene between separate epidemics. Bombay itself was free for 184 years, Moscow, to come nearer home, for 150 years, figures which are not particularly reassuring.

As now the Plague has manifested itself in no uncertain way upon the Atlantic coast of Europe—in Portugal,—not to mention along the Pacific coast, from Japan to the southernmost parts of China; nay more, has assumed an epidemic type in parts of Brazil and the Argentine, we in Northern America must no longer live in a fool's paradise of assured freedom from danger. In saying this I do not wish to pose as an alarmist. As Müller and Pöch point out, in Marseilles in 1721, there were 86,000 deaths out of a population of 247,000, a mortality of 34.8 per cent., and in London in 1665, 68,596 out of a population of 460,000, a mortality of 14.9; Defoe, it is true, gives us the popular impression of his time that this figure is too low and that 100,000 is a true estimate, or a mortality of over 20 per cent. In Canton, on the other hand, in 1894, it is estimated that 140,000 died, or 5 per cent. of the inhabitants. In Bombay in 1896-7, with the more rigorous measures adopted there by the authorities, 19,849 died out of a population of 846,000, a mortality of only 2.3. If in a city so notoriously unsanitary as Canton, and among a people so predisposed to the disease as the Chinese (it is estimated that over 90 per cent. of the Chinese attacked in Hong Kong succumbed), the mortality was only 8 per cent., if again in the continuation of the same epidemic in India, the mortality was brought down by preventive measures to 2.3 per cent.; if again, as the rareness of

hæmorrhagic cases would seem to indicate, the present epidemic is of a relatively mild type, then with our present powers of quarantine and segregation, even did the pestilence gain entry into the country, there is, in my opinion, singularly little chance of its spreading, unless indeed—and this is on the whole unlikely—it suddenly increases greatly in virulence. All that I wish to urge is that reasonable precautions should now be taken to guard against its entrance, and that the present is a particularly favourable time to seek out and remove the weak spots in our hygienic defences, and if, as is the case in Montreal, there are foul and utterly unhealthy areas in the city, now is the acceptable moment for cleansing those areas.

It follows therefore that the quarantine officers at all our ports, both on the Atlantic and on the Pacific, receive the fullest instructions to be on guard against the entrance of infected individuals or infected goods, and that everywhere, but more especially in our seaport towns, the ordinary practitioner be on the alert to recognize the first case, or first symptoms of the disease. We are glad to assure our readers that under the able direction of Dr. Montizambert, all official precautions are being taken. Only within the last few days a bacteriological laboratory has been inaugurated in connection with the quarantine service at Victoria, B.C., and Dr. Charles Higgins, Assistant Pathologist and Bacteriologist to the Department of Agriculture, a thoroughly capable and reliable official, has been placed in charge. At the Atlantic ports also care is being taken to obtain sure diagnosis and segregation of any suspected cases. It is opportune, however, to collect here into a brief and succinct form the main characteristics of the disease and the means of diagnosing and of preventing the spread of the same, so that the general practitioner be not perchance caught napping.

THE NATURE OF THE PLAGUE AND ITS CHARACTERISTIC SYMPTOMS.

What then is the plague? It is a disease caused by infection by a specific bacillus, manifesting itself more particularly as a malignant lymphadenitis, and its characteristic symptom, that which distinguishes it from all other epidemic diseases, is the production of buboes. Just as in cholera, the mucous membrane of the intestine is the tissue of election, and in small-pox the skin—so in the Plague it is the lymph glands which are especially picked out, and here, I may add, it is that the specific bacteria of the disease are to be detected in profuse abundance. But again, just as one may occasionally come across a case of typhoid in which there are no enlarged Peyer's patches, so occasionally a case of plague presents no enlarged subcutaneous lymph glands—while, apparently more frequently than is the case with typhoid, the

disease may take on the pneumonic type.* For our present purposes, these cases, which are peculiarly fatal, may, I think, be neglected. The general history when the pestilence first reaches a country, is that the earlier cases tend to be mild and indefinite and of the bubonic type. This is well brought out in Defoe's classical account of the Great Plague in 1665, of which I here note a new and excellently printed edition in the now familiar "Temple Classic" Series. Like other epidemics this tends to begin insidiously, and as often the earliest cases of cholera appear to be nothing more than a somewhat more severe diarrhœa than normal, so the Plague may show itself first as a development of buboes, clearly non-venereal in origin, accompanied by little or but transient disturbance. As pointed out, I believe, by Cantlie, cases of slight fever accompanied by glandular enlargement were noted at Hong Kong before the plague was recognized there—and Simpson gives full details of similar cases in the Shropshire regiment which came to Calcutta from Hong Kong. The condition spread to other soldiers who had never been in Hong Kong and eventually terminated in cases of typical Plague.

It is not surprising that the heads of the Indian Medical Service refused to acknowledge that they were here dealing with the genuine disease. What I wish to point out here, is that cases of non-venereal bubo occurring in the out-patient room or in private practice, deserve now-a-days to be investigated and followed with particular care—more especially if those cases be accompanied by slight fever and a white coated tongue, red at the tip and edges. In short, any case of fever accompanied by marked glandular enlargements in either groin, axilla or neck, deserves thorough investigation.

The general experience of the Bombay epidemic is that buboes which

* Cantlie distinguishes the following varieties of type:

1. The *Bubonic* form, "as a rule the first outbreak of Plague in a community is bubonic in type whatever it may become afterwards."

2. *Pneumonic.*

3. *Intestinal*, in which an intestinal flux occurs consisting of diarrhœa at the onset to be followed later by the appearance of blood, mucus and epithelium in the stools.

4. The *Cerebral*, in which delirium, often apparently of a suicidal type sets in early, with twitchings, tonic and clonic spasms, especially in children, loss of consciousness and deafness are more than occasionally manifest.

5. *Puerperal*, in which uterine hæmorrhage and miscarriage are the prominent features.

6. *Pestis Siderans*, rapidly fatal cases in which the usual clinical signs have not time to develop.

7. *Typhus Type*, resembling malignant typhus; in the Tropics not unfrequently the symptoms of the two diseases are almost identical, even to the skin eruption.

8. *Pestis Ambulans.* A mild type of the disease frequently included under the heading of,

9. *Pestis Minor*, sporadic or even epidemic outbreaks of adenitis going on to suppuration with, however, little constitutional disturbance.

have gone on to well-developed suppuration, yield pus free from plague bacilli and as the only sure means of diagnosis in a doubtful case is the bacteriological, the study of a suppurating bubo is likely to yield no certain results. Examination must be made before suppuration develops and if this is not possible, recourse should be had to the agglutination test, for in the later stages of the disease the blood gains agglutinating properties. A drop of blood collected, as in Wyatt Johnston's method for typhoid fever, and sent to a bacteriological laboratory, may thus afford valuable information. In the earlier stage of the bubo, as already indicated, and in the surrounding sero-sanguinolent fluid abundant bacilli are present.

Passing from these cases of "Pestis minor," before indicating the main symptoms of the more virulent disease, a few words may be said with regard to the specific microbe and to the essential nature of the plague process.

THE PLAGUE BACILLUS.

The bacillus which was discovered by Kitasato during the epidemic in Hong Kong in 1894, has been abundantly proved to be the specific cause of the disease. It is present in large numbers in the buboes in the early stage of the disease and in the hæmorrhagic œdematous fluid surrounding them. It is from these that the bacilli can be obtained in the greatest abundance and diagnosis be made without difficulty. In well marked cases it is present also in the blood but here the individual bacteria are few and far between in any given specimen, and thus the failure to discover them in the blood is not by any means a positive indication that the individual is not suffering from the disease.

These bacilli are short and thick, with rounded ends and when grown outside the body frequently occur in short chains and from the deeper staining of the ends tend to appear like diplococci; they do not stain by Gram's method. They grow best at blood temperature upon all the ordinary media. The most characteristic growth is in slightly alkaline peptone broth, and more especially, as Hankin has pointed out, when a little butter fat has been added. The bacilli tend to grow round the fat droplets upon the surface and falling down form long festoons or stalactites, the old growths gradually accumulating at the bottom as a granular or grumous deposit, while the medium remains clear. Grown outside the body involution or degeneration forms show themselves with fair rapidity, and as Hankin points out, this tendency to involution may be made a means of rapidly identifying the microbe. If this be inoculated upon agar containing from 2.5 to 3.5 per cent. of common salt, involution forms will be found in an unmistakable way after a lapse of 24 hours. Hankin and Leumann have cultivated a large num-

ber of other microbes under like conditions and in none of them have they had any approach to the appearances presented by the Plague bacilli under these conditions of growth in salted media.

The bacillus is pathogenic for rats, mice, guinea pig, rabbits, flies and other insects, and is rapidly communicated from one animal to another. After death the bacilli are found in all the organs. Furthermore, it is rapidly communicated from one animal to another. Though I am inclined to think that too much is being made of this conveyance of the disease by means of rats, nevertheless, the relationship of disease among these animals to plague in man has been noted for centuries, nay more, as I previously pointed out in this Journal,* the fact of this relationship carries us back to about 1141 B.C. in our knowledge of the existence of the Plague.

A curious fact has recently been pointed out, namely, that the known danger of handling rats that have died of the disease extends at most for 24 hours; after this period they may be handled with impunity, and it is indicated, with a fair amount of probability, that the infection is by means of the fleas and parasites on the rat's body which pass on to the hands and clothes of those taking them up immediately after death, which also in a few hours have deserted the bodies, these becoming, therefore, relatively harmless.

THE DISEASE PROCESS.

We have, it would seem, to deal with an infection occurring most frequently through the skin. It is remarkable that the primary seat of infection is in the majority of cases, unrecognizable. Light is thrown upon this peculiarity of the disease by certain observations of Albrecht and Ghon, that the disease may be induced in susceptible animals by merely rubbing some of the virus over the skin, and this even when it has not been previously shaved. In such experiments no marked local reaction need result, but the animal rapidly succumbs. As Hankin (private communication in 1897), Childe and others have pointed out, in some cases a minute reddened papule going

* Adami—Montreal Medical Journal, Vol. 24, 1896, p. 995. Since writing that account of the Plague among the Philistines, and the Trespass Offering of the Golden Emerods (buboes) and Golden Mice, I have learnt that the Hebrew word translated mice, is one which equally refers to rats and small rodents in general. While it is true that mice like rats are affected during Plague epidemics, their wandering out to open places and dying there is not so marked as it is with rats, and thus, if this word refers to rodents in general, the case in favor of the disease among the Philistines and Israelites being the Plague, becomes even stronger. Probably as a result of my note on the matter being contributed in a "Retrospect" it has been largely overlooked. I was not a little interested to come across in last Saturday's *Evening Post* (New York), April 14th, an announcement heralding this same antiquarian discovery by the same writer of a paper presented recently to the Royal Society of New South Wales!

on to vesiculation, may be seen in the very earliest stages in the cutaneous area associated with the first lymph gland which shows enlargement (primary bubo) and here may be found abundant bacilli. One of Childe's cases is peculiarly instructive: The small unopened papule with sero-pus in its apex was found exactly upon the mid-dorsal aspect of the glans penis; from it pure cultures of the bacillus were obtained, which injected into a rat, caused its death from plague. In this case the inguinal glands *on both sides* were equally affected and enlarged to the size of walnuts. Hankin has communicated to me a somewhat similar case. Rarely the local reaction at the point of infection is more pronounced and a primary carbuncle with hæmorrhages, necrotic centre and surrounding œdema, has been observed. It would seem that Roux's statement is well based, that the more marked the local reaction, the less virulent the disease and the more favourable the prognosis; the virulent germ is not arrested locally, but is conveyed rapidly to the nearest lymph gland and there sets up the inflammatory reaction which results in the development of the primary bubo.

I am, I take it, wrong in saying the nearest lymph gland, for as in the case of Professor Aoyama, the primary vesicle may be upon the hand, the primary bubo in the axilla (with in his case a somewhat rare intervening lymphangitis). It is indeed not a little remarkable how rare are buboes in the popliteal and cubital spaces. Either the main body of lymph from the extremities does not traverse the glands situated in these spaces, or the different lymph glands exhibit varying reactions to the virus. Certain it is that the glands of the groin and of the axilla are far and away the commonest seats of the primary bubo.

Next most common are the cervical glands, an indication that infection may be through the tonsils, the mouth, or the nasal mucosa. Feeding animals with the pest bacilli leads much more frequently to the development of cervical buboes than to enlargement of the mesenteric glands. I shall refer later to infection through the lungs.

In general, the course of the disease may be described as, (1). Local infection unrecognizable, or if recognizable accompanied by a minimal local reaction. (2). Affection of one or more of the group of lymph glands associated with the area of local infection, which affection at first sets up at most local swelling and pain, but no general reaction, *i.e.*, the moment general symptoms set in the bubo is already a prominent feature. (3). Following rapidly upon this local production of a bubo there is generalization of the disease—diffusion of the bacilli and their products into the blood and supervention of general symptoms.

SYMPTOMATOLOGY.

I may now rapidly note down, the main symptoms of the disease:—

I. In general, the disease shows itself with remarkable suddenness; there is an initial severe rigor, intense headache with giddiness suddenly supervening upon apparently perfect health, and rapidly developing prostration. More rarely there is a prodromal period in which the patient feels somewhat out of sorts with slight headache, nausea, feeling of weakness in the limbs and it may be some pain, more especially upon pressure in the region where the primary bubo will eventually become manifest. The intense headache and rigors are accompanied by a dry hot skin, the eyes become sunken, the features drawn, and soon a typhoidal state developes with or without coma.

II. There is definite but not particularly high fever rising rapidly to, generally, from 102 to 104°F., with tendency to remissions in the early morning hours and exacerbations in the late afternoon and evening hours, the temperature, however, may never exceed 101°. In favourable cases there may be resolution by lysis, the curve resembling somewhat that of typhoid convalescence, or more rarely by crisis. Septic complications may induce a characteristic curve.

III. Save in the fulminant and pneumonic cases, in which a primary bubo tends to be absent, a bubo, most often in the groin, next most frequently in the axilla, or again less frequently in the neck region,—is to be made out from the very beginning of the illness. An inguinal bubo is most common in adults, a cervical in children. This is, indeed, *the* "token" of the disease. It is painful on pressure, surrounded by an œdematous area, may be only just palpable, but in general is from the size of a walnut to that of a goose's egg; the skin over it is glazed and may be hæmorrhagic and vesicular. In the immediate neighbourhood of this primary bubo there may be other markedly enlarged lymph glands (primary buboes of the second class as they are termed by Albrecht and Ghon), enlarged as a consequence of direct infection through the lymph and showing similar characters. Only very rarely are there bilateral primary buboes (*e.g.* where infection has been through the integument in the midline of the body). Eventually there may be a general enlargement of all superficial lymph glands, *secondary* buboes; but these again, with very rare exceptions, do not show the same large size and surrounding infiltration and hæmorrhages seen in the primary. They are evidently due to infection of the glands from the blood stream after the germs have become generalized.

IV. Other "tokens" are carbuncles and cutaneous hæmorrhages. The latter are only seen in very malignant cases, as in the "Black Death," the former may be primary, at the seat of what is evidently the primary infection, or secondary, due like the secondary buboes to general blood infection.

V. Nervous disturbances are marked, but are very variable. The

preliminary headache and giddiness have already been mentioned. The rest, in the main, are those of the "typhoid state." The giddiness is accompanied by a characteristic walk, as of a drunken man, that of cerebellar ataxia. Sensory disturbances show themselves in the main by apathy, sleepiness or, it may be, complete coma. The speech is slow, and "far away," the eyes dull and heavy; delirium of a prolonged type, colourless (as Müller expresses it), as of a man enacting a prolonged dream, talking and gesticulating to imaginary individuals, is met with. And very characteristically this delirium often leads the patient to get out of bed and wander about aimlessly in the house or street. Defoe gives vivid pictures of this form. While the delirium may be acute, and sometimes of the suicidal, it is most often of the quiet form.

VI. The pulse from being, according to Aoyama, large and full and dicrotic at the start, soon becomes rapid, 120 and more; in cases of unfavourable prognosis, small and of low tension; in fatal cases Müller frequently counted it at 200 and over, indeed, as a case progresses to a fatal termination, the rate becomes more and more rapid. As Müller points out the plague virus is a strong cardiac poison and the pulse indicates very largely the potent effect of the disease in inducing cardiac weakness. Death would in the main seem due to direct action of the poison upon the heart muscles, or it may be, though this is not so likely, upon the cardiac nerves.

VII. Beyond epistaxis and pharyngeal (tonsillar) ulceration, the upper air passages are usually found unaffected. The lungs are usually intact, though there may at times be a certain amount of bronchial catarrh from the third or fourth day. The Bombay epidemic has, however, clearly proved the existence of one special type of Plague—pneumonic Plague. This form was first clearly differentiated by Forbes in the Pali plague of 1838, if not by Gilder at Ahmedabad in 1820. And there can be no doubt that the Black Death, the most terrible visitation known in history, was this most malignant form of the disease. At Bombay, L. F. Childe first called attention to its existence. Just as we have two main forms of anthrax in man, malignant carbuncle in which the primary infection is through the skin, and wool sorters disease (pneumonic anthrax), so it is with this disease. The patients present no very prominent pulmonary symptom; there is a cough but not very frequent, the expectoration, however, is blood stained and contains abundant bacilli—and soon there is extreme dyspnœa with cyanosis. So far, in the relatively few cases that have been studied, there have been pleuritic pains but no accompanying herpes. In ordinary Plague the respirations may rise to 30 or 40—in this condition they may be as frequent as 60 to 75. The condition is one of a lobular pneumonia and the ausculatory and other signs correspond.

What is noticeable is that the lips are dry, while, according to several observers, the tongue has a whitish or chalky surface with reddened tip and edges and it tends to be swollen. The tonsils in general are markedly swollen and reddened—more rarely they are ulcerated. It must be remembered that the frequency of cervical buboes in children would seem to be related to more frequent infection through the mouth or tonsils, even more than through the nose. The gastric juice appears to prevent primary infection of the intestines. Persistent vomiting is by many regarded as an unfavourable sign.

VIII. Wilm, at Hong Kong, is the only authority who has recorded primary plague affecting the abdominal digestive tract; other authorities are inclined to regard this as peculiarly rare, if not non-existent. With regard to the stools they are either regular or more often there is a tendency to constipation. Cantlie, Wilm and others found diarrhœa frequent at Hong Kong in the earlier stages with blood and mucus present. At Bombay this was rare.

IX. The liver, spleen and kidneys present no constant disturbances recognizable clinically. According to Yamagiwa and other recent observers, the amount of urine is diminished, albumin is generally present, but in relatively small quantities. The urine is often of a dark colour and contains indican (Aoyama), chlorides are diminished. There would in short appear to be a not very marked febrile nephritis. Bacilli have frequently been found in the urine—hæmaturia is rare.

PROGNOSIS:

Cases are on record in which the individual without previous warning has dropped down as if struck by lightning (? heart failure) several in which death has resulted within four or five hours from the first onset of symptoms. Death most frequently occurs within five days. If the patient survives for six days, the prognosis becomes on the whole favourable, being distinctly favourable after the eighth day is passed. Where death occurs late, or in the second or third week, it would seem that secondary septic infection is mainly responsible. Suppuration of the buboes, which many hold to be a favourable sign, does not by any means indicate secondary infection—for the Plague bacillus itself can induce true pus production.

TREATMENT:

No specific treatment by drugs has as yet been discovered. Digitalis and cardiac tonics have not been found to effect any definite improvement; nor again the surgical removal of the primary bubo. Already when this becomes noticeable the bacilli are abundant in the surrounding œdematous and hæmorrhagic infiltration. The seat of infection is so often

unrecognizable and when present is so indefinite that little in the way of cure is to be expected from excision.

In this last epidemic as in those of centuries ago, the physician has found himself wholly at a loss to influence the disease by means of drugs of any order; at most an attempt can be made to mitigate individual symptoms. One exception must, however, be made to this sweeping statement; the researches and observations of Yersin have undoubtedly shown that in a certain number of early cases—in which the treatment has been begun at an early stage—the injection of plague serum is effectual. This serum is obtained by accustoming a horse to stand larger and larger doses of the toxines of the Plague bacillus and eventually of the most virulent bacilli themselves. But no small difficulties stand in the way of successful treatment by this method. In the first place, the process of successive injections of horses takes a very long period; in the second place, it would seem clearly that individual horses vary greatly in the amount of antitoxic substances which they develop in their serum and to these two causes we must largely trace the ill success that followed the use of the serum sent from the Pasteur Institute, Paris, to Bombay. In the third place, the amount of serum obtainable from an individual horse is limited and as a consequence the serum is costly and difficult to obtain in any large quantity. In the fourth place, as already hinted here, as is true also in connection with the diphtheria serum or antitoxine, success or ill-success depends very largely upon how soon after the supervention of symptoms the treatment can be applied. In Plague, the infection becomes so rapidly generalized throughout the system, that in severe cases, however soon the treatment may be commenced the infection of the body in general is already so intense and the amount of toxines produced so extreme that, whether the antitoxines directly neutralize the toxines or whether they serve as stimulants, stimulating the tissues to react against these toxines, no amount of serum is adequate to arrest the progress of the disease. However, it must be remembered that we are only at the beginning of serum therapy and it may still be that within the next few years great advances will be achieved. So far, it is true, it is only along these lines that at the present moment we recognize any possible means of influencing the course of the disease.

