THE DISTINGUISHING CHARACTERISTICS OF THE INTESTINAL PROTOZOA OF MAN.*

A SYLLABUS FOR CLINICIANS.

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INTRODUCTION.

Recent advances in our knowledge of the relationship of the intestinal protozoa to disease have made it advisable that the clinician give due attention to the rôle of these organisms when found in the stool.

The present outline is an attempt, in answer to requests from several medical men in China, to prepare a working syllabus which will be easily accessible to the many clinicians who do not have an opportunity to consult the more inclusive contributions on the intestinal protozoa. It is also hoped that it may serve as a stimulus for further investigation of the subject on the part of the medical profession in the Far East.

THE PROTOZOA.

The Protozoa are the organisms which belong to the first phylum of the animal kingdom, and are commonly thought of in contrast to the Metazoa or multicellular animals. They are regarded as being the most primitive of animals and for the most part are microscopic in size. They present great diversity of structure and may live as single organisms or may clump together to form somatella or small bodies. Each organism in itself may be described as unicellular in character though it may possess highly specialized and numerous organelles which are analogous to the organ systems of the Metazoa. By far the greater number of Protozoa are free-living in nature but some are parasitic in their habits. It is this latter group with which medical science is

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Plate 1.—Trophozoites of the common intestinal protozoa as they appear in fresh smears in a normal saline preparation. (Kesseli.)
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concerned. The chief human diseases caused by organisms belonging to the Phylum Protozoa are: leishmaniasis, trypanosomiasis, amoebiasis, malaria, coccidiosis, and balantidiosis.

The Protozoa may be classified as follows:

**Sub-phylum I. Plasmodroma.** Locomotion by one or many flagella or by pseudopodia.

Class 1. *Mastigophora*. These are the flagellates. They move by flagella which are connected to a blepharoplast. The free-living forms are both synthetic and analytic in their feeding habits while the parasitic forms are entirely analytic. Parasitic examples are:—Leishmania, Trypanosoma, Giardia, Trichomonas, Chiromastix.


Class 3. *Sporozoa*. All are parasitic. They reproduce by spores and move by contraction. Examples: Coccidium, Plasmodium.

**Sub-phylum II. Ciliophora.** Locomotor organelles are cilia. Possess both macronucleus and micronucleus.


**Specific Names of Intestinal Protozoa.**

Owing to the facts that the intestinal protozoa are quite generally distributed over the surface of the globe and that numerous observers have described, named, and renamed them, long lists of synonyms are found in the literature for most of the common species. These are being sifted down to two or three important names in most cases, but there is still some difference of opinion among writers. If a representative committee could be chosen to settle the question once and for all, the medical profession and others working with the intestinal protozoa would be saved from a great amount of annoyance. In this syllabus the chief names of the species in current use are given so that those employing it may not be in doubt as to the organisms in question. Fortunately in most instances the accepted generic names are different from one another, hence the danger of confusion is somewhat lessened.
The amoeba causing amoebic dysentery, however, is an exception to this generalization since both it and *E. coli* belong to the genus *Endamoeba*. There is still a difference of opinion expressed by writers concerning the correct name of this amoeba. *Endamoeba dysenteriae* Councilman and Lefleur, 1891, and *Endamoeba histolytica* Schaudinn, 1903, are both in common use. The other intestinal protozoa which are known by several different names in recent literature are:

3. *Giardia intestinalis* (Lambl) Alexeieff, 1914,

**ORGANISMS FOUND IN STOOLS.**

Examination of feces for parasitic protozoa presents considerable difficulty to the beginner and it is only with experience that any degree of accuracy can be secured.

The organisms encountered in the stools may be grouped under three main divisions:

I. Pathogenic protozoa.

II. Non-pathogenic protozoa.
   1. Commensal protozoa.
   2. Fecal contaminators.

III. Other objects confused with protozoa.

**I. PATHOGENIC PROTOZOA.**

A condition of true parasitism may be regarded as one in which a balanced relationship exists between host and parasite. The parasite derives a decided benefit from the association although this at times may be harmful to the host. A parasite which produces symptoms of disease in a host is known as a pathogenic parasite.