PREVENTIVE MEASURES:

It is not necessary here to lay down the duties of the quarantine service and to point out the means whereby the disease can be hindered from entering the country. But a few words may be said concerning those points in which the Plague possesses characters of its own demanding for it special treatment. In the first place, it is a peculiarly contagious disease; its spread is rarely by the water or again by the

air, whereby I mean to indicate that the bacilli exposed to the air and sunlight are very rapidly destroyed, and as a matter of fact it is only those in the very immediate neighbourhood of patients, those brought into contact with them or with diseased animals (rats, mice, cats), or again with the soiled linen of patients—who are likely to contract the disease. Thus is it that at the beginning of an epidemic the spread is characteristically from one member of a household to another and from one household to another according to the intercourse between the households. It was found in India that if an infected house be left untenanted for twenty days with windows and doors open, that in itself was sufficient to permit families to reoccupy it with complete immunity.

These facts would seem to have been recognized and acted upon centuries ago, for in what are the first serious general enactments against the Plague, the orders of the Privy Council promulgated in 1605 and brought into force rigorously in 1665, searchers were appointed to detect cases of Plague by house to house visitation; infected houses were marked and guarded, their inhabitants isolated under compulsion and prevented from leaving within a period of six weeks—a "true quarantine." In short the "Leicester System" was here for the first time introduced, and Defoe devotes many pages to show how impossible it was. Such isolation is only possible when an epidemic has been detected at its very onset and the affected households are very few in number, and even then can only be enforced when the population is awake to its importance.

What then is to be done? If as already stated the disease be immediately detected, the sick must as immediately be separated from the apparently healthy members, for once it enters a household, surely and not too slowly the tendency is for the members to be affected. But also those of the household who are apparently healthy must be segregated, and inoculated with Haffkine's vaccine, the house disinfected and kept empty for three weeks or more. Segregation was easy of accomplishment in India. There, thanks to the warm climate, whole villages, nay, whole towns, could be turned out of doors into temporary tents and huts. Here, and in European countries, such segregation would present almost insuperable difficulties, while, as Hankin has pointed out to me, it is by no means certain that we could so surely disinfect our many storied and solidly built houses with the same thoroughness with which they disinfected the one or two-roomed hovels in the East with their solid floors and absence of crannies. It comes to this, therefore, that as in the case of small-pox, vaccination so soon as the Plague is heralded in a community, is a sounder hygienic measure than is segregation.

PREVENTIVE INOCULATION:

We owe to Haffkine the discovery as well as the employment upon a very large scale, of the method of vaccination against this disease. Previous experience has shown that preventive inoculation may be produced either by the setting up of a mild form of the disease, or again by introducing dead microbes in their culture media into the system, when the organism reacts against the products of the bacteria which gradually diffuse out of them in the same way as it reacts against the products that are produced when yet they are alive; lastly, one may employ the products which by chemical methods have been separated from the bodies of the bacteria and from the culture fluids in which they have grown.

In connection with cholera, Haffkine found that he could employ the actually living bacteria which, inoculated under the skin, lead only to local effects but confer a general immunity. In connection with Plague this cannot be done with safety, hence he was obliged to employ a method which has not such lasting effect or results, but which nevertheless, is effective—that of inoculating the dead bacilli—and he used the dead bacilli plus the broth in which they had grown rather than this broth alone free from the dead bacilli, because it has been found that the toxic substances formed by this germ only diffuse out very slowly and as these are difficult to separate from the bodies, this inoculation of the bacilli themselves seems to be the simpler process and one likely to yield results most nearly corresponding to those brought about in the actual disease.

Balfour Stewart has recently pointed out that the fluid of growth contains substances which to some extent neutralize the toxines contained in the bacilli themselves, thus indicating a sound reason for Haffkine's procedure, the reaction not being so severe when this fluid is injected along with the bodies of the bacilli, while the immunizing effects are equally potent.

It is unnecessary here to enter into the exact method employed by Haffkine in preparing his fluid, nor again does time or space permit that we should give here a detailed account of the methods employed by Haffkine to test the value of that fluid. We have referred to this previously in this Journal; suffice to say that the latter methods were so complete that in some cases Haffkine was able to inoculate half the population of a village, leaving the other half uninoculated. In every case, except that of the Bulsar inoculation, the treatment has had a considerable effect in warding off plague attacks from the inoculated and in every case, without exception, it has rendered attacks among the inoculated less fatal than the attacks among the uninoculated. Thus comparing 20,225 uninoculated inhabitants of Plague stricken districts

with 22,967 who had been inoculated, the number of Plague deaths among the former was 980, among the latter 118, or, the percentage of death was 4.8 uninoculated and 0.5 inoculated. In other words, the uninoculated had a mortality nine times greater than the inoculated.

As pointed out by the Indian Plague Commission, Haffkine's system cannot as yet be regarded as complete, nevertheless this Commission (which throughout its report assumes a curiously hostile tone) can only conclude that the inoculation sensibly diminishes the incidence to Plague attacks and Plague deaths; that it confers protection which certainly lasts for some considerable number of weeks, possibly for a number of months. They point out that it is generally recognized that within the first week or first few days after the inoculation has been performed, it does not appear to confer any great degree of protection and that yet better results will be obtained when an accurate method of standardizing the fluid has been devised. It may, indeed, be said that not only is inoculation not protective during the first week or so after the operation, but actually there may be increased danger, provided that the individual is already infected, for inoculation definitely adds to the amount of toxic substances circulating in the system. But this is only what has long been recognized in connection with vaccination against small-pox. It is evident that a certain amount of time is necessary for the reaction on the part of the tissues to develop itself and for immunity to be produced, but this fact is no argument against the anti-Plague inoculation during periods when Plague is epidemic any more than it is an argument against vaccinating when there is a threatened epidemic of small-pox in a community.

With regard to standardizing the fluid, Lustig and Galeotti have developed a method which seems as though it may give much more constant results, though possibly the extent of immunity conferred by it may not be so prolonged as by means of Haffkine's original fluid. Employing Buchner's method they treat cultures of the bacilli with caustic potash and thus dissolve out the bacteria and obtain eventually their nucleo-proteids. The substance thus gained is extremely toxic for several animals when employed in any quantity. It can be dried and kept for considerable periods, can be dissolved in a solution of carbonate of soda and injected under the skin. By inoculation of small quantities of this, they were able at Bombay to immunize rats, guinea pigs, rabbits and monkeys. They found further that the immunizing substance was innocuous in the case of man, no troubles of any kind arising from the come contaminated. The exact dose can easily be determined and used without difficulty which is not the case with Haffkine's liquid. Thus we await with considerable interest to see the effect of these nucleo-proteids when applied to those in a Plague district.

CLINICAL LECTURE ON GALL-STONE SURGERY DELIVERED AT THE MONTREAL GENERAL HOSPITAL.

BY

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Gentlemen: This woman was transferred from the medical side complaining of "pain in the right side" and "swelling of the stomach." The history of the present illness began in April last, when she first felt a sharp, shooting pain in the right side just below the margin of the ribs. The pain gradually became more severe and there was shortly afterwards noticed a swelling in the situation of the pain. She says that her family physician succeeded in relieving the pain and that the swelling gradually subsided and disappeared. About the first of October, however, the pain and swelling both returned, and persisted until her admission to this hospital, in Ward A. under the care of Dr. Finley, on the 3rd of January, 1900. She was transferred to the surgical side on the 13th January, 1900. We found, on examination, a well defined tumour about the size of a goose egg, occupying the space immediately below the liver and extending laterally from a point a little to the right of the median line nearly to the nipple line. It can be distinctly felt, moves upwards during inspiration, and yields a flat note on percussion. Below, it extends down nearly to the level of the umbilicus. The liver is not enlarged: the spleen is not palpable. The patient is a well nourished woman, 35 years of age; she is married, and has had three children; she says that she has never been jaundiced. Her temperature and pulse are normal; urine normal. On the 16th January I removed 28 gall-stones from the gall-bladder; they are contained in this bottle which I pass around for your inspection.

This other woman, 46 years of age, was also transferred from the medical side. Dr. Finley's diagnosis was tuberculosis of the serous membranes, with probably also a condition of cholelithiasis. She has had a considerable serous effusion in the left pleura with displacement of the lung and heart, and some considerable ascites as well. In addition to the symptoms of tuberculosis of the serous membranes, she has for some months suffered from pain in the region of the gall-bladder. Before operation, a large, ovoid swelling could be felt below the ribs on the right side. This mass moved up and down with the liver during respiration. Neither of these patients have ever had jaundice. I operated on this

woman on the 15th January last. On making a vertical incision over the tumour mass, I at once came upon a largely distended gall-bladder. After drawing off several ounces of perfectly clear fluid, I enlarged the opening in the gall-bladder, and found this large stone lying partly in the gall-bladder and partly in the cystic duct. It measured 4½ inches around in one direction, and 2⅝ inches around in the other direction. By careful manipulation I succeeded in pushing it forward out of the cystic duct into the gall-bladder, and removed it entire. The gall-bladder opening was then stitched to the edges of the peritoneum in the abdominal incision and a rubber drainage tube inserted for a few days.

This bottle, which I now pass around, contains 41 gall-stones removed from the gall-bladder of a man, aged 75, a private patient. These patients have all made an uninterrupted recovery.

Although the history of cholelithiasis dates back to at least the year 1618, when Johann Fabricius removed a stone from the gall-bladder, yet the modern surgical treatment was only perfected in 1878 by Marion Simms. In the same year Kocher published a case of cholecystotomy. The surgical treatment of gall-stones was still further brought before the notice of English surgeons by that genius, the late Mr. Lawson Tait, of Birmingham.

At the present time, the treatment of cholelithiasis is surgical. I am not aware of any drug that can materially influence the formation or solution of gall-stones, although many people suffer at intervals for years from gall-stone colic and sometimes pass stones which are found in the stools, the symptoms finally ceasing to occur. Gall-stones are exceedingly common, having been found in Strasburg in one out of every ten autopsies. They are said to be five times as frequent in women as in men. This is probably due to repeated pregnancies, to tight lacing, and to floating kidneys.

The cause is, first, slowing or complete arrest of the flow of bile and, secondly, infection. The infection is of the bile passages and gall-bladder by the colon bacillus, the typhoid bacillus, streptococci or staphylococci. The first result is a catarrhal or purulent angeiocholitis and cholecystitis. The epithelial cells of the bile passages and gall-bladder are decomposed and cholesterine set free.

Gall stone formation, however, it must be remembered, does not always follow the infection of the bile passages. In some instances, particularly if the microbic infection be virulent, it may result in a severe angeiocholitis attended by chills, fever, vomiting, pain across the liver, enlargement of the liver, and the formation of pus in the bile passages. This may result in empyæma of the gall-bladder and, sometimes, great thickening of the walls of the gall-bladder and bile ducts. Localized

peritonitis and, possibly, perforation may be sequent in severe cases, resulting from virulent and wide spread infection.

Again, I think I may say that occasionally a gall-stone may be formed without distinct evidence of infection, as for instance, in the second patient from whom I removed the large stone. The fluid contained in the gall-bladder was sterile. This, however, is a fine point to be determined by a careful examination of a large number of similar cases by the pathologist and bacteriologist. But, as a general rule to which there are certainly few if any exceptions, gall-stones are the result of two factors: slowing of the bile flow and infection of the bile passages.

The gall-bladder is sometimes found much distended, containing 20 or 30 ounces of mucus, or mucus and bile mixed. In these cases the walls are thin. We then call it hydrops of the gall-bladder. The mucosa and muscularis are atrophied. In other cases the walls are thickened, contracted and shrunken.

When the gall-bladder is found distended with clear mucus, the cystic duct is generally occluded. In fact, when such a condition is found, it may be safely asserted that a stone completely blocks the lumen of the cystic duct, as was found in the second case. The bile cannot get into the gall-bladder, and the clear fluid is the secretion of its mucous membrane.

We sometimes find a stone or several stones of considerable size in the common or one of the hepatic ducts. Tait reported cases in which he removed stones from the substance of the liver, lying in a dilated duct or in the tissue alongside the duct, which has escaped by ulceration. I have sometimes found the walls of the common duct, immediately surrounding a stone, very much thinned. Another common situation for a stone is in the dilated duodenal end of the common duct in the ampulla of Vater. In these cases the stone would seem to become engaged in the duodenal orifice of the duct, occasionally giving rise to pain and recurring jaundice, and then dropping back into the ampulla. While it is engaged in the opening of the duct into the duodenum the bile cannot escape; hence the icterus.

In many cases of cholelithiasis the liver is found enlarged. Whether this enlargement is ever the result of the presence of the stones in the bile passages is perhaps a debatable point. Certain it is, however, that a lacing lobe and an angeiocholitis with enlargement, are active predisposing causes of cholelithiasis.

The presence of stones in the bile passages is in a certain number of cases followed by developments of a most serious, and sometimes of a disastrous nature. Among these complications may be mentioned, adhesive inflammation between the liver, gall-bladder and gall ducts, on

the one hand, with the omentum, stomach, duodenum, and transverse colon. The development of this adhesive inflammation is generally indicated by the occurrence of fever, chills, pain, and the development of sepsis or intestinal obstruction. Indeed, it is those complications which not infrequently lead the patient to consult a surgeon.

Another very serious complication of gall-stones is perforation. If this occurs after adhesion has taken place between the gall-bladder and adjacent hollow viscera, the bile and the stone may escape into the stomach, the duodenum, or the colon; and this occurrence is sometimes followed by a cure. Again, the gall-stone may escape from the bladder or common duct, and be then retained by adhesions. Here an abscess may form around the stone, and a communication be established with some hollow organ. In one instance, I found several stones in an abscess cavity communicating above with the gall-bladder and below with the transverse colon. Not always, unfortunately, does nature proceed in this conservative way. It sometimes happens that perforation occurs before limiting adhesions have formed, and infection of the general peritoneal cavity results. Courvoisier states that in about one-fourth of the cases, perforation takes place into the abdomen with general infection of that cavity. Quite recently I saw such a case. The patient had suffered for years from recurrent attacks of hepatic colic. When I saw her, the abdomen was enormously distended and tympanitic. She was livid, pulseless, with cold extremities, and almost complete supression of urine. She was in fact moribund from general septic peritonitis. The attack came on as one of her usual attacks of hepatic colic. Her family physician had attended her during several similar attacks and the peritonitis had developed very rapidly. Of course nothing could be done for her surgically in her then collapsed condition, and the end came about twenty minutes later.

This large stone, which I now pass round for your inspection, has an interesting history. I removed it from a lady whom I had attended for several years. About six months before operation she felt pain in her abdomen, and she herself diagnosed appendicitis. This she told me afterwards. Thinking that if she sent for me I would at once propose operation, she decided to try a physician and to be treated medically. To attain her object with still greater certainty she sent for what is called an "irregular," who treated her with some nice little sugar pills. Her recovery, however, was not very satisfactory, and more or less abdominal pain continued during the summer. When at last I was asked to see her, I found her very seriously ill. She had been vomiting almost continuously for thirty-six hours. At the time of my first visit the vomiting was distinctly fæcal. She told me that she had taken several

purgatives and an enema, but that nothing had passed her bowels for forty-eight hours. The abdomen was considerably distended, generally tympanitic, and tender under pressure. Her temperature was about 101° F., pulse weak and rapid, the face pinched and anxious looking. There was evidently present an intestinal obstruction and, from the history given of appendicitis, I thought probably I had to deal with obstruction by a band. On making an incision in the median line distended and collapsed small intestines were at once seen. I followed up the collapsed bowel to about the middle of the ileum, when I came upon this stone lying in the gut and completely occluding its lumen. I removed it, and the patient made a most satisfactory and complete recovery. The stone is much larger than is usually found, its circumference in one direction being $3\frac{3}{8}$ inches and in the other $3\frac{3}{4}$ inches. The appendix was found quite normal, presenting no evidence whatever of ever having been inflamed. This stone, of course, did not enter the intestines through the common duct. An adhesive inflammation occurred between the gall-bladder and the duodenum, and the stone passed through into the gut as the result of an ulcerative process breaking down the adherent gall-bladder intestinal wall.

As regards the size and number of stones, if you recall the operations that you have seen and examine the collections of gall-stones in the museum, you will find that, as a rule, there are a number of small stones,—the number in a given case sometimes running up into the hundreds and thousands,—or, if the stones are large, there are seldom more than two or three. One rarely finds a large stone associated in the same patient with a large number of small ones.

Gall-stones are sometimes found in association with malignant disease in the neighbourhood of the bile passages. What their relation etiologically to the cancer is, has not yet been definitely determined, but many surgeons think that in some way they prodispose to a local malignant growth, and that this is an additional reason for removing them. This is my own view.

The symptoms of gall-stones are not all uniform. In a great number of cases there are no symptoms at all. And when symptoms do develop they are not at all uniformly those of hepatic colic. Patients often complain of stomach distress and fullness, discomfort after eating, and loss of appetite. When attacks of severe pain in the epigastric or right hypochrondriac region recur at intervals, accompanied by vomiting and tenderness over the region of the gall-bladder, the nature of the trouble begins to be apparent. If, added to these symptoms one can feel a rounded tumour mass in the right hypochrondrium, and which moves with the liver during respiration, the diagnosis becomes pretty clear.

If the attacks are followed by jaundice, then one can feel almost positive that the symptoms are due to gall-stones. The diagnosis of gall-stones without jaundice is always more difficult.

The differential diagnosis must be made between gall-stones and certain conditions of the stomach, particularly ulcer, movable kidney, appendicitis, and echinococcus cyst. Mistakes in diagnosis are most frequently the result of imperfect and careless examination of the patient. Gastric ulcer is more common in pale, anæmic girls, and at an age when gall-stones are rare. Moreover, the symptoms of gastric ulcer usually bear a more direct relation to the taking of food than do the symptoms resulting from cholelithiasis. The point of maximum tenderness in gastric ulcer is not, as a rule, outside the border of the rectus, but more central.

Movable kidney can be palpated. In examining for movable kidney, the patient should always be examined in the erect as well as in the recumbent position. Movable kidney is well over to the right, and can be made to disappear behind the ribs. A distended gall-bladder can never be made to pass away up in the loin out of reach. Again, in cases of movable kidney, there are often present alterations in the urine and vesical tenesmus.

Appendicitis generally gives a clinical history quite different from gall-stones. The point of greatest tenderness is lower and recovery more slow and prolonged. The occurrence of jaundice would not be expected in appendicitis.

It is sometimes very difficult to decide in elderly patients whether one has to deal with cholelithiasis or malignant disease of the pylorus or in the neighbourhood of the bile passages. But this I can say, that there may be very considerable loss of weight from gall-stones and jaundice, even when there is no very severe pain. Too much importance should not be attached to the fact that the patient is losing weight. This was very strongly impressed upon me a few years ago. An elderly woman was admitted to ward K, complaining of weakness and loss of weight. She was somewhat jaundiced, but not at all deeply so. She did not complain of any pain. There was an indistinct feeling of a mass in the neighbourhood of the pylorus, but I could not make it out definitely. In the region of the gall-bladder there was a little tenderness on very deep pressure, but nothing more. Her only complaint was that she "was so weak and all wasting away." I decided in my own mind that I had to deal with malignant disease, and that the physical condition of the patient did not warrant an operation. Some of my colleagues, however, urged an exploratory incision and this I undertook, not without some misgiving, and a feeling that the woman would not be

benefited. I found on opening the abdomen no sign whatever of cancer, but, from a small contracted gall-bladder, I removed 648 small gall-stones and the woman got quite well and was in perfect health three years later. This case and many others have taught me that, in cases of doubt, to make an exploratory incision is sometimes an imperative duty to the patient.

In regard to echinococcus cyst I have very little experience. It is a rare condition in Montreal, although quite common, I believe, among the Icelanders in Winnipeg. Here, again, if in doubt, an exploratory incision should be made.

Having, after a most minute and careful examination of the patient and thoughtful consideration of the subjective and objective symptoms, decided that the case is one of cholelithiasis: what is the prognosis and treatment?

As to the prognosis, I have outlined it pretty well in giving the natural history of the disease. In many cases, after a certain time, the stones are either passed in the stools or they in some way become quiescent and cease to trouble. If they continue to recur, some means of ridding the patient of such a painful disease, and one moreover so liable to most serious complications, should be considered.

I am not aware of any drug that can be relied upon to accomplish this. The soda salts may be given a fair trial. I do not know that the phosphate, which has been held in high esteem, is more efficient than the carbonate. The surgical treatment of gall-stones is safe and satisfactory. There are very few recurrences. If the symptoms continue, after a reasonable trial has been given to dietry, the removal of tight bands around the body—generally tight corsets—and the administration of soda, you can confidently advise operative interference. The mortality is very small and the danger less than the possible results from delay. As to the technique of the operation, I have dwelt upon it very fully when operating and need not repeat it now.

GONORRHŒA IN THE FEMALE.*

BY

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Gonnorrhœa in woman, as in man, may affect only a part or the whole of the genito-urinary tract. Invasion to this latter extent is certainly exceedingly rare. Certain parts are much more liable to be affected than others. This is partly due to the greater liability to infecting contact of some parts of the tract than others, but it is also, and perhaps mainly, due to the relatively greater vulnerability of some parts than others. The urethra, cervical canal, and fundus of the vagina are much more liable to suffer than the vulva and other parts of the vagina. It is a fact beyond dispute, that those portions of the tract invested by cylindrical epithelium suffer much more than those covered by the pavement variety. Cystitis is not a common result of extension, still less so are ureteritis and renal pyelitis. But instrumentation of the bladder, as by the catheter, may easily convey the infection to the bladder, and thence to the ureters and pelvis of the kidney.

After Neisser, the discoverer of the infective agent, the gonococcus, we owe to Bumm, of Basel, more than to any other worker, the best original work on gonorrhœa in woman. The bacteriology of this disease is especially difficult to study because of the limited culture media on which it can be gotten to grow. The gonococcus is certainly often difficult to find in cases in which, from the history and clinical characters, there can be no reasonable doubt of the existence of the disease. This fact is especially true of the subacute and chronic type of case. It is, however, no doubt true, as asserted by Neisser and Bumm,—and Professor John G. Clark, of Philadelphia, agrees with them—that in every case repeated careful search will always be rewarded with success.

That a man with acute or subacute gonorrhœa will certainly infect a woman with whom he has intercourse, will be denied by no one. That a man suffering from the so-called gleet is dangerous, appears to be by no means so generally admitted. The late Dr. Nœggerath, at that time of New York, read a paper on latent gonorrhœa before the first annual meeting in 1876 of the American Gynæcological Association. He had previously, in 1872, published a monograph on the same subject in the German language. In this paper he announced his belief, based on

* Being part of a Discussion on Gonorrhœa at the Montreal Medico-Chirurgical Society, Jan. 5, 1900.

careful observation, that a man, who has once had a gonorrhœa, is rarely if ever so completely cured that he may safely marry. At the American Gynæcological Association, Dr. Nœggerath's views were received by most of his hearers with a howl of derision. But it set the more careful and thoughtful to observing and thinking, and the result is that now, the doctrines inculcated in that paper are to a very great extent accepted. There is much reason to fear that by some surgeons, and especially by a large proportion of the general profession who treat gonorrhœa in men and advise them on the question of marriage, the vital truth is not realized, that a man with even the minutest trace of gleet may infect his newly married wife with gonorrhœa. And what is the result? Hundreds of innocent young wives are infected by a loathsome and painful disease, from which, it is true, many recover, but by which, also, many others are made invalids, more or less, for the rest of their lives. Those who recover symptomatically are often rendered sterile, or if pregnancy occur, it is the dangerous tubal pregnancy or if uterine it ends in abortion. Still others lose their lives or are only saved from death by a mutilating, unsexing operation.

It is important to bear in mind that the disease can be conveyed in other ways than by the sexual act. Such are infected towels, vaginal douche pipes and other instruments, and the unclean fingers of the medical man. Children sleeping with infected nurses have often acquired the disease. As is the case with all infective agents, the personal equation affects the degree of vulnerability, some being much more vulnerable than others. Complete immunity is probably never acquired by either sex.

Pathology.—Bumm's researches on the pathological anatomy of gonorrhœa have much practical importance. He insists on the fact, that in no part of the genital tract do the gonococci penetrate beneath the epithelial layer. Others, however, in isolated cases claim to have found the organisms in the muscularis. While in the vagina, uterus, and Fallopian tubes we may find infiltration and other evidences of inflammation, the minute structure of such parts shows, for the most part, only a rich round-celled and leucocytic infiltration. When once deposited on the surface of the membrane, the growth of the gonococcus is exceedingly rapid and luxuriant. Then, immediately, an acute, rapid transmigration of leucocytes takes place, causing swelling and the purulent discharge. In the female of an age at which exposure to infection ordinarily occurs, those parts of the tract invested by cylindrical epithelium, as previously stated, are much the most vulnerable. In them the skin-like condition of the vagina enables it to resist, but it is otherwise in the child and senile woman. In these the vulva, vagina, and vaginal surface of the cervix, easily suffer:

When the Bartholin glands suffer, Bumm asserts that it is the efferent duct alone that usually is affected, and Judassohn, another observer, believes that this is due to the germicidal action of the secretion of the glands. The efferent ducts often become occluded, and then the gland becomes a retention cyst, and when this is evacuated by incision, the gland recovers. In such cases the acini of the gland are merely compressed. When a true abscess forms, this has been proved to be due to pyogenic infection. In the uterus and Fallopian tubes, as in the vagina, the gonococci confine themselves to the epithelial layer. They do not even deeply involve the glands. The changes found in the walls of the uterus and tubes are due to round-celled infiltration and transmigration of leucocytes. The extension of the disease to the ovaries, as is well-known to every gynæcologist, is exceedingly common. The discharge escaping from the abdominal end of the tube infects the ovary, and sets up localized peritonitis with the formation of adhesions, which envelop or encapsulate the end of the tube and ovary, and, as a result, we have the well-known pyosalpinx. An abscess in the ovary is due to the infection of the Graafian follicles or corpus luteum. Under these circumstances one often finds one or more collections of pus in the ovary, possibly compressing the structure, but apparently not much otherwise altering the organ.

There is very little evidence to show that the gonococcus can long live on the peritoneum. Bumm believes that it cannot set up general peritonitis. In a very large experience of the gonorrhœal affections of the uterine appendages requiring operation, I have certainly never met with a case. In this connection the experiments of Maslovsky on rabbits, guinea pigs, and mice, are interesting. The results seem to prove his contention that suppuration of the tubes and ovaries in gonorrhœa is due, not to the gonococcus, but to its toxines. It is certainly very rare that the gonococcus or any other organism can be found in the pus of gonorrhœal pyosalpinx or ovarian abscess, after the acute stage is some time past. Maslovsky's papers have appeared in recent numbers of the *Annales de Gynæcologie et d'Obstetrique.*

On the question of the incubation period, Bumm's experiments with inoculations of pure culture of gonococcus are interesting and somewhat at variance with ordinarily observed, clinical facts. He found that inoculation of a pure culture on the genital tract resulted in evidences in twelve hours, and well marked symptoms in twenty-four to thirty-six hours, whereas, from five to seven days usually elapse after ordinary exposure before the symptoms develop.

Symptoms.—To enter fully into a description of the symptoms of gonorrhœa in a discussion such as this, would be manifestly improper. The

pelvic aching, scalding of the genitals, and profuse, fœtid, purulent discharge, are strongly suspicious; and the discovery of the biscuit-shaped gonococcus completes the diagnosis. It is in its chronic form, so very common, and there are many cases in which no history or description by the patient of an acute stage is to be had, that one must be on the look-out for certain very characteristic features of this stage of the disease. The patient, being instructed to retain her urine, is placed on the examining table and the parts exposed in a good light. The vulva generally is often apparently healthy. The urethra must be carefully examined. If discharge have not been washed away by the stream of urine, we will usually find it in evidence. The orifice will be swollen, red, and pouting especially in the floor of the canal. Pressure by a finger in the vagina on the urethra from within outwards, will reveal the discharge if it cannot be had without. Besides a discharge from the canal generally, which in very chronic cases may be entirely absent, a discharge will become apparent escaping from the Skene's tubules. Then the Bartholin glands and their ducts must be compressed, when from the middle or neighbourhood of the red patch, which surrounds or lies near the orifice of the gland duct, pus will often be found to exude. In such discharge the gonococci can usually be found, although perhaps only after repeated examination. The vagina must next be inspected. It may be found to be generally reddened and bathed with pus, possibly, however, only at the fundus or in the form of red points on the ridges of the rugæ. The vagina, however, will often appear to be quite healthy, while the more vulnerable mucosa of the cervical canal with its cylindrical epithelial investment is found affected. The busy gynæcologist or general practitioner cannot always be looking for the gonococcus. I believe it to be a good working, clinical rule to accept as very fairly certain evidence of chronic gonorrhœa, a persistent, purulent discharge from the Skene's tubules, Bartholin gland ducts, and the cervical canal. To search for the Neisser coccus a good microscope stand with Abbe condenser and a twelfth oil immersion objective are necessary. I append Professor J. G. Clark's instructions in his own words:—"For clinical purposes methylene-blue solution is a practical and easily manipulated staining fluid. The secretion may be spread out on a cover glass or on a slide, the latter being usually the better. If it is very small in amount or rather thick and viscid, it may be diluted slightly with a drop of normal salt solution. After spreading it evenly, it is dried by passing it a few times over the flame of an alcohol lamp or gas burner. Methylene-blue solution is then dropped upon the slide and allowed to remain for one-half to one minute, and is then carefully washed off in running water and dried with a bibulous paper or with a clean white

handkerchief. It is not necessary to protect the stained area with a cover glass for it may be inspected directly with a high power or (which is always preferable) with a one-twelfth oil immersion lens.

To be certain of the diagnosis the gonococci must be found inside of the pus cells. While the presence of buscuit-shaped cocci in pairs free in the secretion without the association of other bacteria, is very significant, it is nevertheless, unsafe to make a positive diagnosis. One should never be content with one search, for the gonococci may be found in a certain number of cases only after a repeated examination. In one instance, which I recall, at least twelve negative examinations were made on different days before the gonococci were at last found; in this case the history and symptoms so strongly pointed to gonorrhœa, that the examination was not abandoned until we were rewarded by finding a very large number of intracellular organisms." As to the value of this method of establishing the diagnosis, I fully concur with the opinion of Dr. Clark, when he says, that "there has been considerable dispute, but there is now a general consensus of opinion as to its value. In some instances in which I have been unable to find the gonococci, even after repeated examination, the symptoms have been so characteristic that I have felt justified in making a tentative diagnosis of gonorrhœa, under the assumption that the micro-organisms were concealed."

When the uterine body is involved, the organ is somewhat bulkier, firmer, and tenderer than normal, and it gives out a thin purulent discharge. Invasion of the tubes and ovaries, besides by the symptoms of pelvic inflammation, is revealed by tenderness and increased resistance of structures in the region of the appendages, and in a short time, by more or less well-defined masses.

Prognosis. There is, perhaps, the danger that the gynæcologist may overestimate the gravity of this disease, inasmuch as the worst cases are those he is most likely to see if he operates extensively. There can be no doubt that a percentage of cases recovers perfectly, in the sense that not only symptoms and physical signs disappear, but the great function of successful pregnancy is restored. A successful full term pregnancy is, however, not to a certainty followed by a normal labour and puerperium, for a latent gonorrhœal infection may be roused to activity or a mixed infection be set up.

Incomplete recovery is exceedingly common in the case of involvement of the appendages, and in many instances more or less complete invalidism is ended only by an operation for their removal. I have already alluded to the very chronic course of the disease in the urethra, especially the Skenes' tubules, the Bartholin glands, and the cervix. In this stage and in these situations, though attended by almost no symptoms, it can undoubtedly be communicated.

Treatment. In this part of the discussion I prefer to be suggestive rather than to fully describe. Concerning the treatment of the acute stage, there is the widest difference of opinion between such authorities as Bumm of Basel, Behrens of Berlin, and Neisser, than whom there are no authorities deserving of more respect. Bumm and Behrens are opposed to all local treatment as by douches, etc., because of the risk of carrying the disease from the vulva and urethra to the upper parts of the genital tract. Neisser, on the other hand, urges the prompt, energetic and persistent use of germicides. In this, as in so many other instances of radical differences of opinion between high authorities, a midway course of action is probably the safest.

In the acute stage the patient must be put to bed and kept there. The diet should be unstimulating, the bowels regulated by saline purgatives, and warm hip baths and frequent soothing irrigation of the genitals be employed. The use of linseed tea by irrigation and douche is very grateful to the patient. The acute stage having passed, germicidal douches of permanganate of potash 1—5000, bichloride of mercury, 1—5000 to 1—2000 or formaldehyde, 1—1000 to 1—2000, each well tried and reliable, may be employed. The toxic sublimate must be cautiously used. For the best results the vaginal douche must be taken or administered in the dorsal position on the bed pan. If the patient lie still for a time afterwards there is, in the condition of the parts in many women a tendency for a pool of the poisonous solution to remain in the vagina from which it may be absorbed. The sublimate douche should therefore be followed by a small quantity of warm water. But the vaginal douche must be considered as merely accessory to the careful, thorough application to the whole of the affected surfaces of what I consider the most effectual of all remedial agents, silver nitrate solution in strength of from 20 to 60 grains to the ounce of water. This cannot be done thoroughly in any way other than with the patient in the Sims position, through the Sims speculum. The surface to be thus treated must be wiped clean and dry and the solution thoroughly applied by the swab with pressure, till every part is whitened. If the relatively new and, as they are claimed by their advocates, much less painful protargol and argonin be equally efficacious, they will be valuable acquisitions. They may be used in strength of from 1 to 3 per cent. Simiarly the urethra and especiallv the Skene's tubules, the ducts of the Bartholin glands, and the cervix must be treated by careful topical applications of the same remedies.

The urethra and cervical canal may be best treated by instillation of the solutions, the Skene's tubules and Bartholin glands efferent ducts, I treat with a small, slender nozzled syringe, such as is used by the

ophthalmic surgeon for the treatment of the canaliculi of the nasal duct. For all the accessible areas affected by the disease the use of a 5 to 10 per cent. solution of ichthyol glycerine is advocated by Bumm and endorsed by Clark. This remedy may be used on pledgets of gauze or tampons left *in situ* in the intervals of the applications of the silver salts.

In the treatment of the uterine cavity in all but the most advanced chronic stage, local treatment by curetting, douches, or other must be avoided. In the early stage, instrumentation of the cavity of any kind is very apt to lead to extension to the tubes and ovaries. This is a lesson I have learnt by personal experience and it is in line with the experience of other gynæcologists.

In the management of the gonorrhœal affections of the Fallopian tubes and ovaries those who, like myself, have had experience of these cases before the advent of the modern, all invading extensions of abdominal and pelvic surgery, will, I think, be inclined to counsel time and patience. By long rest in bed, good nursing, and judicious symptomatic treatment, a fair percentage of such cases will get well; so well, as already affirmed, that now and then one may witness a restoration of the highest function of the sex,—a favourable pregnancy and labour. On this point I personally have strong convictions, all the more so because if operation be inevitable the longer the interval since the acute symptoms have subsided the more favourable will be the subsequent course of the case. The fact of the extreme rarity of general peritoneal gonococcus infection, if it ever occur, strongly supports such a course of action.

The reader in search of further information on this subject may be usefully referred to the monograph on gonorrhœa by Bumm in the first volume of Veit's "Handbuch der Gynäkologie," to Professor John G. Clark's "Critical Summary of Recent Literature on Gonorrhœa in Women," in the January and April numbers of the *American Journal of the Medical Sciences* for the current year, both of which I have made use of in the preparation of this paper; and to an article by Ravogli in the *Medical News* for November 18, 1899.

A SIMPLE AND INEXPENSIVE METHOD OF OBTAINING AND PASTEURIZING CREAM FOR THE PREPARATION OF INFANT FOOD.

BY

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The problem of providing a suitable food for infants who have to be fed artificially is one that the family physician has constantly before him; and although he may have a partial respite during the winter months from his worries and anxieties in this respect, returning spring brings with it the same difficulties each year.

That cows milk modified in such a manner as to render its composition similar to that of mother's milk is the best artificial food, seems to be now generally admitted by the profession, and the plan carried out by the Walker Gordon laboratories is perhaps the best one yet devised. Nevertheless, for many reasons, the application of this method is as yet only possible in large cities and even then among the well-to-do, so that for country people and the middle and poorer classes in cities one must rely upon home modification.

It has always seemed to me that there are two essentials in the use of cows' milk for infants food; namely, cream of fairly constant strength, and pasteurization. With regard to the latter, I am quite aware that under certain circumstances it can be dispensed with, but these are not the conditions which are met with among the class to which I have referred. In the cities where milk is delivered once a day and where this milk with few exceptions has been drawn from the cows the night before the morning delivery, it is impossible to keep it free from contamination for twenty-four hours without pasteurizing it, except, perhaps, during the coldest months of the year. In the country, on the other hand, although fresh milk can be obtained twice a day, it takes time for the cream to rise and as comparatively few families can afford the luxury of an ice-house, during the hot months there is the same, though not so great, danger of those fermentative changes taking place in the milk which render it indigestible and unsafe.

The necessity for using cream as the basis of the food I will not refer to as it is not my intention to discuss that part of the subject.

Some years ago, having to do with a considerable number of infants requiring artificial food both in private and hospital practice, I devised

the following plan and have found it simple and easy to carry out. I do not claim anything especially original in my methods but merely that they can be easily put into practice by any woman who is willing to devote three-quarters of an hour each day to the preparation of food for her baby and who is able to incur the small expense ($1.00) entailed in procuring the apparatus.

To obtain a cream of fairly definite composition.

In the city where milk is delivered in quart bottles the daily supply should be obtained in this way, and the milkmen make no extra charge for delivering it in bottles. Milk delivered in the city in the morning, except in a few instances in which the dairies are only a few miles from town, is drawn from the cows the night before and put either into quart bottles or into large cans. When the new milk is placed in bottles each bottle will contain about the same amount of cream, some of which will have risen during the night preceding delivery. Where cans are used some of the cream will have risen during transit to the city, and the milkman, in order to ensure that his customers all get their fair proportion of cream, gives his cans a shaking up before measuring out the milk. This, however, is only partially successful in mixing the cream and milk and the first milk poured from each can is much richer in cream than that at the bottom. The bottles, when received, are to be set in a cool place for six or eight hours to allow the cream to rise. In the country, where each family has their own cows, the new milk should be put into quart bottles, "jem jars" will answer the purpose perfectly, and set aside for the cream to rise.

In separating the cream from the milk it is necessary, in order to ensure uniformity, to draw the milk from the bottom of the bottle and allow the cream to slowly settle down without being disturbed as the milk is taken away. This can only be accomplished by means of a siphon and, owing to the impossibility of obtaining a simple and cheap one ready made, I am in the habit of making a siphon myself for each of my patients requiring it. All that is necessary is to bend a piece of glass tubing of the proper size to the shape of a V, and any physician can do this by using the following simple directions:—

To make the Siphon, get a piece of glass tubing 21 inches in length and a quarter of an inch in calibre. This can be obtained from any wholesale druggist and can be ordered cut into lengths of 21 inches, which makes it easy of shipment. German glass I have found less liable to crack and easier to work than American. Should it be necessary to cut the glass, make a small scratch in it with a three-cornered file where the break is wanted, then catch it between the fingers and opposing thumbs of both hands having the thumb nails touching on the side of

the glass just opposite to the scratch, then, on attempting to bend it, it will break off smoothly across, and the sharp edges can be rubbed down with a file. To bend the glass to the V shape, hold it in the flame of an ordinary gas jet, or coal oil lamp with the chimney removed, for a few minutes until it softens sufficiently to allow it to be bent to the required angle. The tube should be warmed gradually at first and then put right into the flame and allowed to become smoked, twirling it slowly in the flame so that it becomes equally heated all around. It is well also to heat in this manner about four inches of the tube in order to get a curve rather than an angle at the bend, as the latter is harder to keep clean. A Bunsen burner or spirit lamp gives too hot a flame and melts the glass. It is convenient to make one arm of the siphon an inch or two longer than the other.

In using the siphon hold it with the angle down, fill it with water, and close the long arm with the tip of the finger. Then, keeping the finger applied to the long end, turn the siphon with the angle up and introduce the short arm into the bottle of milk, letting it rest upon the bottom. On removing the finger, the milk will flow through the tube and continue to do so until the bottle is empty. If, however, the layer of cream is watched, the siphon can be lifted out of the bottle just before the cream reaches it, and thus there is left in the bottle all the cream and a small portion of milk, the latter depending upon the expertness of the person using the siphon.