**THE ENDAMOEBAE.**

By far the most important pathogenic protozoan inhabiting the intestine of man is *Endamoeba dysenteriae* or *Endamoeba histolytica*, which is responsible for amoebiasis, the common forms of which are amoebic dysentery, amoebic liver abscess, and chronic colitis. If the morphological characteristics of this organism are
thoroughly learned, its differentiation from the other closely related forms found in the feces is usually possible and it is with this aim in view that the practitioner should work. A detailed outline of its morphology follows later in the text.

Five cases of another pathogenic amoeba, *Caudamoeba sinensis* Faust, 1923, have been reported from China. Unfortunately the cysts of this amoeba have not as yet been described. Since this amoeba resembles *E. dysenteriae* in the possession of hyaline pseudopodia, in the ingestion of red blood corpuscles, and in its causation of acute dysentery, and since it yields even more readily to emetine treatment than *E. dysenteriae*, the writer does not believe it necessary for the clinician to endeavor to differentiate the motile forms of this amoeba from those of *E. dysenteriae*.

*Councilmania lafleuri* Kofoid and Swezy, 1921 is an amoeba the pathogenicity of which is still an open question. It has been reported in one instance to ingest red blood corpuscles and a few cases have been seen in which positive gastrointestinal symptoms were attributed to the presence of no other organism. However, further data are needed before this amoeba can be definitely incriminated as a pathogen. Of special interest are the hyaline pseudopodia of *Councilmania*, which at times may lead to a confusion of the trophozoites of this species with the trophozoites of *Endamoeba dysenteriae*. The cysts, however, may be differentiated from the cysts of *E. dysenteriae* by the presence of eight nuclei.

**THE FLAGELLATES.**

The question of the pathogenicity of the intestinal flagellates is one about which there is considerable difference of opinion. The flagellates are often found in great numbers in cases of diarrhea and dysentery and the question which presents the difficulty is this:—"Are the flagellates the cause of the diarrhea, or do they merely live in the intestine as harmless commensals and appear in the feces in great numbers following the diarrhea produced by some other cause such as bacillary infection or dietary disturbances?"

The term flagellosis is generally accepted in medical literature and may in some instances denote a diseased condition. Reports often appear from medical men in the tropics concerning the pathogenicity of these flagellates and the following from Routine Division Circular No. 19 of the South African Institute for Medical Research leaves no uncertainty as to the opinion of that institution on the subject.
"Trichomonas hominis" (also known as T. intestinalis) is a small flagellate Protozoan, causing colitis and flagellate diarrhoea in man. Small ulcers and erosion of individual epithelial cells of the intestines are produced by the action of the parasite."

"Chilomastix mesnili is a small pear-shaped Protozoan allied to Trichomonas and having similar effects upon the host."

"Giardia (Lambila) intestinalis is a flagellate Protozoan provided with a sucking disc by which it attaches itself to the intestinal epithelial cells. Erosion of individual epithelial cells by the parasites occurs, and small ulcers are produced."

The more conservative idea, however, and the one most commonly held is to regard the flagellates for the most part as harmless commensals.

Giardia and Pentatrichomonas may be exceptions, for Giardia is known to attach itself by its anterior sucker to the mucous membrane of the host; and Pentatrichomonas, which is differentiated from Trichomonas hominis by the presence of five anterior flagella instead of three or four, seems to have been found repeatedly in cases suffering from a diarrhea, usually of a chronic type.

The Coccidia.

The coccidia constitute a large group of exclusively parasitic protozoa. They belong to the sporozoa and their life history is similar to the life history of the malarial parasite, the chief important difference being that the coccidia inhabit most commonly the epithelial cells of the small intestine instead of the red blood corpuscles, as is the case of the malarial parasite, and that the life cycle is completed within a single host. Coccidiosis is the term applied to the condition of being infected with coccidia. Dobell and O'Connor state: "Since coccidia are always tissue parasites, they must always produce a more or less pathological condition in their host. Nevertheless, no clinically recognizable disease due to their presence has yet been observed in man."

One case of Isospora hominis has been reported from man in Central China by Wassell in 1921.

Balantidium.

Balantidiosis is the term applied to an infection with Balantidium. This organism has a widespread distribution. It has been studied by numerous workers and is known to cause an irritation in the bowel often leading to ulceration and acute dysentery not unlike amoebic dysentery.
II. NON-PATHOGENIC PROTOZOA.