To pasteurize the cream.

A clear glass bottle with not too large a neck, a chemical thermometer registering up to 212° F. fitted in a perforated cork, which loosely fits the neck of the bottle, in such a manner that the bulb of the thermometer comes within half an inch of the bottom of the bottle, and some absorbent cotton, are all that is required in the way of apparatus. The chemical thermometer can be obtained from any wholesale druggist for 85 cents. The cork can be perforated with a rat-tail file or by burning out the hole with a red hot skewer. The cream is put into the bottle and the cork containing the thermometer inserted; the bottle is then placed in a pot containing a couple of inches of warm water and allowed to heat on the stove. The thermometer is watched until it reaches 160° F., taking care that it does not go above 165° and the pot is then set on the back of the stove where it will cool off very slowly and allowed to remain there for twenty minutes. At the end of this time the bottle is removed from the pot and the cork replaced with a rolled up plug of absorbent cotton. If the cotton should become wet it must be changed for a dry plug. Cream prepared in this way will keep sweet for twenty-four hours at least without needing to

be kept on ice, and all that is necessary in removing a portion from the bottle is to be sure that the cotton plug does not become moist, or, if it should, to replace it with a dry piece at once.

It is not my intention here to say anything about the formulæ for preparing food from cream obtained in this way. Water, or barley water, and sugar can be added in various proportions according to the age of the child. If desired, too, a certain amount of milk can be left in the bottle with the cream. My own practice has been to call at the patient's house and see the bottle containing the milk after the cream has risen and then show the person who undertakes the pasteurization how much is to be left in the bottle when the siphon is used. If this should not agree with the child, the proportion of cream to milk can be altered by allowing less or more to drain away through the siphon, and in this way, although one cannot always estimate exactly the proportionate amount of proteids and fats that the child is getting, one can, by changing the proportions, get a food that agrees with the child.

It will be readily understood that this method of siphoning off the milk can be much more easily comprehended by a practical demonstration, and that, therefore, it is much better to have a siphon and milk bottle in one's office to show how it is done than to describe it, or, better still, to go to the patient's house and perform all the steps for them the first time. The only difficulty I have met with so far has been in having the siphon kept clean and sterile. It can be washed by allowing a stream of cold water to run through it after each time it is used and also by using one of the wire tube brushes that are sold at every shop where feeding bottles are to be had. The wire of the brush requires to be lengthened by adding eighteen inches of brass or copper wire to it in order that it may be drawn through the tube. The siphon can also be boiled occasionally.

ASEPSIS AND ANTISEPSIS IN SURGERY.

BY

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Of the sciences whose number is legion, none have made such wonderful progress and such marvellous strides during the last twenty years as surgery; and if we stop for a moment to consider, or rather to endeavour to ascertain the means by which this remarkable advancement was accomplished, we will find that, of many factors, none has played as important a rôle as the subject of this paper.

The introduction of antiseptic and particularly of aseptic measures into the domain of surgery, from its first establishment by Lister up to the present day, has converted a speculative science into a well-defined certainty, and has assured results after operation, which formerly considered as unexpected, uncertain, and indefinite, have now become most satisfactory and conclusive, and most gratifying in their nature. In fact, the knowledge and proper application of aseptic and antiseptic surgery have revolutionized that noble science, and have given to the nineteenth century a blessing, a protection, and a safeguard, for which humanity at large must feel the greatest pride and must entertain the deepest gratitude.

The surgery of to-day, in the hands of conscientious and competent men, will give positive and definite results in at least 80 per cent. of cases where surigcal intervention is indicated or is justified; while fifty years ago the effect of surgical procedure was negative or, at all events, most disappointing in about 85 per cent. of cases operated on.

The terrors of the surgical practice of those former days, terrors which both surgeon and patient faced meekly and in resigned despair, such as unavoidable suppuration, septicæmia, pyæmia, erysipelas, tetanus, and, notably, hospital gangrene, have now almost completely disappeared and may safely be declared to be becoming extinct. They are now looked upon as the exception rather than the rule, and can always be traced to ascertainable and avoidable conditions. Hence, even suppuration is now considered an unusual occurrence, and the possibility of its occurrence determines, very naturally, the advisability of any operation.

Aseptic operations should be thoroughly safe and should not occasion any undue anxiety or impose any additional degree of responsibility, for, as Gerster very wisely states, "it can now be truthfully and safely

* Read before the Medical Society of Ottawa.

asserted that the surgeon's acts determine the fate of a fresh wound, and that its infection and suppuration are due to his technical faults of omission or commission."

In this short and necessarily incomplete exposition of the subject, I shall endeavous to give a brief outline of the principles of asepsis and antisepsis; how they should be applied and to mention some of their respective advantages and disadvantages.

Asepsis is the technique by which a primarily clean and germ free wound is maintained in its original condition until healing is complete. Antisepsis, on the other hand, is the procedure the object of which is the destruction and elimination of noxious germs that have found lodgment in the human tissues and are damaging them.

The stage of controversy and argument as to the benefits of asepsis and antisepsis, is past, and the surgical world is at one as to the value of these methods. The bacteriological proof that suppuration, erysipelas, and all other similar dangers, arise from pyogenic organisms, is now practically absolute, and the clinical proof is equally strong.

In the aseptic methods, besides the mechanical measures, chemical antiseptics or heat, or both, are used for the purpose of obtaining absolute surgical cleanliness, including in this the patient's person, and particularly the field of operation, the hands of the surgeon and his assistants, all instruments, dressings, etc.; and after this no chemical antiseptic is used, but only such solutions and dressing as have been sterilised and made germ free by heat. In the antiseptic method, the same antiseptics are employed for procuring cleanliness, and, in addition, chemical antiseptic solutions and dressings impregnated with them, during and after the operation. According as they are indicated, either method must be thorough or else it is useless.

In my description of the application of asepsis to surgical work I do not purpose dwelling at length upon the elaborate and varied explanations as given in different works on the subject, for we must never lose sight of the fact that surgeons are not above having marked peculiarities—I might be pardoned for calling them hobbies—but rather to report the methods adopted in my own practice and by my hospital confrères, with whom it has been my good fortune to labour, and also from close observation and study of the methods carried out by my able and worthy friend, Dr. Prevost, whom I assisted for several years in gynæcological surgery, and to whom I am deeply indebted for much valuable information and instruction on this very important department of surgery.

Asepsis must be complete in every detail, or else it is useless and the operator will fail dismally. Every object, article, instrument, or solution which may be employed or applied, or with which the operator

or the assistants or the nurses' hands may come in contact, must be thoroughly sterilised and, moreover, the hands and arms of every person taking part in the operation must be scrupulously aseptic and kept as such until the last dressing is applied. Suitable sterilised costumes or gowns must be worn. In the absence of a perfectly pure or germless atmosphere, plenty of plain sterilised or medicated water must be employed to keep the fields of operation, the hands, etc., as free as possible from any particle of dust or other matter floating in the air and liable to deposit themselves in the region to be operated on.

Foremost among the *means of sterilization and disinfection* stand:—

(1) The homely but thoroughly efficient and sound methods of mechanical purification, consisting of shaving, washing, scraping, maceration and scrubbing, with the aid of soap and plenty of clean warm water. How much can be accomplished in surgery by the use of these simple methods was first demonstrated by the brilliant results of men like Lawson Tait, who placed almost absolute reliance upon ordinary measures of personal and domestic cleanliness. This is certainly the most important preparatory act of all forms of disinfection.

(2) The most valuable of all bactericidal agents, because easily procured, rapidly effectual, and practical, is heat. It can be used in the form of boiling water, steam, or hot air. I do not mention the actual cautery as it properly belongs to the subject of operative technique. Of all agents, boiling water occupies the front place because, taking its bactericidal value into consideration, we know that it will kill spores of anthrax, one of the most resistant forms of bacteria, in two minutes, and will destroy the vegetative forms of any coccus or bacteria in one to five seconds.

Next in importance is steam, which to be fully effective must be pure and saturated. Steam can be used quiescent, moving, under increased pressure, or superheated; but moving steam has been found most useful and will kill anthrax spores in five to ten minutes. Hot air is so inferior to the other forms of heat that it is practically useless and rarely employed.

The value in surgery of the commonly applied chemicals as germicides falls far below that of the above mentioned caloric agents, and very few, even in a concentrated state, will destroy anthrax spores within twenty-four hours. Those commonly employed are: carbolic acid, bichloride of mercury, permanganate of potassium, creolin, formaline, iodoform, boracic acid, salol, hydrogen peroxide and many others.

The external conditions influencing disinfection and sterilization are variable, and under these changing conditions a variation of the process adopted must take place. As a rule, several of the known methods

have to be combined, their application being either simultaneous or successive.

The *methods of sterilization* carried on for the instruments, dressings, ligatures, vessels and dishes, and drainage tube and other accessories, in my operations in the hospital are as follows—and I must state, without wishing to appear presumptuous or arrogating too much praise for the system or the nurses who superintend the work of this department, that they have proved extremely satisfactory and the results have been excellent.

All instruments except the knives are boiled in 1 per cent. solution of carbonate of soda for twenty minutes; the knives for three to five minutes only. The sterilization is done immediately before the operation, when they are placed in dishes containing warm sterilized water. In cases demanding aseptic surgery, as far as this distinction applies, I usually employ plain sterilized gauze only. The process of sterilization of the gauze is as follows:—Strips of gauze one yard long are first boiled for one hour, then taken out and allowed to dry completely. They are then placed in the sterilizer and steamed at 212° F. for two hours and immediately afterwards packed in sterilized jars which are hermetically closed. The gauze is preserved in this manner, and previous to every operation, the quantity is resteamed for one hour and is then ready for immediate use. The pads—sponging pads which are now substituted for ordinary sponges—the towels, and the gowns are sterilized in a similar manner. The agate-ware dishes are placed in boiling water for half an hour and then immersed in a 5 per cent. carbolic acid solution for about one hour. The glass vessels are scrupulously washed with soap, and afterwards put in a similar carbolic acid solution for one hour. The rubber drainage tubes are boiled for twenty minutes and then preserved, ends upwards, in jars filled with 1 to 20, carbolic acid solution. The rubber sheets are disinfected by immersion in carbolic acid or bichloride solution. The water itself is sterilized by boiling for thirty minutes.

If precedence can be given to any one article required in operative surgery, where the demand for the strictest ascepticism is considered, the ligatures are certainly those which must be prepared with the most scrupulous care. The three kinds of ligatures most commonly employed are catgut, silkworm gut and silk ligatures, and their respective methods of sterilization offer differences worth mentioning.

Silkworm gut is sterilized by being kept in boiling water for twenty minutes, and then put in a well-covered jar containing absolute alcohol.

Silk ligatures are boiled in a 5 per cent., carbolic acid solution, for forty-five minutes to one hour, and are then preserved in pure alcohol.

The manner of preparing catgut so as to render it perfectly aseptic,

is rather more complicated and difficult. The smaller-sized catgut undergoes the process with the greater degree of certainty, and as a consequence most surgeons discard the larger sizes in their operations. Dr. Prevost prefers Keller's catgut, No. 00, which is remarkably strong for its size, and when necessary he uses it double. The catgut is first immersed in ether for an indefinite length of time, afterwards soaked in juniper oil (an effective antiseptic) for twenty-four hours, then washed in ether to remove the fats, and, finally, is boiled in absolute alcohol under pressure for a few hours, and then transferred and preserved in sublimated alcohol, 1 to 1000, until required.

There are several modifications to those methods, but these are the ones in vogue at the General Hospital for the preparation and preservation of the various ligatures above mentioned.

Following the brief account of the manner in which the various kinds of material required in operative work are sterilized, I desire to terminate my observations on the subject with a short description of the *modus operandi* from an aseptic point of view in any one operation, say a laparotomy, as performed in the operating room of our hospital.

However reliable his staff of assistants and nurses may be, the surgeon before beginning an operation should see that absolutely everything is ready; not only that the patient has been properly prepared and the field of operation thoroughly washed and scrubbed and disinfected, in the manner about to be described, and covered with sterilized dressings the day before, but that all the instruments, bandages, dressings, and the plain and antiseptic solutions, are at hand; and that everything that can be needed is within reach. The hands and forearms of all connected with the operation, excepting the "dirty" nurse, should be disinfected and sterilized in the following manner:—

The fingernails having been cut close and scraped while dry in every case, the hands and forearms are given a generous and stiff scrubbing with a previously sterilized brush, plenty of sterilized water and ordinary castile soap; this procedure to last about five or six minutes. Johnson's ethereal soap or green soap is next rubbed in for a few minutes, the hands and arms rinsed in sterilized water, alcohol poured over them, and finally bathed in a bichloride solution, 1 to 1000, for a minute or two—a step which I look upon more as a matter of form than a real necessity—and this completes the toilet of the upper extremities for what they are about to do. Some surgeons of the Water Street General Hospital go further and immerse their hands in potassium permanganate and oxalic acid solutions as a more stringent precaution; I do not, and have had no reason to regret it. The latest fad as a completion of the disinfection of the hands and fingers, consists in dipping them in pure carbolic acid followed by immediate immersion in absolute

alcohol. I consider this a very heroic measure and I fear it will take me some time to muster up enough courage to carry it out.

The field of operation which has been previously shaved, scrubbed and aseptically prepared, is put through the same process of sterilization as for the hands and arms, by the first assistant, and covered with a strip of gauze and the field completely surrounded by sterilized towels or sheets. Everything is now in readiness for the operation to begin, providing the patient is properly anæsthetised. During the operation, every detail must be attended to with a thoroughness as minute and definite as if upon it depended the success of the whole operation. Throughout the whole operation, the procedure of all concerned, next to the proper observance and application of the technique of the operation, is to preserve the field, the hands, the sponges, etc., as pure and as sterile as possible. Where the operator has not to deal with an infected wound or one liable to become so from the direct nature of the neoplasm or parts removed, plain sterilized water alone should be employed for both external and internal use, always remembering that any chemical solution introduced into the peritoneal cavity is wont to act as an irritant and is consequently unsafe and even dangerous.

The operation being completed and the incision closed with as much care and as firmly as possible, the wound is mopped, cleansed, and dried, and pads of sterilized gauze applied over it, and a quantity of loose gauze added to this, and the whole covered with a large sterilized pad made of absorbent cotton surrounded with gauze, which is held in place with strips of adhesive plaster and a wide abdominal bandage. The dressing of the wound has been done without the aid of any chemical antiseptic and why? because they are both unsatisfactory and unreliable in what we term an aseptic operation.

If the wound is perfectly aseptic after the operation, the sterilized dressing, properly applied, should keep it so till the healing process is completed by resolution, while the application of antiseptic lotions, powders, or gauzes, will irritate the soft tissues of the wound, as most of them coagulate the albumin contained in human tissues and their discharges; converting them into inert albuminates and annihilating their germicidal properties. They also produce a superficial necrosis of the skin and underlying tissues with which they may have come in contact, and consequently prevent resolution and encourage inflammation.

If at the completion of an operation the wound has not been preserved aseptic or made so, the application of iodoform, aristol, salol, boric acid, etc., will not prevent suppuration; such at least has been my experience.

Before terminating, I desire to make a passing reference to the agen-

cies by which a septic or infectious process established in the human tissues can be stopped. Here, also, after washing and disinfecting the external parts, we resort to mechanical measures. By mechanical measures we understand:—

(1) Incision, whose prime object is to relieve tension and afterwards to allow the evacuation of the liquid, semiliquid, or solid products of suppuration. Irrigation of the cavity may be employed to aid the first evacuation of abscesses.

In all incisions, or where there is a counter incision, two tubes should if possible be introduced, as they facilitate the influx and outflow of the irrigating fluid; and if one tube only is used, irrigation might be done continuously so as not to cause over distention and rupture of the walls of the abscess cavity.

(2) Drainage of abscess cavities through incisions, whether by means of tubes or gauze packing, is important, and is indicated as the cavity continues to suppurate. The medium of drainage should occupy the most dependent position, and must be placed so as not to be liable to be expelled, and should not impinge on nerves or vessels. Their daily cleansing and revision are imperative. When the discharges become serous and limpid, the cleansing of the cavity is finished and the tubes or gauze should be removed.

While pus is discharging, moist, antiseptic dressings frequently changed are indicated; but as soon as the cavity is cleaned and drainage discontinued, dry dressings should be applied and antiseptic powders dusted over the wound. Chemical antiseptics are here applied because they exert a distinctive effect upon the micro-organisms actively engaged in the production of suppuration and neutralise the activity and intensity of their ptomaines and toxines.

In conclusion, I beg to state that my object in presenting the subject of asepsis and antisepsis in surgery to this meeeting to-night was not to impart a great deal of new information upon a subject with which you are all so well acquainted, but rather to freshen your memories on some of the facts, to call for an expression of opinion, and to elicit discussion, which I am sure will prove more interesting and more instructive than my humble and very imperfect effort.

ON THE ESTIMATION OF DISABILITY AND DISEASE DUE TO INJURY.*

BY

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The literature in regard to the medico-legal aspect of disability and disease resulting from injury is at present almost exclusively German, I know of no work in English which deals with the subject in a general way, though several of those referring to special parts of it are among the most valuable we possess. The reason for the preponderance of German literature in this field lies in the very extensive system of government insurance against industrial accidents, introduced into Germany in 1884 and controlled by the German Imperial Insurance Bureau. This has resulted in the training of a class of medical officials whose unbiased and thoroughly scientific study of the questions involved cannot be placed too high.

The principle of an equitable compensation of labour accidents has been enforced by law in Switzerland (1881), Austria (1887), Italy (1898), Belgium (1894), Norway (1894), Denmark (1898), Finland (1897), England (1898) and France (1898), and will before long probably be adopted by all civilized countries. Russia and Sweden have similar laws already drafted. A bill aiming at this was introduced recently in the Ontario Legislature, but has not yet become law. I understand that similar legislation is contemplated for the Province of Quebec.

The above legislation is in all cases based on the principle that in the case of personal injury received through accident, occurring in connection with occupation and not intentionally caused by the employee or specific negligence on the part of the employer, the loss should be shared between employer and employee under conditions fixed by the government, which also guarantees the payment of such indemnity as may be decided upon, if the employer becomes financially unable to do so. The amount of such indemnity paid by the employer varies from 50 per cent. in England and France to 60 per cent. in Austria, and 66 2-3 per cent. in Germany and Switzerland. The non-compensated part of the loss represents the workman's share. As a rule the loss is equalized by systems of liability insurance or by mutual benefit societies guaranteed by government, the assessment varying with the localities

* Read before the Montreal Medico-Chirurgical Society, Jan. 26, 1900.

and the particular trades insured. Payment by annuity is mostly followed, though in England this may be commuted by a lump sum calculated on a basis of three years full wages.

The limitation of liability does not apply to cases in which specific negligence of the employer is proved, in which case the full amount of damages may be recovered under the common law; but in England the injured person must decide at the outset whether he will accept the partial indemnity or proceed in the courts. A very clear summary of the law on the subject has been recently published by Professor F. P. Walton, (*La Revue Legale, Feb., 1900.*)

As the assumption is that the employer is liable for a certain proportion of the loss in all cases unless exceptional negligence is shown, the legal questions under the government insurance system, are relatively scanty; and the assessment of the amount of disability incurred, which is essentially a medical matter, is the chief problem. The question of what constitutes sufficient ground for assuming a certain medical fact to be proved. is of course a matter of judicial decision. In Germany, Austria and Switzerland, there are over 20,000,000 persons insured under the laws, and the claims from over half a million accidental injuries are annually adjusted by the officials. In Germany, the hospital or home treatment is free during the first three months following an injury, but compensation only begins at the termination of three months.

The conditions under which we have to do with the estimation of disability are :—

(1) Employer's liability.
(2) Accident insurance and benefit societies.
(3) Medico-legal damage claims.
(4) Pensions, etc.

In employer's liability, the nature of the medical work depends largely upon whether special legislation exists concerning responsibility in ordinary cases, or whether the responsibility is left an open matter to be settled by litigation in each case. In the former, the medical study of the case is the chief factor; in the latter, the legal element dominates from the outset, and the medical problems are of secondary importance. In accident insurance, the liability is limited by contract, the amount, rates and compensation being specified, and a proviso made excluding all effects of illness or constitutional conditions, so that the medical aspect of the case is considerably narrowed. Hence, comparatively few accident insurance claims, unless grossly unreasonable, are contested, apart from the fact that from business reasons a reputation for paying claims is generally sought.

In medico-legal damage claims, one of the chief hindrances to rational adjustment is the circumstance that the facts are often only known to

one side and the amount demanded is usually much in excess of fair compensation. It is especially in these cases that trivial proofs of injuries, which are often non-existent, are supported by expert testimony of a kind which has obtained for medico-legal experts as a class a more than doubtful reputation.

The above is mentioned to indicate how one set of conditions, which rarely calls for serious medical consideration under certain circumstances, may form the bulk of medico-legal work in others. The amount of trouble and expense caused to railroad companies, for instance, by cases where the injury is ill defined, non-existent, or exaggerated or misrepresented, far exceeds that caused by definite severe and well authenticated injuries. It must be remembered, however, that the element of prognosis, with all its attendant uncertainty, enters largely into this branch of medico-legal work, whereas the criminal branch of legal medicine deals mainly with what is past.

The closely allied subject of sickness insurance, which has been thoroughly studied in Germany and to which our insurance companies are now beginning to devote attention, presents many points of interest which have not received the scientific study they deserve from the medical officers connected with benefit societies.

In the present article the subject matter is divided as follows:—

(1) Permanent disability from injury.

(2) Temporary disability from injury.

In giving practical instruction on the estimation of disability due to injury in connection with my medico-legal course, I found it impossible to obtain adequate information on the subject from any of our English text-books.* I had, therefore, prepared, in the form of synopses, a concise summary of the statements of the leading German authorities (especially C. Kaufmann and Ch. Thiem) for the use of my students. These are reproduced together with an abstract of some of the comments made about the more important topics.

It has since occurred to me that this might also be of service to physicians concerned in accident insurance work or who have to give evidence about damage cases in court, as well as insurance officials, judges, claims agents and those having to do with pensions of any kind. It is remarkable how little use has been made hitherto of the very convenient continental method of expressing the disability in terms of the percentage loss of earning power, and how little it has been made with us a subject of medical study.

The best known of several tabulations of the loss of earning power in

* The appearance of Pearce Bailey's English translation of E. Soliebiewski's "Hand Atlas of Diseases due to Accident" (W. B. Saunders, Philadelphia,) will materially improve matters.

regard to the leading forms of permanent disability, is that known as the Vienna Schedule, which has served as a basis for most other similar tables. It must be noted that in certain points minor differences exist among the standard authorities, and that the values given are only intended to be approximative and to serve as a point of departure in deciding individual cases. It must be remembered that the Vienna schedule is expressed, so to speak, in terms of unskilled workman. From this relatively simple problem, the variations called for by special forms of occupation can be determined. From the point of view of disability workmen are divided into four classes :—

(1) The unskilled laborer.

(2) The laborer whose work requires skill as well as strength, such as the bricklayer, mason, etc.

(3) The handicraftsman : as carpenter, joiner.

(4) The higher grades of skill, as mechanics.

It will be seen that the same injury might produce different results in each class. For instance, anything which impairs the finer movements of the fingers or wrists would represent a great loss to an engraver, whereas a laborer would be relatively little impeded by a partially anchylosed wrist, which was not painful and permitted of heavy work being done. On the other hand, a sensitive scar of the hand, which would incapacitate the laborer completely, might not interfere at all with the finer movements of the engraver. Accidents lessening the flexibility and free motion of the feet without impairing their firmness as a base of support and rendering them painful give relatively slight impairment to laboring men as compared with that caused in the case of roofers or sailors, etc. Injuries to the lower extremities cause much less inconvenience to those whose work can be done in a sitting posture than to others. Certain callings require unusual acuteness of sight and hearing as compared with others.

The following factors also come into account :—Can the condition be rectified by mechanical appliances if it cannot be improved by treatment ? Is it likely to get better or worse; is it temporary or permanent ? Can the person without difficulty adapt himself to another occupation ? Does the condition, besides incapacitating him from work, cause him an actual increase of expense for nursing, attendance, etc.? Are his chances of securing other employment diminished ? Does he suffer from pain ? Has the injury made him liable to any special disease ? Is the condition in part due to disease existing before the accident, or to some complication set up or predisposed to by it ? Can operative treatment be undertaken ? (The patient is under no obligation to submit himself to any operation which may be dangerous, all involving general anæsthesia coming under this category.) Was the

condition due, not to accident, but to occupation disease? Did it arise from causes unconnected with his work?

Medical men as a class tend to underestimate the injury to laboring men, and especially to reckon too short a time as the limit of disability after injury of the bones or of parts (hands and feet) used in rough work. The date at which a patient can be released from hospital treatment or when medical supervision becomes unnecessary, is often only one-half of the time required to put him in condition to renew his work. The schedule policies adopted by many of the insurance companies are not well adapted for the insurance of working men, as they are compiled on tables prepared for classes whose work is largely clerical or sedentary.

The frequency of actual simulation is much smaller than one would gather from medico-legal literature, and the cases, as a rule, are very easy of detection. On the other hand, more or less tendency to exaggeration is found in the majority of cases. Attributing to a recent injury conditions which pre-existed is perhaps the most common form of simulation: a decision on the matter may be difficult when the case is not seen soon after the alleged injury.

Just as in bacteriology we have certain postulates necessary to constitute proof of injury due to accident we require here:—

(1) There must be proof of the occurrence of an accident or injury.

(2) The accident and its effects must have occurred suddenly.

(3) The part affected must be located in the region injured.

It is astonishing to find how often these obviously essential data are unproven in cases of alleged injury.

Age. Injuries of young persons heal more rapidly than those of the old, and adaption to altered conditions is more complete and rapid. The immediate effect of injuries on the very young and very old is more marked than in adults. The predisposition to special diseases is greater at certain times of life, for instance, the liability to hernia in cases with advancing age.

Sex. Females need higher compensation for disfigurement than males. Slight disfigurement may be compensated only in case of females.

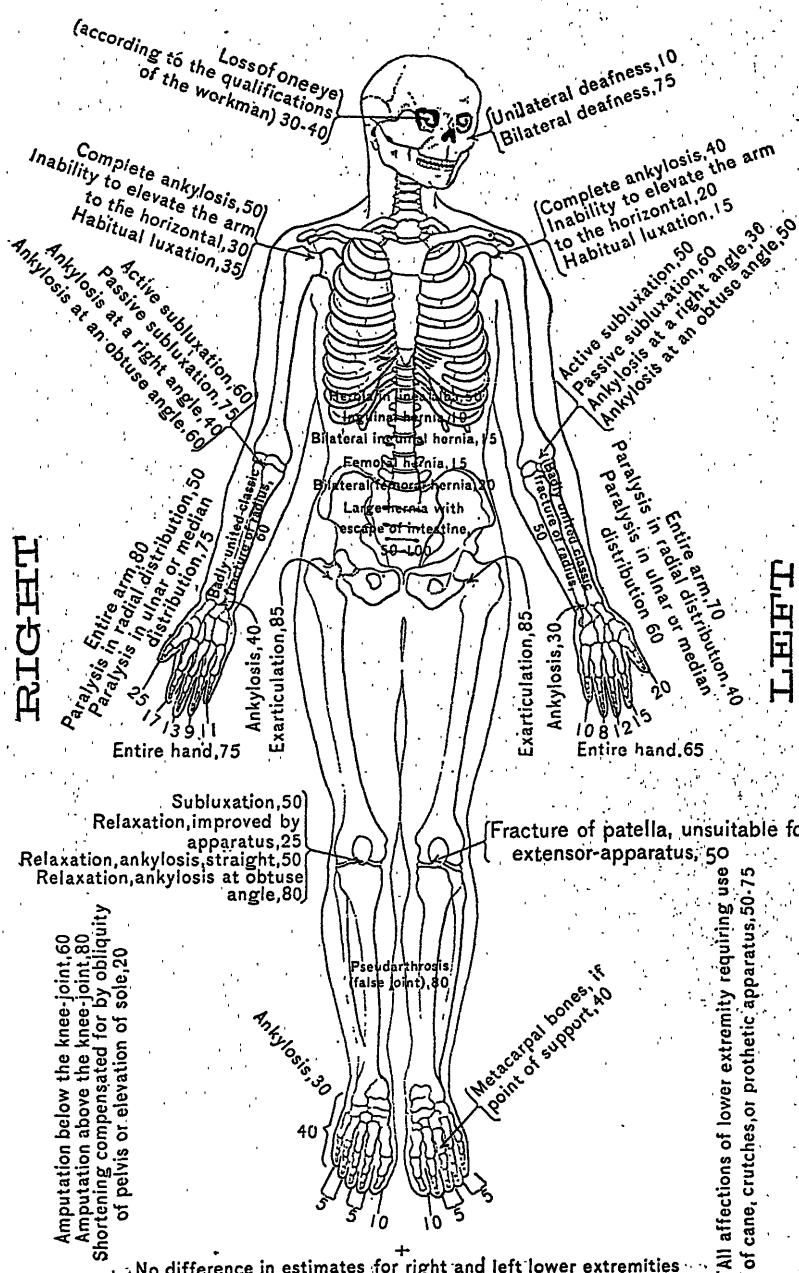
Previous Disease. The occurrence of an injury may leave a liability to the same injury. This is especially noticeable in dislocations, in abnormal conditions of the skin predisposing to erysipelas from trifling injury, or from exposure. Fragility of the bones from rickets or osteoporosis renders fractures more probable. The enlarged spleen in malaria is subject to injury. The existence of a latent or partly cured infectious disease, such as tuberculosis, may lead to unexpectedly bad results when persons are injured in the chest or subjected to a prolonged confinement. Disease of the ear greatly increases the danger of infection and meningitis in fractures of the base of the skull. Chronic heart diseases and

chronic lung diseases lessen the chances of recovery from a severe injury or shock, and influence unfavourably injuries of the chest wall. The enlarged (or pregnant) uterus is specially subject to injury from falls or other external causes. A latent appendicitis may be made acute by very moderate injuries of the abdomen. Rheumatic conditions may prolong the disability from injuries of the bones and joints. A disease may be the direct cause of the injury, as in epilepsy. The occurrence of disease as a consequence of injury is treated of more fully in another part of this article.

Alcoholism is one of the most important factors in regard to injury. Besides being a frequent cause of accident or neglect it may effect very unfavourably the chances of recovery. There is a great tendency amongst heavy drinkers, apparently in good health, to be seriously affected by relatively trifling injuries. The mere fact of confinement to bed through fracture of a bone is very liable, in a drinking man, to lead to an attack of delirium tremens, often followed by pneumonia. Hence, whenever practicable, methods of treatment which permit such patients to be up and about, are preferable. The grave effects of chronic alcoholism, such as ascites, renal cirrhosis, etc., lessen the chances of recovery and predispose to sudden death.

Occupation. Certain accidents are specially liable to occur as a direct result of the occupation; toxic effects from inhalation of poisonous fumes, effects of changes of temperature and absorption by the skin of poisonous substances, apart from the direct danger of mechanical injuries from falling bodies, defective scaffolding, or other support, moving machinery, or electric currents, etc.

Over-exertion in connection with employment may be brought about by accident and is a frequent cause of sprains, ruptured muscles or tendons, and of hernia. On the other hand, many conditions ascribed to simulating accident may be really gradual in onset and due to unhealthy occupations. These should be carefully excluded and hence suddenness of onset in accidental conditions is an important point to establish. Predisposing conditions due to occupation may aggravate the effect of accident. The occupation may be such as to render it temporarily unsuitable for persons who have been injured. A tendency to neuralgia, left after injuries, makes exposure to draughts or changes of temperature injurious. Conditions leading to a defective closure of the eyelids or to conjunctivitis excludes from occupations carried on in dusty places. A tendency to giddiness, partial deafness, much loss of vision, or inability to move promptly, makes it dangerous to continue an occupation which necessitates being in the presence of moving machinery or involves the perception of signals. Callings which bring the person much in contact with the public, are more or less debarred to persons having



G. Haag's graphic schedule showing the percentage-loss of earning-power through permanent partial disability. (Compensation allowed equal to 60% of disability under the state system of compulsory insurance of workmen.)

Reproduced from Gould's American Year Book of Medicine and Surgery. (By permission of W. B. Saunders, Philadelphia.)

mutilating or disfiguring injuries; and those which necessitate shouting out orders, to persons whose vocal organs have been permanently damaged. The percentage frequency of the common forms of accident vary greatly in rural and urban districts.

In persons who have been injured, one has to determine if the disabling effects are transient or permanent, and if such permanent conditions will improve, remain stationery, or get worse. When an annuity is paid, this may be increased or decreased according to the course of the case. The chances of ultimate recovery are often greatly enhanced by such measures as may relieve the person from the necessity of attempting heavy work before he is fit for it. On the other hand, the definite and final settlement of a claim one way or another, often has a wonderfully beneficial effect upon cases represented as being quite hopeless, and it is certain that the annuity system by no means tends to bring about the cures and lends itself to grave abuses.

The relative frequency of percentage compensation was found in Germany to be in the following order: 10, 20, 15, 50, 33, 25, 100, 30, 40, 75, 60, 66, 80, 90, 70. Thus 10 per cent. was the most and 70 the least frequent of the allowances made; the average was 30 per cent., disability below 10 per cent. not being compensated.

It is a matter both of common law and of regulation, that persons receiving such indemnity would take every reasonable means to favour the cure. It is quite common everywhere for the interested party to pay for the medical treatment. The occupation followed should be one which will favour recovery. The employment of artificial limbs and supports may be a reason for reducing the indemnity.

I. SCHEDULE OF PERMANENT DISABILITY.

The following table shows the percentage of loss of earning power, in the case of unskilled laborers.

I. Head.	Disability per cent.
Limitation of movement	8-16
Bone defect with epileptic attacks	50-70
" " " paralysis right arm	80
" " " " " and leg	100
Scar and bone defect of cranium attacks of pain	33
Hemiplegia following apoplexy	80-100
Headaches and weakness of right arm following depressed fracture.	56-60
Incurable neuralgia	15
Persistent headache, dizziness, nausea following concussion of brain	80
After injury headache, dizziness, epistaxis " "	50
Incurable despondency, irritability and headache	50
Incurable epilepsy only result	30-50
Incurable insanity	100
Permanent weakening of mental faculties, loss of memory	40-50
Weakness, unsteady gait, lessened mental capacity, confusion of ideas following fracture of skull	70-80

II. Face.	Per cent.
Disfigurement from scars of cranium (more in case of females)	8-16
Loss of nose do	10-15
Loss of incisor teeth (females only)	5
Defective closure of one eyelid,	8
" " both	16
Incurable trismus	33
III. Eyes.	
Loss or blinding of one (according to employment)	25-33
Loss of both eyes	100
Defective sight one eye	25
Trachoma extreme	100
Chr. conjunctivitis	15
Obstruction of lachrymal duct	8
Nystagmus	16

Josten's table for estimating loss of vision, partial in both eyes.

Rule.—Estimate loss of central vision in each eye if over 50 per cent. (amounts below 50 per cent. disregarded).

Follow column giving the vision of one eye below V. and of the other eye to the right of V, the intersection of the column will be at the percentage of disability for both eyes.

V.	0.50	0.40	0.30	0.20	0.10	0.00
0.50	0	6.5	13.5	20.0	26.5	33.5
0.40	6.5	14.5	22.0	30.0	38.0	46.0
0.30	13.5	22.0	31.5	41.0	50.0	60.0
0.20	20.0	30.0	41.0	52.0	62.5	73.5
0.10	26.5	38.0	50.0	62.5	75.0	87.0
0.00	33.5	46.0	60.0	73.5	80.0	100.0

IV. Ears.	Per cent.
Loss of one ear (or complete deafness one ear.)	8
Moderate deafness one ear	0
" " both ears unless occupation needs acute hearing)	0-8
Slight deafness both ears	0
Chr. discharge from ear	15-30
V. Neck and Voice.	
Permanent wearing of tracheotomy tube	50
Inability to read (alexia)	75
Inability to speak (aphonia)	40
Hoarseness or whispering voice	8
Dyspnœa from stenosis of larynx	33-40
VI. Chest.	
Restricted movement from distortion of chest wall, extreme	60
" " " " " moderate	33
" " " " " slight	8
Restriction of movement from badly healed fracture of ribs, extreme	40
" " " " " medium	25
" " " " " slight	8
Intercostal neuralgia	25
Lung disease, severe	100
" medium	40
" slight	0-8
Traumatic heart disease	0-100

VII. Abdomen.	
Pain in abdominal wall and inability to carry heavy burdens, due to rupture or sprain of muscles	25
Prolapse of uterus	25
Disturbances of digestion, extreme	80
" " medium	25
" " slight	0
Liver diseases, extreme	80
" " medium	25
" " slight	0
VIII. Hernia.	
Hernia in laparatomy scar	25
Umbilical hernia	15
Ventral hernia	25
Inguinal hernia	8
Omental hernia	8
Femoral hernia	15
Hydrocele of cord	15
IX. Genito-Urinary.	
Inability to retain urine	15-20
Difficult micturition	15
Loss of penis	8
Loss of testes	15
Urinary fistula	50
Painful enlargement of testes and spermatic cord	15
Rupture or loss of kidney	20
X. Trunk and Vertebral Column.	
Impaired mobility, extreme	50
" " medium	25
" " slight	8
Rupture of lumbar muscle, severe	50
" " " medium	25
" " " slight	8
Disease of spinal cord, severe	100
" " medium	66
" " slight	40
XI. Upper Extremity.	
Loss of both hands or arms	100
Upper Arm.	
Loss of arm above elbow	66-75
Anchylosis at shoulder	50-60
False joint at shoulder	50-60
Wasting of muscle	25-60
Chronic arthritis of shoulder	16-66
Badly set fracture of clavicle	16-50
Badly healed dislocation, blade injuries	8-50
Forearm.	
Loss at wrist or elbow	66-75
Anchylosis of elbow, extended	40-50
" " semi-flexed	25-33
" " flexed	33-40
False joint	50-60
Diminished flexion or rotation	25-60
Hand or all Fingers.	
Loss at wrist	66-75
Anchylosis of wrist	25-33
Loss of all fingers but not metacarpals	66-75
Anchylosis of all fingers	60-66
Distorsion of all fingers	60-66

Single Digits.

Loss of single thumb, loss of metacarpal	25-33
Loss of both phalanges	25-33
Terminal and ½ proximal	16-25
Terminal phalanx	5-10
" thumb tip (special trades only)	0-5
Stiffness 1st and 2nd joint	25-33
" 1st joint	15
" 2nd "	8
Distorsion and fixation in flexed position, extreme	25-33
" " " medium	16-25
" " " slight	8-16

Forefinger.		*Middle finger.*	*Ring finger.*	*Little finger.*
Loss with metacarpal	16-25	8-16	8-16	0-8
Loss of all 3 phalanges	16-25	8-16	8-16	0-8
Loss of 2nd and 3rd phalanges	8-16	8	8	0
Loss of terminal	0	0	0	0
Loss of finger tip	0	0	0	0
Anchylosis of all three joints	16-25	8-16	8-16	0-8
" proximal and middle	16-25	8-16	8-16	0-8
" proximal	8-15	8	8	0
" middle	8	8	8	0
" proximal and terminal	15	8	8	0
" middle and terminal	8-16	8	8	0
" terminal alone	0	0	0	0
Fixation in flexed position, extreme	16-25			
" " medium	8-16			
" " slight	0-8			
Chronic arthritis of one finger	8-33			

Thumb.

Thumb and fore	40-50
" middle	33-46
" ring	33-40
" little	25-33
Thumb, fore and middle	50-60
" " ring	50-60
" " little	40-50
Thumb, fore, middle and ring	60-66
" " " little	60-66
Thumb, middle and ring	50-60
" " little	33-40
" ring and little	33-40
Fore and middle	25-33
" ring	25
" little	16
" middle and ring	40
" " little	33
Middle and ring	16
" little	16
Middle, ring and little	25
Ring and little	16

Combined loss of fingers of both hands.

Loss of all fingers on both hands except one finger on each	100
Loss of both thumbs	50
Thumb and forefinger of one hand, and opposite thumb	55-60
Thumb, forefinger and middle or ring finger of one hand with loss of other thumb	66-70
Loss of all fingers of one hand except forefinger and loss of opposite thumb	75
Loss of both fingers and forefinger	80
Chronic arthritis of several or all joints of both hands	30

XII. Lower Extremity.

Loss of both legs	100
One thigh and one leg	100
Complete paralysis both legs	100
Chronic arthritis	16-66
Injuries to pelvis	16-80
" " fibrous tissues	60
Synovitis	8-33
Tenosynovitis	8-33
Thigh.	
Loss of thigh	75
Anchylosis of hip, extended	50
" " flexed	60
Wasting muscles of one thigh	33
Healing of fracture with diminished motion of knee or ankle or both.	25-66

For neuritis, or injury of nerves 25 per cent. more than for loss of limb.