1. The Commensal Protozoa.

The majority of the intestinal protozoa of man cannot be associated definitely with a pathological condition and therefore may not be regarded as strictly parasitic in nature. They live chiefly on the waste products and bacteria found normally in the human digestive tract and, in so far as is known, cause neither harm nor good to the human host. This group may be spoken of as commensal in habit. For the most part these organisms do not live readily outside the human body and suitable cultural conditions are difficult to provide. Cultural media have been found for some of the flagellates but to date the non-pathogenic amoebae of the human digestive tract have not been successfully cultivated in artificial media.

The commensal protozoa found in the human intestine are:—

*Trichomonas hominis* Davain, 1860; *Chilomastix mesnili* (Wenyon) Alexeieff, 1912; *Embodomonas intestinalis* Wenyon and O'Connor, 1917; *Embodomonas sinensis* Faust and Wassell, 1921; *Enteromonas hominis* da Fonseca, 1915; *Bodo s.*; *Endamoeba coli* (Loesch, 1875); *Endolimax nana* (Wenyon and O'Connor) Brug, 1918; *Iodamoeba butschlii* and *Dientamoeba fragilis* Jepps and Dobell, 1918.

2. Fecal Contaminators.

The term "fecal contaminators" is here used to denote those protozoa occasionally found in human excrement but which do not live within the human body.

Dobell uses the term "coprozoic" to apply to the group of protozoa here discussed, but since these forms seem also to live free in nature, apart from animal feces, it does not appear advisable to restrict them to the fecal environment by the term "coprozoic."

If the term "coprozoic," which means "feces feeders," is to be applied to protozoa found in the stool, it seems that the group which should be thus designated is the one commonly known as the Commensal Protozoa of the intestinal tract, which protozoa are in reality dependent for their food upon organisms found in the feces. The organisms, here designated as "fecal contaminators," may gain access to the feces by two routes:—

(1) By ingestion of the cysts in food and water by man. The cysts are not digested by man nor do the organisms excyst within the
Distinguishing Characteristics of Intestinal Protozoa.

human body. After passing out of the body to ordinary atmospheric temperatures, if kept sufficiently damp, the organisms may excyst. Both cysts and motile forms are found in the stools though the active trophozoites are found only in stools that have been passed for some time.

(2) By contamination of feces through outside sources, such as dust or water which gain access after the feces have been voided from the body.

There is little danger of confusing the trophozoites of this group of protozoa with the trophozoites of the intestinal protozoa, because, for the most part, the motile intestinal protozoa do not live long outside the body, while the trophozoites of these free-living protozoa appear only in stale stools.

The chief possibilities of confusion are the actively motile stages of Hartmannella hyalina which have hyaline pseudopodia and resemble the actively motile stages of E. dysenteriae when moving rapidly. However, their size is much smaller than E. dysenteriae, and the food inclusions which are for the most part, bacteria, serve to differentiate this amoeba from E. dysenteriae. H. hyalina also possesses a contractile vacuole, which organelle is absent in all the intestinal amöbae.

The flagellates which contaminate feces are distinguished from the intestinal flagellates by the fact that the intestinal forms (with the exception of Embadomonas which is easily distinguished by its cup-shaped cytopharynx) have three or more flagella while the free living forms in question have less, Bodo and Cercomonas and the flagellate stage of Dimastigamoeba grüberi having two flagella and Copromonas subtilis having only one flagellum.

A species of flagellate (Pl. 7, Fig. 99) which the author has not been able to differentiate morphologically from Bodo caudatus has been found in fresh human stools where there has been no possibility of contamination. Dr. E. C. Faust of the Division of Parasitology, Peking Union Medical College, also reports such findings here in China.

The cysts of the protozoa which contaminate the feces are perhaps more likely to be confused with the intestinal protozoa than the motile forms, though none of them resemble very closely typical cysts of E. dysenteriae. Probably the cysts of Dimastigamoeba
grüberi and of Hartmannella hyalina are the most likely to be confused. However, these can easily be differentiated from E. dysenteriae by the fact that they are never known to contain more than one nucleus, that the chromatoidal inclusions are always small round spheres, that the nuclear membrane is always thin with no encrusted chromatin and that the karyosome is much larger than the karyosome of E. dysenteriae. The cysts of H. hyalina can be differentiated from cysts of other protozoa by the presence of a heavy, wrinkled cyst wall.