Leg.	
Loss below knee	66
False joint at ankle	40-66
Anchylosis of knee, extended	40
" " flexed or over extended	50
False joint at knee	60
Foot.	
Loss at or below ankle	66
Injury to ankle bones	16-40
Anchylosis of ankles with flat foot	40
" " with	50
Chr. arthritis of one or more joints	15-50
Toes.	
Lower extremity foot	8
Loss of great toe	10
" any other toe	6
" all toes of one foot	50

With 5-10 per cent. more for loss of metatarsal bones.

II SCHEDULE OF TEMPORARY DISABILITY.

The following table compiled from the statements of the various standard authorities, notably C. Kauffman, shows the duration of temporary disability and some of the commoner complications and consequences of frequent forms of injury.

Explanation of abbreviations:

Numbers indicate duration of disability in weeks; unless otherwise stated.
p.p.d., permanent partial disability.
per cent., percentage loss of earning power.
p.t.d., permanent total disability.
B., confinement to bed necessary.
H., treatment in hospital preferable.
F., likely to be fatal.
Complications are enclosed in brackets.

HEAD.

Scalp: *Contusions:* Slight, 1—2; severe, 2—6; (blood cysts, neuralgia, varicosities.)

Wounds; 1—2, B.; *Lacerations:* 2—6, B.; (4—8, F.; erysipelas, 4—12, H. F.; wandering erysipelas, 8—26; loss of hair; sensitive to heat and cold; neuralgia; insanity; sensitive scar; epilepsy, aura from scar).

CRANIUM : *Contusions :* Same duration as scalp wounds ; (osteoma, osteosarcoma).

Fracture : Vault or base, 1—6 months, H. ; often p.t.d. or p.p.d ; (meningitis, F. ; encephalitis, F. ; abscess, F. ; thrombosis and pyæmia, F).

BRAIN : *Concussion :* H. ; immediate unconsciousness lasting hours or days, vomiting.

Compression : H. ; slow, hard, irregular, pulse.

Contusion : H. ; cramps, spasms or paralysis immediately after injury. In compression, contusion and concussion, (mental disturbances ; paralysis ; tinnitus ; headache ; impaired vision, hearing and speech ; tuberculous meningitis ; diabetes ; polyuria ; white softening ; chronic brain abscess—headache and dizziness, exclude ear disease ; brain tumours ; epilepsy ; insanity—connection recognised if early after accident).

FACE : *Cuts, Lacerations and Contusions :* 1—4 ; heal rapidly ; (salivary fistula, 4—8 ; erysipelas, 3—4 ; relapses frequent).

Burns : if superficial, 2—4 ; from boiling liquids and explosions : deep, or corrosions ; (scarring and disfiguring require plastic operations—important in young women ; obstruction of orifices ; ectropion ; danger of foreign bodies ; paralysis of facial).

Fractures : of nose, 2—4 ; (lachrymal fistula, traumatic ozæna, malposition in setting) ; of malar bone, (rare) 3—6 ; of superior maxilla : 4—10 (necrosis) ; of inferior maxilla, 4—10, (necrosis, aspiration pneumonia).

Loss of Teeth : disfigurement ; (10 per cent. p.p.d to young women for loss of incisors).

EYE.

EYELIDS : *Contusions :* 1—3. *Lacerations :* 2—4 H. ; *Burns :* 3—10 H. ; *Stabs and Cuts :* 1—2 ; (ectropion, entropion, ptosis, 2—4, H. ; operation).

CONJUNCTIVA : *Foreign Bodies :* 1—3. *Lacerations :* 1—3. *Burns :* caustics (keratitis, synblepharon. Trachoma—when case infection occurs accidentally in course of treatment).

CORNEA : *Foreign Bodies :* not infected, 3—7 days ; infected, 1—4 ; (loss of sight).

Contusions : 4—8, (hypopyon, loss of vision, phthisis bulbi, liable to take unfavourable course later).

Wounds : non-penetrating, seen early, 1—2 ; if neglected, 2—6, B. ; (hypopyon). Penetrating cuts and stabs, 1—2 ; not infected.

Lacerations : 6—12, B. ; (iridectomy, cataract later, opacity of cornea—central or peripheral).

SCLERA : *Wounds :* superficial, 1—2 ; perforating,—involving ciliary body, choroid, retina, or with foreign bodies, non-suppurating, 6—12 ; often loss of vision later. Suppurating, 6—26 ; loss of eye, (sympathetic ophthalmia).

IRIS : *Contusions :* paralysis of accomodation, traumatic mydriasis, 6—10. Separation of iris, no operation, 2—4, B. ; operation, 4—12, B. ; (p.p.d., loss of vision).

Foreign Bodies : non-septic, seen early, 2—4 B. ; septic, (panophthalmitis), 4—6 B. ; loss of eye.

Wounds : usually severe iritis, prolapse of iris and dislocation of lens, 4—12 ; (often panophthalmitis).

LENS : *Rupture of capsule :* resorption, 6—8 ; (in young persons). Inflammation, 4—16, H.

Foreign Bodies ; opacity and suppuration requiring extraction, and perhaps secondary operation, 2—15 months, H.

Wounds : operation usually required, 2—6 months, H. Note : Resulting

aphakia cannot usually be corrected by glasses during work if other eye sound. Eyes operated on for cataract require almost same compensation as for loss—30 per cent. Loss of eye with cataract suitable for operation, 20 per cent. Blindness of one eye when the other has a cataract, 70 per cent. if successfully operated.

CHOROID, RETINA AND VITREOUS: *Contusion and Hæmorrhage*, 4—8, B.

Retinal Hæmorrhage: slight, 2—6, severe, 4—12; (severest forms near macula, good prognosis only if prompt recovery; detachments usually incurable).

Foreign Bodies: good results in 6 per cent.; 6—12, H.; (usually panophthalmitis and sympathetic ophthalmia).

Wounds: non-suppurating, common, 6—10. Suppurating call for enucleation; 6—12, H.

ORBIT: *Foreign Bodies:* small, not dangerous; large, dangerous from suppuration; (meningitis).

Wounds: stabs and cuts from instruments or splinters; if suppuration, 4—20 H.; (meningitis, F).

EAR.

LOBE: *Contusions and Abrasions:* 1—2.

Lacerations and Cuts: 1—4.

Burns and Corrosions: 2—6, (deformity or defect; hæmatoma; stenosis of meatus).

MEATUS: *Foreign Bodies and Injuries:* 1—2; (entrance of water; blow on jaw; fracturing skull).

TYMPANUM: *Rupture:* foreign bodies usually in upper part; (separation of ossicles; fracture of malleus or stapes); indirect injury from blow, fall, alteration of air pressure or explosion; 1—8, B.; (purulent otitis prevented by aseptic measures; curable; subjective noises may persist for months; persistence of perforation or recurrence of ear disease).

TYMPANIC CAVITY: *Foreign Bodies:* cause suppuration (meningitis); hæmorrhage, 6—15; (deafness may persist; polypus; bone necrosis; complete healing necessary before beginning work).

LABYRINTH AND NERVE: *Concussions:* blows and falls, striking head or any part of body; explosions and noises; (dizziness, loss of co-ordination, tinnitus); 8—12; often incurable.

HEARING: Slight or medium deafness of one ear, 0; severe, one ear, 10 to 30 per cent.; deafness of both ears, 30 per cent.; (chronic ear disease shortens expectation of life; abscess; mastoiditis, pyæmia, F).

NECK.

Corrosions and Burns: (scarring and fixation). Injury to deeper tissues from explosions and lacerations; (larynx, hyoid, trachea, vessels and nerves exposed); injury of carotid or jugular, usually F.; after ligature, paralysis or aphonia in 30 per cent. of cases.

HYOID BONE: *Fracture;* 3—6; (dysphagia).

LARYNX: *Contusions:* may be fatal from shock.

Fractures: dangerous; also dangerous after tracheotomy from obstruction of tube (disturbance of speech; difficulty of changing canula; supervision required).

LOSS OF SPEECH: aphonia and hoarseness; (asymbolia; asphasia; alexia from central lesions).

CHEST.

THORAX: *Concussion:* (shock fatal (?); loss of consciousness; syncope; heart and lung diseases).

Contusion: slight from blows or falls; ecchymosis of skin and muscles; 1—2. Severe, from crushing; may have internal injuries with little injury of chest wall; (lesions of heart, diaphragm, and vessels); often fatal; may heal in 1—4; or lead to chronic disease.

Fractures sternum, simple, 4—10; compound, usually fatal; (cough, palpitation of the heart, dyspnœa, suppuration and abscess); of ribs simple, not dangerous, 5—12 B.; (danger in old persons of lung disease). Compound fracture, (hæmothorax; heals after aspiration, rarely suppurates; pleurisy, heals readily with adhesions, may suppurate, 2—4 months, H.; (pneumonia, œdema of the lungs, neuralgia at site of injury, fistula, caries of rib,—tuberculous but curable, 2—4 months,—lung tuberculosis most fatal).

Wounds: burns, (scarring and contraction) stabs and cuts are rare in industrial accidents. Wounds of chest and lung generally curable unless involving large vessels, but suppuration common. Heart wounds: not always rapidly fatal, unless in auricles, sometimes curable. Rupture of diaphragm, from falls and run over accidents, usually associated with fatal injuries.

Heart Disease: Traumatic forms include (1) acute endocarditis, (2) chronic endocarditis, (3) rupture of valve, (4) nervous heart disturbance, (5) pericarditis, (6) aggravation of existing disease; after injury, psychic shock or over exertion. Heart dilatation a prominent symptom in serious cases.

Lung Disease: Traumatic forms include (1) acute traumatic lobar pneumonia, (2) localized traumatic pneumonia, (3) bronchopneumonia, (4) secondary pneumonia, (5) laceration of lung, (6) gangrene, (7) traumatic tuberculosis of lung, (previous condition of lung important, also previous health). Main diagnostic symptom of traumatic pneumonia, early appearance of bloody expectoration.

Traumatic Pleurisy: 50—60 per cent. recoveries.

ABDOMEN.

ABDOMINAL WALLS: *Contusions:* Ruptured muscles from direct violence, overstretching and heavy lifting, usually in recti below umbilicus, 4—6.

Perforating Wounds: without injury of organs, usually heal readily, 2—8 B.; (prolapse of omentum or intestine).

STOMACH: *Contusions:* from compression against vertebræ, 1—3 months; (gastric ulcer may follow, 4 per cent. due to trauma, hæmatemesis leading symptom).

Stabs and Cuts: operation immediate; 2—3 months.

INTESTINE: *Wounds:* same as stomach. *Contusions and Lacerations*, operation imperative; unless early operation, are fatal from peritonitis, gangrene or hæmorrhage.

LIVER: *Contusions:* occasionally occur. *Lacerations:* common; result good by early laparatomy, otherwise fatal.

SPLEEN: same as liver; often no injury to abdominal wall; (constitutional disturbances after removal).

HERNIA: *Inguinal:* predisposition exists in most cases; sudden onset necessary to show traumatic origin; immediate pain and inability to work; enlargement of ring or enlarged veins point to pre-existing hernia; causes, direct violence, lifting or heaving, in heavy work; early examination needed, improbable when simultaneous double hernia, or unilateral hernia with en-

larged ring on opposite side, or inguinal testis exists. Old hernia may be demonstrated: (1) by records of examination for military service, or accident or life insurance; (2) signs of truss; (3) size larger than lemon; (4) irreducible but not strangulated; (5) inguinal canal short and wide. Hernia can rarely be stated to be quite recent; burden of proof rests with claimant. Indications for gradual onset: (1) continuous heavy work; (2) advanced age; (3) statements that a moderate load was found too heavy. Compensation based on 10 per cent. disability, less in females, double hernia same compensation as single as same truss suffices; increase compensation when truss is worn with difficulty or causes inflammation, or if hernia suddenly increases while wearing a proper truss.

Strangulation is to be compensated for if due to injury or over-exertion. Strangulation of a hernia already compensated for may be admitted if a good truss is worn, but not unless worn at time of accident. Always examine both sides to see if recent or old; always test efficacy of truss after application.

Femoral, umbilical and ventral: same as inguinal, but may require more compensation as truss is less easily applied.

KIDNEY: *Concussion and contusion:* hæmorrhage and traumatic nephritis; (casts and blood after a few hours, albuminuria); may be fatal.

Lacerations: may be free from symptoms (blood) in a few days, 4—10, H.; hydronephrosis: *floating kidney* requires bandage or operation.

BLADDER: *Rupture:* from direct violence or lifting, one-third of operated cases recover; 4—12, H.

URETHRA; *Lacerations:* in pelvic fractures, 40 per cent. fatal; from straddling falls, 14 per cent. fatal; 6—12, H.; may leave stricture; liable to relapse.

PENIS: *Contusions and crushing:* 2—4; *lacerations:* 3—8 B.; 2—3 months (deformity).

TESTIS: *Contusion and Concussion:* 1—2; liability to sudden death from shock; hæmatocele, 3—4; hydrocele, 4—6; purulent inflammation, 4—8, (spermatocele and varicocele); loss of testis, 10—15 per cent. if double, or much more if followed by hypochondriasis.

FEMALE GENITALS: *Abortion* from injury of pregnant uterus, *prolapse* from over-exertion; signs of recent origin, pain and tenderness, acute inflammation, absence of chronic inflammation, ulcers, thickening and attrition.

TRUNK AND SPINAL CORD: *Rupture of muscles:* 3—10, B.; lumbago, usually rheumatic in origin, chief difficulty of diagnosis.

Contusions: 1—3 months; contusions of vertebræ, slight, without injury of cord, 1—4 months, B.; severe, may last months or years or give p.t.d.

Fractured vertebræ: 6—12 months. *Dislocation:* same as fracture; (inflammation of spinal membranes, meningocele, meningeal hæmorrhage, myelitis or sclerosis of cord, paralysis, bed sores, cystitis, often fatal).

UPPER EXTREMITY.

CLAVICLE: *Fracture:* 5—10; sometimes bilateral; in women greater need to prevent deformity by B. and traction; (injury to nerves and vessels, overgrowth of callus, shortening, disfigurement, false joint may require suture, effect on movement, atrophy of deltoid).

Dislocations: 4—12, H.

Fracture: of blade or acromion, 6—8; usually no permanent disability, but may prevent full motion of arm.

Of neck, 6—12; injury of axillary nerve and paralysis of deltoid; danger of stiffness of shoulder joint and difficulty in raising arm.

SHOULDER: *Contusions:* great functional disturbance at first; rapidly relieved by treatment; 4—8.

Sprain: swelling and tenderness in anterior part of capsule; healing prompt; 4—8.

Dislocation: if promptly recognized and reduced, 4—8, with no further results; (separation of great tuberosity and fracture of head of humerus, 6—10; if dislocation reduced, may have complete cure; otherwise, pressure on vessels and nerves require subsequent operation; primary injury to to nerves or compound wounds; paralysis of circumflex nerve and atrophy of deltoid; recurrent dislocation from trifling causes happens when arm is used a few days after reduction; old dislocations occur through non-recognition in early stage, usually in cases not seen at first, attempts at reduction may cause injury to nerves or vessels or fracture of humerus).

HUMERUS: *Fracture:* separation of great tuberosity often confused with sprain, 8—12; old cases good objects for mechanical treatment, 2—4 months, may have p.p.d, from limited mobility in raising arm or chronic arthritis. Anatomical neck or epiphysis, 8—12, best results from extension.

Compound Fracture: 2—4 months; (injury to radial nerve, operation; injury of axillary artery, operation, 8—10).

AXILLARY VESSELS: injured by external causes or in reducing old dislocations; may be fatal; usually p.p.d. from weakness of arm and disuse of shoulder.

AXILLARY NERVES: *Injury and contusions of shoulder or crushing:* if severe, complete and incurable paralysis of arm; in slight cases, neuralgia; (neuritis from crutches).

SYNOVITIS OF SHOULDER: liable to occur in persons carrying burdens or from injury; 3—6; paralysis of deltoid from prolonged rest and fixation, besides causes given above.

SHAFT OF HUMERUS: *Fractures:* 8—12; if transverse, extension and B., if fragments override; compound, non-infected, the same as simple; if infected, may need amputation; (nerve injuries, usually to radial; malposition requires operation; false joints).

ARM MUSCLES: *Laceration:* of muscles and tendons, common; in biceps, separation of scapular origin in heavy lifting; (atrophy and weakness of flexors).

NERVES OF ARM: *Crushing or section:* (neuralgia, suture, stretching, paralysis and trophic injuries, blebs and ulcerations of hands and fingers after injury of median and ulnar). Note: Examine condition of nerves, test sensation, etc., before applying splint, to demonstrate primary injury.

ELBOW: *Laceration or burns of skin:* scarring, 8—12; may require plastic operation.

SYNOVIA: over olecranon, injured by falls; may suppurate if neglected, 4—6, B.

BICEPS TENDON: *Section or rupture:* suture.

ULNAR NERVE: injured in dislocations.

ELBOW JOINT: *Sprains:* usually associated with hæmorrhage; 4—6; stiffness cured by mechanical treatment.

Contusions: posterior and inner surface; inflammation of bone; 3—8.

Dislocation: backward most common; 1—2 weeks after reduction may begin passive motion; 4—8; often limitation of movement.

Fracture through elbow: stiffness is now less frequent owing to mechanical treatment; compound, good results if properly treated; (infection; nerve injuries, p.p.d. mostly from interference with nerves of hand).

Fracture through condyles. 8—12, B.; deformity, operation.

FOREARM : *Contusions :* usually heal well, even with much swelling ; 4—8;

Wounds : often complicated with injury of vessels, nerves, and tendons ; suture beneficial even years later.

Crushing : causes extensive separation of skin ; 4—12 H. : often p.p.d.

Fractures : of both bones, 8—12 ; (ischæmic paresis of muscles from tight bandaging ; at first easy to treat ; if only noticed after removal of splints, leaves permanent effects ; interference with pronation and supination from bony adhesions, callus, or malposition, require operation ; false joint, may not cause disability ; in other cases, operation and fixation needed ;) treatment by extension in supine position.

Fractures of Ulna : in upper third, often dislocation ; 8—12 ; old neglected cases cause functional disturbance, operation and resection of head of radius or ulna.

In middle or lower third, 8—10 ; (pseudarthrosis or impaired rotation).

Fractures of Radius : in upper and middle thirds, pseudarthrosis if fragments not opposed but one supine and the other prone ; in lower thirds, Colles' Fracture forms 10 per cent of all fractures, often called fracture of the forearm ; or treated as sprained wrist ; 3 weeks fixed and 4 weeks gymnastics ; massage good, even in worst cases, but may take one to two years. (fracture of lower end of ulna may leave pain and disturbed function ; comminution of lower fragment, or fractures of carpal bones ; compound fractures, results bad ; worst results due to paralysis from tight plaster bandage).

WRIST : *Sprain :* massage, 2—4 ; with rest treatment, function disturbed for months ; heavy work might be better done than delicate hand movements.

Dislocation : rare ; usually means fractured radius.

Tenosynovitis : suppuration, 2—4 ; often relapses ; common about thumb in certain occupations, smith, carpenter, joiner, farm labourers, washerwomen.

HAND AND FINGERS : *Contusion and crushing :* from severe injuries, hence often protracted ; in crushing of ungual phalanx, remove nail to lesson risk of infection ; 2—4.

Sprains : 2—6 ; often lead to stiff joint with thickening ; benefited by massage.

Dislocations : rare ; Röntgen ray examination important ; 3—6 ; operation gives good results.

Fractures : bony union, 3—8 ; if soft parts are much injured and inflamed, 4—12 B.

Wounds : early treatment important ; first aid should be simple, water dressings, or iodoform gauze ; unskillful use of carbolic acid or perchloride of iron liable to produce gangrene ; infection of wounds most important, and phlegmon may occur through infection by callosities or small foreign bodies.

General considerations for assessing cases of hand injury.—The younger the person the greater the chances of adaptation ; new conditions or change of employment and ultimate improvement of condition ; heavier compensation needed for old persons. Sex : Men are better able to find work with injured hand than women, as the latter do chiefly fine hand work ; common labourers do not use fine finger movement ; skilled labour needs especially high compensation, if the injured finger is used in special occupation ; women require special compensation for deformity. ; previous injury, if not already compensated for, should increase the amount of disability. Estimation of the loss of power of hand or arm to be tested quantitatively, the angle to which flexion is possible and the force in various parts to be tested and compared with the opposite hand ; the special effects of injury to nerves, as seen in the claw hand from beginning of the ulna nerve with the loss of

apposition of thumb, in which the hand is quite useless. In the radial nerve, absence of extension and abduction ; in median nerve, loss of apposition, separation of fingers, loss of power of flexion. Dupuytren's contracture and ulcers also cause disability. Degeneration of muscles, electrical tests.

LOWER EXTREMITY.

Pelvis : *Contusions :* extensive ecchymosis, removable by puncture ; separation of tissues (infection) ; 4—8, B.

Sciatic Nerve : Contusions : by falls or tumbling over when kneeling or squatting ; 4—12, B. ; (cramps and prolonged sciatica, nerve stretching, or section and suture).

Fracture : often multiple, always severe, gravity depends on implication of pelvic organs especially urinary tract ; 2—4 months ; (injury of urethra, 3—6 months, H. ; often p.p.d. ; fracture through acetabulum may affect hip joint).

Hip : *Contusions :* often present extensive separation of the skin and extravasation of blood or lymph ; 4—8, B. ; (contusion of groin, 1—2 ; often infected from injury of glands ; rupture of psoas muscle, after severe exertion, pushing or lifting, 4—10, B. ; injury of great vessels, danger of immediate bleeding, or gangrene of whole or part of leg).

Hip Joint : *Sprains :* rare.

Contusions : falls on trochanter ; 3—6, B. ; if simple contusion healing good.

Dislocations : reduced when recent, 6—12, B. ; fracture of acetabulum may make reduction harder, extension apparatus, 8—12, B. ; in fracture of neck, dislocation unreduced ; with union in good position, the gait is less disturbed than in simple unreduced dislocation ; injury of great vessels may cause death from bleeding and gangrene ; old unreduced dislocation may be reduced without operation, but latter is preferable ; in unreduced dislocation, first, crutch used, then stick ; if paralysis and pain remain from head of femur, it should be resected.

Thigh : *Contusions :* extensive and severe functional disturbance ; 4—10, B.

Laceration of muscles : adductors or quadriceps ; in tendons, suture required ; results good ; 4—8.

Wounds : complicated by infection, dangerous ; after injury of large vessels, gangrene ; crushing commonly from run-over accidents.

Femur : *Fracture :* of neck ; intracapsular, rarely gives bony union in old people, 2—6 months ; always have partial or total stiffness of hip-joint and shortening with a limp ; (in old people, often bed sores and hypostatic pneumonia ; extension and long splint) ; usual cause, external violence in long axis or axis of trochanter ; rarely spontaneous ; in impacted fractures, may walk with stick ; often only sprain diagnosed and short rest in bed ordered ; these cases later have profuse callus and anchylosis of joint.

Of shaft, simple, 3—4 months, H. ; extensive twisting or separation of fragments, common ; treatment by plaster ; shortening usually considerable ; malposition may require osteotomy ; compound fractures heal well with good treatment, but if thigh is crushed, amputation indicated ; (malposition ; shortening ; false joint. requiring fixation apparatus and walking out ; stiffness of knee joint from inaction, requiring gymnastic treatment ; relaxation of ligament, needing apparatus ; atrophy of quadriceps ; paralysis of peroneal nerve, from over extension of knee).

Knee : *Wounds :* from falls, corrosions, cuts and bites ; danger to popliteal vessels ; in neglected cases, purulent arthritis,

Contusions: with bloody effusions, 4—8, B.; on knee cap, bleeding into bursa.

Sprains: slight, 1—2; severe, 4—12, B.; (relapsing synovitis with effusion; uncertain gait; fatigue and tendency to fresh sprain; may cause fixation; stiffness in joint with exostoses, p.p.d.; muscle atrophy; rupture of internal lateral ligament, 5—10, B., and apparatus, 1—2 years.

Dislocations: from severe violence; good results if seen early; 2—4 months, H.; anterior and posterior dislocations often complicated by injury to vessels.

PATELLA: *Dislocation:* 3—12, B.; readily healed if replaced but liable to recur; if unreduced, motion is impaired.

SEMILUNAR CARTILAGES: *Rupture:* impaired motion requiring operation; floating cartilage.

KNEE JOINT: *Fracture through:* 8—12, B.; if comminuted, 8—16; if transverse; (fibrous union; with stiffness, mechanical treatment, 1—2 years; weakness of quadriceps); fracture through condyles, 8—16; fracture through upper end of tibia, 12—24; (stiffness often results).

LEG: *Wounds: contusions: abrasions:* periostitis often diagnosed when merely bandaging bad; varicose veins, special care necessary; also if scars or ulcers are injured; varicosity aggravated by accident and may lead to ulcer; to be compensated if the direct result of accident; *thrombosis* common, apart from varices; pain felt in leg with swelling following; patient may work one or two weeks with increasing pain before disabled; if the accident can be proved, thrombosis may be regarded as due to it even if work is continued during interval.

Laceration: of muscles and sinews in calf, often tendo achilles; 8—12; suture.

Fracture: shaft; usually of both bones; 4—6 months; (stiffness of joints from disuse, massage beneficial; malposition often leaves an angle; pain from pressure on nerves; eversion of foot, osteotomy; X ray diagnosis important, callus at first transparent; may have delayed union and false joint; if treated by plaster splint or allowed to walk with apparatus, operation rarely necessary; swelling of foot and ankle from interference with vessels or thrombosis relieved by massage to restore muscular tone, or by passive motion of joint; thrombosis likely in advanced age; compound fractures, 4—8 months, H.; often leave necrosis of bone, fistulæ or ulcers).

ANKLE: *Sprain:* usually from falling or jumping; best results from massage; 2—6; (swelling and radiating pain; uncertain gait and tendency to sprains; stiffness, if kept at rest during the cure; good results by massage and mechanical treatment; persons with varicose veins suffer most).

Dislocation: anterior or posterior; 8—12, B.; less disability from badly healed anterior than posterior: calcaneus position than equinus; operation with good result; subastraguloid, prognosis good; in neglected cases, only hope of improvement is operation; dislocation with fracture of astragalus, good if replaced, otherwise pain persists.

Fractures: through malleolus of fibula; 2—4 months; position of foot most important; danger of subsequent stiffness.

Fractures compounded from injury by bone fragments; (pressure necrosis; swollen foot and leg; thrombosis; embolism; and stiff joint, permanent if from callus, often in equinus position; *flat foot* if fibular fracture set without correction of position; prevents climbing and standing long; never perfectly healed benefitted by plate).

Fracture of malleoli, either the inner or outer may break ; the commonest form, Pott's fracture of fibula and inner malleolus. Fractures above malleoli often comminuted, may need resection if compound, 3—6 months, H.

Fracture at tibio-fibular ligament may occur with sprain; in neglected cases, often leave flat foot.

Fracture of astragalus from falling or jumping often complicated with fractured malleoli and leaving club foot deformity ; may leave severe results, especially anchylosis ; X ray diagnosis important in all injuries of ankle.

Foot and Toes : *Wounds :* neglected, dangerous from sepsis and phlegmon ; scars on soles, bad and may need operation ; special liability to tetanus ; infection may follow trivial wounds.

Contusions : 4—12 ; walking painful ; badly fitting shoes aggravate the condition ; bed and warm applications necessary.

Sprains : in cases of flat foot, very serious ; may take years to heal.

Lacerations : with rupture of tendon and fascia ; the plantar fascia may be tender for months.

Fracture : of os calcis, pain in standing and walking may persist from 2—4 years ; of metatarsal, often interferes with function ; pain after removal of bandages may last for months causing limping and limited use of foot.

Rules for assessing injuries of lower extremity.

(1) Certain occupations especially require steady footing ; if climbing and good balancing necessary, motion must be free.

(2) In other occupations much walking is needed.

(3) In others, prolonged standing. For all these, good restoration of function needed, not merely cure of the injury. It should be noted whether the person can acquire a sedentary occupation and do his work sitting, or if he can only do light indoor work. The p.p.d. in lower extremity is 40—75 per cent. after serious injuries. The actual motion of the joint is to be accurately noted.

RETROSPECT

OF

CURRENT LITERATURE.

Medicine.

UNDER THE CHARGE OF JAMES STEWART.

DR. SLAWYK. "Zur Statistik der diphtherischen Kehlkopf erkrankungen."—*Charité-Annalen, XXIV Jahrgang.*

A most interesting and instructive report on the results of treatment of the laryngeal complications of 702 cases of diphtheria has appeared under the above title. The great practical importance of this subject is the excuse for giving a lengthened summary of Dr. Slawyk's report. It deals in a most convincing way with the subject, and enables one at a glance to judge of the comparative merits of the serum and non-serum methods of treatment, as well as the usefulness of, and the indications for, the employment of intubation and tracheotomy.

From the first of October, 1894, to the thirty-first of December, 1898, 702 children were treated in the diphtheria department of the Children's Hospital at Berlin, of whom 254 (36.2 per cent.) presented symptoms of laryngeal involvement. It was found that laryngeal complications were more frequent in the winter than in the summer months, the proportion being 40 to 32 per cent. These statistics bear out the generally recognised frequency of laryngeal complications in young children. Fully 50 per cent. of all children admitted under the age of three years had laryngeal complications. The comparative narrowness of the larynx and the difficulty of early recognition of diphtheria in young children, and therefore the late beginning of preventive treatment, accounts, according to Slawyk, for this increased frequency.

The mortality in all the cases diphtheria of the larynx, amounted to 78, being 30.7 per cent. As showing the very great importance of laryngeal diphtheria, 72.2 per cent. of all deaths occurring were due to this complication. Of 254 cases of laryngeal diphtheria, 146 (57.5 per cent.) were operated, while 108 (42.5 per cent.) were not operated. The mortality in the cases not operated on, amounted to 17. The treatment in these cases comprised, besides the serum injection, hot baths

and the internal administration of iodide of sodium and the inhalation of salt solution. Of the 146 cases operated on, 66 (45 per cent.) were boys, and 80 (55 per cent.) were girls. The operations were intubation, tracheotomy, and in a few cases, both were performed.

Intubation was performed in 127 cases, with a mortality of 48 (37.8 per cent.). In 31.5 per cent. of those intubated, tracheotomy was afterwards performed; while in 69 per cent., intubation alone was performed. In the cases where both intubation and tracheotomy were performed, the mortality amounted to 69.2 per cent., while it amounted to 23.9 per cent. in the cases where intubation alone was the operation.

Primary tracheotomy was performed in 19 cases, with a mortality of 68.4 per cent. The statistics bear strong testimony to the severity of laryngeal diphtheria in children under three years. The third and fourth days were found to be the periods during which the greatest danger from laryngeal stenosis existed,

The mortality from the various operations is summarised as follows:—

For intubation alone.....23.9 per cent.
For intubation and secondary tracheotomy.....69.2 per cent.
For primary tracheotomy.....68.4 per cent.

The high death-rate, in the combined operations, is due to the fact that the secondary tracheotomy was only resorted to in cases where intubation failed to relieve, either owing to the low situation of the membrane, or the strength of the patient was inadequate to expel it. Secondary tracheotomy was necessary in 39 cases, chiefly owing to the deficient quantity of air admitted to the lungs in spite of the intubation tube. Recovery followed in 30.7 per cent. of these cases of combined operation.

There was found to be comparatively little difference between the results of primary and secondary tracheotomies. The former was performed on 15 cases; in ten, owing to the age (1½ years); in two, owing to cardiac weakness; in one, owing to the great swelling of the throat; and in two, from non-stated causes. Six of the 15 children recovered (31.6 per cent.).

An interesting comparison is made between the cases treated since the introduction of serum and intubation and those treated in the ordinary way or where tracheotomy was performed. From the 1st October, 1890, to the 31st March, 1894, there were admitted 415 cases of diphtheria treated by the usual measures in vogue prior to the introduction of the serum treatment. Out of this number, tracheotomy was necessary in 175, or 42 per cent. of the cases. Of 702 cases treated with serum since March, 1894, only 146 were operated on (tracheotomy and intubation), showing the very marked difference of 21.7 per cent. Of

the non-serum cases, 136 died (78 per cent.), while only 61 (41.8 per cent.) of the serum-treated cases died. Had the mortality rate remained the same in the serum as in the non-serum cases 51 more children would have died.

A most telling proof of the usefulness of the serum treatment is shown by the following facts:—Twenty-seven cases of laryngeal diphtheria in the old series, that is in those cases treated before the serum period, required tracheotomy some days after their admission into the hospital, as the following table shows :—

After	3	days'	stay	in the hospital	4
"	4	"	"	"	10
"	5	"	"	"	5
"	6	"	"	"	2
"	7	"	"	"	1
"	8	"	"	"	2
"	9	"	"	"	1
"	12	"	"	"	1
"	25	"	"	"	1

In no case after admission in the serum-treated cases, did a laryngeal complication requiring an operation set in.

Slawyk does not consider that we have any reliable rules as to the time for interference in stenosis from laryngeal diphtheria. The most trustworthy symptoms likely to call for early interference are, in his opinion, great restlessness; and as a first measure he recommends intubation, except in cases of very young children or where the throat is so engorged as to prevent, practically, the use of the tube.

James Stewart.

Surgery.

UNDER THE CHARGE OF GEORGE E. ARMSTRONG.

The After-History in Cases of Successful Complete Gastrectomy.

SCHLATTER. "Final Report on Schlatter's Case of Removal of the Stomach." *Medical Record, March 18th, 1899.*

RICHARDSON. "The completed history of a case of total extirpation of the stomach, with remarks upon the surgical treatment of gastric cancer." *Boston Medical and Surgical Journal, September 28th, 1899.*

BRIGHAM. "After-history in a case of successful total extirpation of the stomach." *The Philadelphia Medical Journal, February 3rd, 1900.*

MACDONALD. "Notes on the total removal of the human stomach, and on gastroplication, with a late history of two cases." *The Philadelphia Medical Journal, February 3rd, 1900.*

HARVIE. "Report of a case of recovery after gastrectomy for carcinoma." *Annals of Surgery, March, 1900.*

Carl Schlatter was the first to remove successfully the whole stomach for carcinoma, on September 6th, 1897. The patient was a woman, fifty-six years old, suffering from a diffuse carcinoma of the whole stomach. Up to the beginning of September, 1898, she had been well with the exception of a slight pain now and then in her side and back. Her appetite was good and she took all the food allowed her. From that date she began to suffer from painful sensations in the left hypochondrium after taking solid food. On October 2nd, examination revealed a tumour about the size of a child's head, hard, nodular, and painful on pressure, extending from the middle line into the left hypochondrium and downwards. She did not vomit, but had frequent eructations of a clear yellow fluid. The patient died on October 29th, 1898, one year and nearly two months after the operation. The post-mortem showed masses of cancerous lymph glands in the mesentery, between the liver and the œsophagus, and behind the peritoneum. Cancerous deposits were found in the bronchial and subclavicular glands and in the pulmonary pleura. The autopsy did not confirm the assumption that a dilatation of the œsophagus or intestine had formed a diverticulum in

the digestive tract, taking the place of the stomach. The subdiaphragmatic portion of the œsophagus had a capacity of scarcely one hundred cubic centimetres, and yet the patient had been able to take upwards of three hundred grammes of nourishment at one time without suffering any inconvenience. The only explanation of the ability to take such large quantity of food is that the fluid and softer portion passed at once into the small intestine. The death of the patient was due to the multiple carcinomatous metastases, and could not at all be ascribed to inanition from insufficient nutrition. An entire year had a fifty-seven-year-old woman lived free from suffering without a stomach, and had even gained notably in body weight in that time. Up to within the last week of her life she had been able to go about outside the hospital, but with the appearance of the cachectic symptoms she rapidly succumbed to her malady.

Charles Brooks Brigham reported the second case. The patient was a woman, sixty-six years of age, who had been suffering for a year with pain in the stomach, which with the hardness in the region of the pylorus led to a diagnosis of cancer. The operation was performed on February 24th, 1898. After the removal of the stomach the duodenum was united to the œsophagus without undue tension by means of a Murphy button, $^{13}|_{16}$ inch in diameter. Seven weeks later the patient left the hospital for her home where she has been living ever since. At first, for several months, her meals were at three hour intervals, and she was not restricted to any particular food. As she had few teeth the meat was cut into small pieces. At the present time she takes but three meals daily, with eggnog in the afternoon. She has no indigestion, and her bowel movements are normal, containing no undigested food; her sleep is natural; her skin moist; and her cheeks have considerable colour. In the spring of 1899, she weighed 110 pounds. Her weight at present is 113 pounds. Her blood is practically normal save for a slight diminution of hæmoglobin.

Maurice Howe Richardson performed the third successful operation on May 31st, 1898. The patient was a woman fifty-three years of age, and had suffered from symptoms of cancer for a year. She left the hospital and returned to her home on July 5th. She was able to take sufficient nourishment of great variety, and there was no difficulty in its assimilation; she was free from the distress that she used to experience after taking food, but there was in the epigastrium a sensation of drawing or dragging more or less pronounced, as if there was undue tension in front. Careful examinations were made from time to time to detect any evidence of recurring disease, but they were always negative. In November, 1898, the wound unexpectedly reopened, after

some pain and discomfort in the left hypochondrium. Shortly afterwards symptoms of intestinal obstruction began to appear and her strength failed with alarming rapidity and she died on February 19th, 1899. At the autopsy it was found that the mass at the left of the epigastrium was recurrent cancer, which had infiltrated the peritoneum under the rectus and had spread about the walls of the small intestines. There were nodular masses in the mesentery of both large and small intestines. Minute nodules were scattered everywhere. Near the splenic flexure the lumen of the colon was totally obstructed. Beyond this point the bowel was collapsed, above it was enormously distended. The line of suture was perfect except for a sinus about the size of the little finger. From the history of this case the author concludes, that the patient's health would have been fully re-established had there been no recurrence of the original disease, that the sufferings were due to the mechanical effects of a chronic obstruction rather than to cancer itself, and that œsophago-duodenostomy is technically possible in a certain percentage of cases.

G. Childs Macdonald reported the fourth case. The patient was a man, thirty-eight years of age, who had been suffering from symptoms of gastric cancer for over a year. The operation was performed in September, 1898. The man is now well and living at Pasadena, Cal., where he follows the usual hard life of a farm labourer, eating and drinking the common food, partaking of meat and vegetables and red wine, and he is able to digest it all and do a good day's work, although he has no stomach.

John Bruce Harvey, (a graduate of McGill '91) has recently recorded a fifth case, having performed the operation on May 15th, 1899. The patient was a woman, forty-six years of age, who had suffered for nearly eighteen months from symptoms referable to the stomach, and for some time a mass was observed in the epigrastrium. The stomach was removed with great difficulty owing to its attachment to the surrounding parts. The duodenum was without much difficulty brought in apposition with the œsophagus, and after the parts were secured with catgut, a final row of Lembert's sutures completed the operation. The patient made an excellent recovery, and left the hospital on June 25th, after partaking of a dinner consisting of roast beef, mashed potatoes, one glass of milk, ice cream, and a small cup of coffee. Her appearance was one of happiness, and her feelings those of perfect comfort, every vestige of stomach distress having vanished. The only inconvenience she spoke of was a sense of pulling in the epigastrium, when she lay perfectly flat on her back, with her legs straightened out. On returning to her home she immediately assumed the responsibility of her household work, attending to all its details except washing.

Summary of the cases :—

1. Woman, aged 56, died 14 months after operation.
2. Woman, aged 66, alive and well 2 years after operation.
3. Woman, aged 53, died 9 months after operation.
4. Man, aged 38, alive and well 17 months after operation.
5. Woman, aged 46, alive and well 10 months after operation.

These cases clearly show that the stomach, although a convenience is not an absolute necessity, and can be removed in its entirety without apparently causing any interference with nutrition. In suitable cases the operation is quite justifiable, it relieves the patient of the intense distress and suffering, and offers a reasonable expectation of prolonging life, for many months. To be of any avail the operation must be performed at the earliest moment upon patients whose hearts are in good condition and whose general strength is but little impaired, and in whom the disease itself is situated favourably for wide and thorough dissection.

Fracture of the Humerus, with Paralysis of the Musculo-Spiral Nerve.

Dr. B. Farquhar Curtis presented before the New York Surgical Society (*Annals of Surgery, February, 1900*), a lad sixteen years old, who, in December, 1898, sustained a fracture of the humerus in its middle portion, together with a fracture of the forearm. The fractured humerus united, but complete musculo-spiral paralysis followed. He had a condition of complete wrist-drop, with extensive atrophy of the muscles of the forearm and hand. On March 7th, an incision was made over the humerus over the point of fracture, and the nerve was found to be continuous, but displaced by the fragments, which were fairly well aligned, although there was some overriding. At the upper end of the lower fragment the nerve was caught so that it was carried up and passed at almost right angles across the back of the humerus. This had resulted in stretching the nerve, and a cicatrix had formed about it, so that it was closely bound down to the bone, and its diameter had become reduced to about one-third its normal size for a distance of about three inches. The nerve was freed from the cicarticial tissue with some difficulty. The wound healed by primary union, but no improvement was noticed in the function of the arm until July. From that time steady improvement had occurred, and when the boy was shown almost full power in the arm and hand had been regained.