Ciliates are occasionally found in the feces, but with the exception of Balantidium these are always introduced by contamination and should not be regarded with alarm.

III. OTHER OBJECTS CONFUSED WITH PROTOZOA.

The most common objects found in the feces which might be confused with intestinal protozoa present no difficulties except to the beginner. Such are oil droplets, found especially after a purge of oil, and artefacts produced in the preparation between the slide and cover glass.

Small plant cells and particles of undigested food will also be objects often considered by the amateur. These are particularly confusing under the lower powers of magnification but under the higher powers can be differentiated readily because of the absence of nuclei and other cytoplasmic structures.

The host tissue cells commonly found in cases of acute dysentery are of great importance especially in dysenteric stools. These are discussed under the heading, "Microscopic Picture in Dysentery and Diarrhea."

Yeast and Molds.—The molds are not commonly found in fresh stools and when present can be easily differentiated by the many budding forms which are usually present. These often appear as branching forms or as long chains.

The intestinal yeasts present greater difficulty. They live normally in the human intestine and are found commonly in fresh feces. Since budding forms are not often seen yeasts may be mistaken for cysts of parasitic protozoa.

Blastocystis hominis.—This species (Pl. 6, Fig. 73) is perhaps the most common. It is present in a great diversity of forms and
varies in size from 5 μ to 30 μ but can be distinguished by the large central vacuole, between the margin of which and the cyst wall there are present from one to six or more darkly staining masses without any regular structure. Occasionally this central area stains as a large dark mass instead of appearing as a vacuole (Pl. 6, Fig. 74). Once a Blastocystis is recognized, it is not easily confused a second time with protozoan cysts.

The small intestinal yeasts, however, present greater difficulty and often puzzle the best trained microscopist. They are probably most easily confused with cysts of E. nana and with the smaller races of E. dysenteriae. They are not always eosinophilic when stained with iodine-eosin, but some may take the green of the iodine fraction of the stain.

The internal structure of yeasts and small protozoan cysts is not always sufficiently well defined in the iodine-eosin stain to make a differential diagnosis with certainty and in such cases the haematoxylin stain must be resorted to. Here the positive diagnosis for yeasts must be made on the absence of typical cyst-like structures. The yeasts are most commonly oval in shape and contain a central vacuole in which a darkly staining mass may or may not be present (Pl. 6, Figs. 80 and 81). They often appear, however, in spherical form and may contain several small vacuoles with small dark inclusions resembling karyosomes (Pl. 6, Fig. 80). It is this type that presents considerable difficulty. A safe diagnosis can be made only by a careful study of a sufficiently large number of the organisms in question to warrant a positive or negative diagnosis. Since the inclusions in the vacuoles are usually smaller than the karyosomes of E. nana, and since the margin of the vacuoles which resemble nuclei do not possess encrusted chromatin as is common in E. dysenteriae, differential diagnosis is made accordingly.

Laboratory Methods.

At present there is only one recognized method of diagnosis for the intestinal protozoa and that is by repeated microscopic examination of the stool by which process the organisms are detected and then carefully differentiated on the basis of their morphological characters. Experience has shown that examination of a single stool is insufficient to give a negative diagnosis for there
is no regular periodicity in the appearance of the protozoa in the feces. For routine laboratory methods it is now quite generally accepted that about 90% of all positive cases are detected by six daily examinations of stools, and after a case has been negative for six consecutive days, the diagnosis of "probably negative" may be given. However, for cases in which the symptoms warrant it, stool examination should be extended over a longer period of time.

Stools should be examined as soon as possible after defecation. It is possible to make an examination for cysts in feces that are two or three days old, although this procedure is recommended only in unavoidable instances. For motile protozoa, especially amoebae, it is essential that the stool be examined immediately after being passed in order to observe the motility of the organisms in question. Of course a stool should not be thrown away unexamined because it is more than an hour or two old, but the best results in differentiation of motile amoebae cannot be secured in cold stools. If stools must wait for a period before examination, they should be placed in a vacuum bottle immediately upon collection. If only small amounts of the stool are to be saved for examination, they should be collected from several widely distributed regions of the whole.