Dr. G. Riethus (Leipzig) discusses this lesion in *Beitrage zur klinischen Chirurgie*, Band xxiv, Haft 3. (Reviewed in *Annals of Surgery, January, 1900*). In the clinic at Leipzig, from 1860 to 1898, amongst 319 cases of fractures of the humerus, seventeen cases of mus-

culo-spiral paralysis were met with, and in nine instances the fracture was situated at the middle of the humerus. In comparison, the statistics of Bruns offer a collection of 866 fractures of the humerus, with seventy-three paralyses, and associated with fracture of the mid-humerus in more than fifty per cent. of the cases. Aside from the location of the fracture the nature of the violence is accountable for nerve injury, and both primary and secondary musculo-spiral paralysis ensue when the violence is not merely spent in causing fractures, but aids in the dislocation of the fragments, therefore, torsion fractures and fractures with great displacement are more frequently met with in musculo-spiral paralysis. Nerve palsies may be either primary or secondary. The former occur immediately after the injury, and the latter at remote periods. In the first instance the continuity of the nerve may be intact, its fibres merely contused and lacerated in part by the fragments or compressed between the fragments, or the continuity of the nerve may be completely severed. The motor paralysis, as a rule, is a typical wrist-drop, the sensory disturbances are very variable. The exact diagnosis of the nerve injury is impossible, as all degrees of injury may provoke the same symptoms, yet with great displacements of the fragments and writ-drop contusion may be assumed, and if in addition there are great sensory disturbances a complete severance of the nerve is most likely.

Treatment should at first be expectant; but if the paralysis is progressive, or if at the time of union it is stationary, operation is to be resorted to. Immediate nerve suture must be performed if the diagnosis of severed nerve is made. Secondary palsies are due to compression of the nerve by the callus against the shaft, or included in the callus, or stretched out over it, in consequence of which the disturbances set in later than in the primary palsies. There may be a combination, the first due to contusion, the subsequent due to compression. Motor and sensory disturbances set in simultaneously in the secondary paralyses. As secondary paralyses never occur spontaneously, operation is always indicated, and, as the onset of the paralysis is so insidious, operation should be timed early, yet late interference may prove beneficient.

Kenneth Cameron.

Ophthalmology.

UNDER THE CHARGE OF J. W. STIRLING.

Intraocular Injections.

KNAPP. "Injections of Weak, Sterile, Salt Solutions into Collapsed Eyes." *Archives of Ophthalmology, Vol. XXVIII., page 308.*

FUGE. "Antiseptic Injections into the Anterior Chamber." *Archives d'Ophthalmologie, July, 1899.*

DARIER. "Painless Subconjunctival Injections of the Mercury Salts." *Die Ophthalmologische Klinik, August, 1899.*

Knapp mentions three cases in which he very successfully used an injection of sterile, salt solution and the following are his conclusions.

(1) When, from lack of vitality in old age or any other cause, the cornea sinks in so that the eye collapses in such a way as to prevent the wound in cataract extraction from closing exactly, a liquid should be injected until the globe has resumed its shape, and the lips of the wound apply correctly.

(2) Not only remnants of cataract, but also cholesterine and other heterogenous substances including perhaps some movable foreign bodies, may be syringed out of the eye with impunity and success.

(3) When, during the extraction of a complicated cataract, the fluid vitreous escapes in such a quantity that the eyeball collapses, either totally or in such a degree as to prevent the closure of the wound, liquid should be injected to refill the globe and make the wound close.

(4) When, from an operation or an injury, the eye collapses, injection of a sterilised, indifferent liquid may restore the shape of the globe, facilitate the closure of the wound, and ward off infection from the entrance of conjunctival secretion into the eye.

Fuge conducted his experiments on human and rabbit's eyes, and considers that the main indications for intra-ocular injections are those diseases characterised by the appearance of hypopyon and infectious irido-choroiditis. If the hypopyon be very large or if there be post-operative suppuration with beginning panophthalmitis, the antiseptic douching of the anterior chamber gives very good results. A counter opening assists the drainage and cleansing in many cases. Fuge uses solutions of boric acid and cyanide of mercury.

The drawback to subconjunctival injection is the intense pain experienced, which cocaine and orthoform are incapable of allaying.

Darier finds that acoin is a capital anæsthetic for this purpose, using hydrarg cyanid. 0.01; sodi chlori, 1.00; aquæ distill, 50.00; and to this adding a drop of a one per cent. solution of acoin.

Epileptic Eye Strain.

CAPPS. "Epileptic Eye Strain." *New York Medical Journal, September 16, 1899.*

Capps considers that the continued effort which is put on the nerves of the accommodation, in course of time, sets up a reflex condition of the sympathetic nervous system that produces the epileptic paroxysm, just as it does in other parts of the body. Some cases of correction of refractive errors with resulting freedom from epilepsy are quoted.

Optic Atrophy following Profuse Hæmorrhage.

Editorial in the *Medical Record, September 9, 1899.*

FERNANDO. "Optic Atrophy following Profuse Hæmorrhage. *Annales de Oftalmologia, September, 1899.*

The article in the *Medical Record* is based on a case of Theobald's published in the Johns Hopkins Hospital Reports, Vol. X., No. 98, and also on a review of the literature bearing on this subject. The inferences drawn are :—

(1) The ophthalmoscopic examination, as a rule, points to thrombosis of the central retinal artery as the cause of blindness.

(2) The resistance to the already enfeebled blood current in the central artery by the intra-ocular tension is an important factor.

(3) Exceptionally, the thrombosis occurs in the retinal vein and not in the artery.

(4) In other exceptional cases the blindness is due to hæmorrhage or serous effusion in the sheath of the optic nerve or the optic nerve itself; and here the damming back of the blood current by the intra-ocular tension is likely of much importance.

Fernando reports a typical case of a man, aged 45, who, after bloody vomit and stools was unconscious for five days. On recovering consciousness he was found to be totally blind. Examination showed dilated pupils and optic atrophy, but no hæmorrhages in the fundus.

Connection between Ocular and Nasal Affections.

DE LAPERSONNE. "Connection between Ocular and Nasal Affections." *Annales d'Oculistique, September, 1899.*

HEILMAIER. *Zeitschrift für Augenheilkunde, December, 1899.*

De Lapersonne gives the histories of three very interesting cases. In each there was monocular optic neurtiis with stasis in the papillary ves-

sels. In one case there was sarcoma of the sphenoidal sinus, in another, infectious posterior rhinitis in which the sphenoid shared, and in the third case, purulent posterior rhinitis also implicating the sphenoid. Operation on these nasal conditions produced no improvement of the neuritis which progressed steadily to optic atrophy. Kaplan's symptoms of neuralgia, photophobia, lachrymation, blepharospasm, and erysipelatous redness of the root of the nose, were wanting. The involvement of the optic nerve was due to the close connection between the sphenoidal sinus, on the one hand, and the optic canal and upper part of the intraorbital portion of the optic nerve, on the other.

Heilmaier found in thirteen hundred cases that in only sixty-four was the nasal mucous membrane in a normal condition. In disease of the tear passages, nasal trouble was almost always present, generally rhinitis atrophica fœtida. Eczematous affections of the eye are almost invariably associated with similar conditions in the nose. Catarrhal conjunctivitis is frequently caused by disease of the nasal mucous membrane. Serpiginous ulcer of the cornea is attended essentially by those nasal affections which are most frequently associated with blenorrhœa of the lachrymal sac.

Acoin ; A New Local Anæsthetic.

RANDOLPH. "Acoin : A New Local Anæsthetic." *Ophthalmological Record, August, 1899.*

BRUDENALL CARTER. *Lancet, October 21, 1899.*

DARIER. *Die Ophthal. Record, August 5, 1899.*

RANDOLPH. *Transactions Amer. Ophthal. Society, 1899.*

Acoin is a new anæthetic which, so far, seems to have a very limited application in eye diseases, as will be inferred from the results obtained by the authors of these three papers.

Darier and Carter found its main use in rendering painless the subconjuctival injection of cyanide of mercury, where both cocaine and orthoform failed.

Randolph's conclusions are valuable in regard to its general usefulness in ocular therapeutics. Acoin is a white powder easily soluble in water in the proportion of one per cent., it is derived from guanin and is allied to caffeine and theobromine.

(1) Acoin, in the proportion of 1 to 100 and 1 to 300. causes satisfactory anæsthesia in an *unirritated* eye in about the same length of time as cocaine.

(2) In more than one case, where the eye was congested, repeated instillations of acoin were incapable of producing satisfactory anæsthesia.

(3) No defects of the corneal epithelium were observed after its use.
(4) Acoin has no effect upon the accommodation.
(5) It has no effect on the size of the pupil.
(6) It does not increase the intra-ocular tension.
(7) The staphylococcus pyogenes albus did not grow in agar which contained acoin in the proportion of 1 to 100 or 1 to 300, and furthermore, the exposure of this organism for twenty-four hours to the action of acoin, resulted in its death. Acoin would thus seem not only to inhibit the growth of this germ but also to destroy it.

Anæsthesia lasted 15 minutes with a solution of 1 to 1000.
" " 30 " " " " 1 " 400.
" " 60 " " " " 1 " 200.
" " 40 to 80 " " " " 1 " 100.
" " over a day " " " 1 " 40.

Protargal.

ENGELMANN. "Protargol." *Centralblatt f. Gynækologie, November 9, 1899.*

PRAUN. *Centralblatt f. Augenheilkunde, June, 1899.*

Engelmann uses a 20 per cent. solution of protargol in ophthalmia of the new-born with great success, and professes to obtain far more favourable results than with nitrate of silver. He much prefers it to the use of nitrate of silver in the Credé method, there being little or no reaction; and in the few cases in which secretion was increased it disappeared after a day or two.

Praun finds the action of protargol specially marked in all cases where there is much secretion, and exceeding nitrate of silver in the speed of its curative action. In cases with little or no secretion its action fails.

Praun uses a 10 per cent. solution in dacryocystitis and conjunctivitis syringing it into the sac or dropping it into the eye. If there is much swelling of the lids, a poultice of gauze pads dipped in protargol, may be applied.

Corneal Ulcers.

JOHNSON. "Nitric Acid as a Cautery in Corneal Ulcers." *Amer. Jour. of Ophthalmology, July, 1899.*

BOURGEOIS. "Treatment of Infectious Ulcers of Cornea." *Annales d'Oculistique, July, 1899.*

Johnson uses 9 to 15 per cent. solution of chemically pure nitric acid applied to the infiltrated ulcer by a fine grained, soft-wood stick, whittled to an appropriate shape. He holds that he hereby avoids the scar

caused by the use of the actual cautery or nitrate of silver. He applies the acid until the whitening of the tissues shows that the tissue is destroyed, and then washes the eye with water or a saline solution.

Bourgeois inveighs against the too frequent and rough tampering with the cornea in infectious ulcers. He pays especial attention to the lachrymal sac and duct, getting these thoroughly aseptic, cauterising them if necessary, and cleansing with cyanide of mercury, 1 to 1000 or 1 to 2000. He cleanses the ulcer with concentrated boracic acid and then cauterises it with the actual cautery or hot air blast. If there be pus in the anterior chamber and it only occupy one-fourth of this space, leave it alone; if it increase, paracentese the chamber and then wash it out with a salt solution of a strength of one and one-fifteen-hundreth parts of salt to ninety-eight parts of water, the solution being heated to the temperature of the body. Iodoform is now dusted in and the eyelids closed.

J. W. Stirling.

Reviews and Notices of Books.

NOTES ON THE MODERN TREATMENT OF FRACTURES. By JOHN B. ROBERTS, A.M., M.D. Professor of Surgery in the Philadelphia Polyclinic, Mütter Lecturer on Surgical Pathology of the College of Physicians of Philadelphia. With thirty-nine illustrations. New York, D. Appleton and Company, 1899.

This little volume is a collection of essays contributed to the medical press by the author at various times during the past few years. He disapproves of a blind reliance upon therapeutic dogmas and the adoption of routine measures, and enters a strong plea for the exercise of more simplicity and more common sense in the treatment of fractures. He applies all the methods of modern aseptic treatment to this branch of surgery. To obtain complete reduction and exact restitution of contour he advocates, when necessary, skiagraphy, exploratory incision, tenotomy, and subcutaneous nailing, and clearly defines the indications for each operation. A large portion of the book is taken up with the consideration of the fractures of the lower end of the radius, and it contains the most valuable suggestions, as the author has given a very great deal of thought and study to this subject. His treatment of these lesions consists in complete reduction. Little else is required in the ordinary cases. A roller bandage or a strip of adhesive plaster applied to the wrist in a circular manner is all that is necessary, except in unusually complicated fractures. All ordinary forms of splints should, as a rule, be discarded as useless, needless, or dangerous. The book is an extremely valuable addition to the surgeons' library, the style is vigorous and the language plain, and all who read it will do so with interest and profit.

K. C.

A MANUAL OF THE DIAGNOSIS AND TREATMENT OF DISEASES OF THE EYE. By EDWARD JACKSON, A.M., M.D. With 170 illustrations and two coloured plates. Philadelphia, W. B. Saunders, 1900. Price $2.50.

Dr. Jackson has written a book which is far above the ordinary stamp of manuals on eye diseases, now appearing so frequently. The author shows a thorough appreciation of the practical points a student is so much in need of, and brings them out clearly without unnecessary verbiage. Nevertheless, it strikes one that in several places this useful condensation has been carried almost too far. This seems really the only fault to be found in an otherwise excellent little work. A chapter on remedies and their application is a thoroughly useful and practical innovation.

J. W. S.

THE

Montreal Medical Journal.

A Monthly Record of the Progress of Medical and Surgical Science.

EDITED BY

THOS. G. RODDICK, JAMES STEWART,
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GEO. E. ARMSTRONG, G. GORDON CAMPBELL,
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A. E. GARROW, E. J. SEMPLE A. G. NICHOLLS.

VOL. XXIX APRIL, 1900. NO. 4.

THE PRESENT SMALL-POX EPIDEMIC.

The epidemic at present existing in the Lower St. Lawrence presents some very striking features. Although nearly 500 cases in all have occurred, there have only been two deaths; and of these one occurred through a complication probably not connected with the disease, and the other was in a very debilitated subject.

The degree of infectiousness seems to be very high; and the fact that the patients for the most part are only slightly ill, makes it unusually difficult to ensure isolation. It has usually been found relatively easy to eradicate the disease from country districts owing to the greater facilities for enforcing isolation, but in the present case infection seems to have twice occurred from cases on the border of New Brunswick. Fortunately, the disease has not spread in our larger cities.

The extreme mildness is characteristic of the type of small-pox which has been so abundant in the Middle West of this continent for two or three years past, and has been the despair of the State Boards of Health. The condition has been carefully studied by experts in various parts of the continent and pronounced to be undoubtedly small-pox though of the varioloid type. It is noticeable that secondary fever rarely occurs and that the pustules dry up more rapidly than in the typical form.

The eruption, however, passes through the classic types of papule, vesicle, pustule and crust, and shows umbilication and, occasionally, hæmorrhagic infiltration.

The diagnosis from chicken-pox is rendered unusually difficult from the fact that the pocks may appear in successive crops and frequently appear on the back. Hence, it is unusually difficult to recognize with certainty the first case. The disease does not attack vaccinated persons, and is rapidly got rid of by the ordinary measures of disinfection and isolation.

As the chief centre of the disease is in districts which profit largely by summer visitors and tourist travel, we hope that the municipalities concerned will co-operate heartily with the Provincial Board of Health, which has the matter in hand.

The most probable explanation which has been given of the mild character of the cases, is that diseases was imported from Cuba at the close of the Spanish-American war, where a very mild type of small-pox has been known to exist for many years past, whereas a widespread epidemic outbreak of varioloid has been practically unknown in America during the past 40 years.

The following comprise the Medical Staff of the recently opened Home for Incurables at St. John, N.B. Consulting Physician-Surgeons: Drs. Wm. Bayard, Boyle Travers, John Berryman, James Christie, P. R. Inches, and H. G. Addy. Visiting Physician-Surgeons: Drs. W. F. Roberts, F. W. Daniel, Murray McLaren, T. D. Walker, and S. S. Skinner. Oculist: Dr. John H. Morrison. Dermatologist: Dr. Melton. Pathologist: Dr. W. L. Ellis.

At a recent meeting of the Board of Governors of McGill University, the following appointments were made in the Faculty of Medicine:—

Dr. Wyatt Johnston, Assistant Professor of Hygiene.
Dr. J. M. Elder, Lecturer in Surgery and Clinical Surgery.
Dr. D. J. Evans, Lecturer in Obstetrics.
Dr. J. A. Hutchison, Lecturer in Clinical Surgery.
Dr. J. G. McCarthy, Lecturer in Anatomy.
Dr. A. G. Nicholls, Lecturer in Pathology.
Dr. J. W. Stirling, Lecturer in Ophthalmology.

The Annual Meeting of the American Medico-Psychological Association will be held at Richmond, Va., under the presidency of Joseph G. Rogers, M.D., of Logansport, Ind. Upwards of thirty papers have

already been secured, and the meeting promises to be a very successful one. The Executive Committee has secured the Jefferson Hotel for the accommodation of members, and the meetings will be held in the hotel building.

The Annual Meeting of the Canadian Medical Association is to be held in Ottawa on the 12th, 13th, and 14th of September, 1900. Mr. Edmund Owen, of London, England, has consented to deliver the address in Surgery, which will add greatly to the attractions of the meeting. At a largely attended meeting of the profession in Ottawa, it was unanimously decided to endeavour to make the closing session of the Association for this century the most successful in its history, and a large sum of money was subscribed by those present for incidental expenses. Under the presidency of Dr. R. W. Powell, of Ottawa, a meeting in the Capital of the Dominion is sure to be a great success both professionally and socially.

The March number of the *University Medical Magazine* appears under new auspices. The Board of Trustees of the University of Pennsylvania has now obtained entire control of the journal, and it is henceforth to be the official organ of Department of Medicine, and to be edited by Charles H. Frazier, M.D., with the collaboration of the Faculty of Medicine. The contents will consist of original articles and clinical reports of cases, the transactions of the University of Pennsylvania Medical Society, and a department of recent literature. Readers will be kept fully informed concerning the work that is being done in the clinics, the laboratories, and the hospitals, by members of the Teaching and Hospital Staffs of the University.

Mr. William Johnson, of Liverpool, has founded a Research Fellowship in Bacteriology of University College, Liverpool, to be known as the "*Colonial Fellowship*," and open to Advanced Students of the Colonial Universities.

The Fellowship is of the value of £100 per annum, but if the Reseacher shows great promise a second year will be entertained. The work is to be done in the Thompson Yates Laboratories of the School of Pathology under Professor Robert Boyce, who is now ready to receive applications.

It is hoped that the founding of this Fellowship will be the first step towards a closer union between the Colonial and English Universities. It is intended as far as possible to take the Universities in rotation, and we understand that should a good man apply McGill would likely be

given first chance. McGill graduates should apply through Dr. Adami, Professor of Pathology at the University.

The following is the list of graduates at Queen's University in Medicine for 1900: D. M. A. Allison, Adolphustown; T. J. Barnet, Clayton; D. B. Bridge, Westbrook; S. Burton, Kingston; R. F. Carmichael, Strange, Ont.; E. W. Donnell, Cataraqui; J. W. Edwards, Kingston; C. C. Ferrier, Kingston; W. A. Hall, Kingston; F. R. Hastings, Kingston; R. C. Hiscock, Kingston; C. P. Johns, B.A., Kingston; T. H. Johnston, Drayton; A. McConville, Kingston; R. D. W. Parker, Bermuda; S. E. Porter, Lindsay; W. S. Broderick, Ottawa; T. F. O'Hagan, Fort William; W. J. Ross, Martintown; S. M. Smith, Kingston; T. A. Wilson, Kamloops, B.C. Prize-winners, recommended for house surgeons: T. H. Johnston, B. B. Bridge, R. C. Hiscock, C. P. Johns, R. F. Carmichael. *Medal for Surgery:* T. H. Johnston, of Drayton, with the honor of medal in medicine. *Medal in Medicine:* B. B. Bridge. Faculty Prize of $25 for the best examination in Anatomy, Physiology and Chemistry: T. O. MacLaren, of Lancaster. Dr. Hayunga's prize for the best examination in Materia Medica, $10 in books, G. F. Dalton, B.A., Kingston.

NEW BOOKS, ETC., RECEIVED AND NOTED.

W. B. Saunders, Philadelphia.

A Manual of the Practice of Medicine prepared especially for students. By A. A. Stevens, M.D., 1898.

A Text-Book on Diseases of Women. By Charles B. Penrose, M.D., Ph.D., Third Edition, 1900.

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