Various concentration methods have been described for protozoan examination, but they are too complicated for routine laboratory technique so that for general purposes the direct smear method is employed. Two smear methods are in use, one for preliminary examination and one for permanent fixation and staining. The stains and fixing fluids used for these routine methods are as follows:

1. **Donaldson's Iodine-Eosin as modified by Kojoid.**
   Solution (a) : 5% normal saline solution of potassium iodide saturated with iodine.
   Solution (b) : saturated solution of eosin in normal salt solution. Solutions a and b should be kept separately and mixed freshly each day in equal volumes just prior to use.
   Solution (c) : normal salt solution.

2. **Schaudinn's Fixing Fluid.**
   Distilled water saturated with mercuric chloride, 2 parts; 95% alcohol, 1 part. Add 5 to 10 cc. of glacial acetic acid to every 100 cc. of this mixture.

3. **Iron Alum.**
   2% aqueous solution of ammonium-ferric sulphate.
Distinguishing Characteristics of Intestinal Protozoa

4. Haematoxylin Stain.

5% aqueous solution of alcoholic ripened stain.

Stock solution is prepared by dissolving one part of haematoxylin crystals in 10 parts of absolute alcohol. This may be ripened in one of several ways.

1) By the ordinary slow process of standing for several months.
2) By placing in an incubator for two weeks.
3) By adding hydrogen peroxide.
4) By adding carabolic acid and then boiling.

The ripened stain should be diluted to 0.5% by adding distilled water. If upon using the stain is found to be insufficiently ripened, a few drops of hydrogen peroxide or of carabolic acid should be added to each 100 c.c. of solution and the solution heated.

i. Preliminary Examination.

Normal salt solution and freshly prepared iodine-eosin stain are used. In making a smear place a drop from a small pipette of the iodine-eosin mixture on a slide, and about 1 cm. away place the same amount of normal saline solution. With a toothpick or small bamboo smear-stick dip into several regions of the sample to be examined and smear a small amount of the fecal matter on the slide, first in the drop of normal salt solution and then in the drop of iodine-eosin stain. Place the cover glass on carefully, allowing it to touch the normal salt portion of the smear first. Care should be used to judge the size of the drops of liquid used according to the size of the cover glass, 18 or 22 mm. squares being the most convenient size.

In examining under the microscope, actively motile trophozoites may be studied in the normal saline portion of the smear, and cysts examined in the iodine-eosin portion where they stain greenish yellow and stand out prominently against the pink background. Of special value is a careful study of the region midway between the saline and the eosin where organisms that are just beginning to take the stain may be observed with care and the flagella of the flagellates may be counted easily.

Beginners should use the high power objective but after experience is attained it is advisable to use a low power ocular and objective (16 mm. objective and 5X ocular) to determine the presence of organisms where the cysts will stand out as tiny green dots. The 4 mm. objective may then be used with the 5X or the 10X ocular for study of the detailed structure of the organisms.
2. **Permanent Staining with Iron-Haematoxylin.**

Examination in iodine-eosin smears is often insufficient to determine with certainty the species of organism in question because the morphological characters do not stand out as prominently as in smears stained permanently with iron-haematoxylin. Therefore in all cases of doubt permanent stains should be made and the diagnosis given from a careful study of such slides. This is especially important in differentiating the smaller races of cysts of *E. dysenteriae* from *Endolimax nana* and from small intestinal yeasts which take a green stain in the iodine-eosin and from Iodamoeba. It is also essential in order to differentiate cysts of *E. coli* from *Councilmania*. At times it is also helpful in differentiating the smaller races of *E. coli* from the larger races of *E. dysenteriae*.

The rapid method of iron-haematoxylin staining is given below. In staining by the iron-haematoxylin method it is imperative that the slides be kept moist throughout the process. Smears should be made quickly and the slides placed in fixative immediately and care should be taken to transfer them rapidly from one solution to another.

1. Smear fecal material on slides evenly and not too thick.
2. Place slide in Schaudinn's fluid heated to a temperature of 40°C. Leave in three minutes.
3. Transfer to 70% alcohol for 2 minutes.
4. Transfer to 70% iodine-alcohol for 2 minutes. This is prepared by adding sufficient tincture of iodine to the alcohol to give a dark amber color.
5. Transfer to 70% alcohol for 2 minutes.
6. Transfer to 50% alcohol for 2 minutes.
7. Wash in running water for 2 minutes.
8. Transfer to 2% aqueous iron-alum at 40°C. for 2 minutes.
9. Wash in running water for 3 minutes.
10. Transfer to 5% aqueous haematoxylin for 2 minutes. The time may vary according to the strength of the stain.
11. Wash in water for 2 minutes.
12. Decolorise in cold 2% aqueous iron-alum. The time varies from one to five minutes depending upon how deeply the objects have stained. Usually two minutes time is sufficient. The decolorising may be watched under the microscope using a high dry objective.
13. Wash in running water for 10 minutes.
Distinguishing Characteristics of Intestinal Protozoa.

14. Transfer through 50%—70%—80%—90%—and 100% alcohol for two minutes each.
15. Place in Xylol for 2 minutes.
16. Mount in balsam, using a No. 1 cover glass.

Microscopic Picture in Dysentery and Diarrhea.

One thing that surprises the protozoologist in regions where diarrheas and dysenteries are common is the large number of such cases in which amoebae cannot be found in the stools. The bacteriologist is equally disappointed if he expects to procure positive cultures of a dysentery bacillus from all cases of bacillary-like dysentery. This is, of course, partly owing to the fact that the bacteria often become non-viable by the time they are placed in the culture media. While one is sure of a case of bacillary dysentery if he is fortunate enough to procure a positive culture, yet the culture method of diagnosis is not entirely satisfactory because of the length of time required to secure a report and because of the possibility of procuring negative cultures from positive cases. The macroscopic picture in dysentery is relied upon by some clinicians as a method of differential diagnosis, but this is far from satisfactory in most cases although it may be an aid to diagnosis.

Recently considerable emphasis has been placed on the differentiation of amoebic and bacillary dysentery stools by the appearance of the cellular exudate. Among those who have presented important contributions on this subject are Bahr (1910), Wenyon and O'Connor (1918), Willmore and Shearman (1918), Anderson (1921), Thomson and Robertson (1921), and Haughwout (1924).

The microscopic pictures in pure infections of amoebic dysentery and bacillary dysentery are certainly characteristic, though there may be present a great many body cells which could easily be mistaken for rounded amoebae, especially in unstained preparations. In any cases of doubt permanent haematoxylin stains should be made and differential diagnosis determined on the basis of cytoplasmic and nuclear structure.

Some of these body cells are figured in Plate III where they may be compared with rounded motile stages of *E. dysenteriae* and of *E. coli*. 
Of chief importance are the large macrophages (Pl. 3, Figs. 20, 21, 22) many of which are without nuclei. These as a rule contain inclusions some of which are oxyphylic and some basophilic in their staining reaction. In the iron-haematoxylin stain these inclusions may give the appearance of erythrocytes. Endothelial cells of various types and plasma cells may often resemble amoebae. However, for the most part the nuclei of the body cells are larger in proportion to the size of the cell than are those of the amoebae, and the chromatin network of the nuclei of body cells is, as a rule, more conspicuous than is this network in the nuclei of amoebae.

The following generalizations, based on the experience of the writers cited above and for the most part verified by the writer, may be used in differentiating the microscopic picture of amoebic and bacillary dysentery:

**Amoebic Dysentery.**

1. Scantiness of cellular exudate, especially the polymorphonuclear element.

2. Preponderance of mononuclear leucocytes over polymorphonuclear leucocytes.

3. Evidence of proteolytic digestion of the cells, beginning at the periphery and affecting the nucleus last.

4. Presence of Charcot-Leyden crystals at times.

5. Eosinophilic cells present, the number varying from 2% to 5%.

**Bacillary Dysentery.**

1. Abundance of cellular exudate, mostly polymorphonuclear leucocytes.

2. Preponderance of polymorphonuclear leucocytes over mononuclear leucocytes.

3. Evidence of toxic necrosis of the cells, the degenerative changes occurring early in all parts of the cell, including the nucleus.


5. Eosinophilic cells seldom or never present.

It must be remembered in places like China, where a high percentage of the population is infected with *E. dysenteriae* and where chronic cases of bacillary dysentery are commonly encountered, that mixed infections of bacillary and amoebic dysentery will be found. In such cases the microscopic picture will not be so distinctive as described above and the clinician must judge from the symptoms as to which is the major infection. It should be
stated with much emphasis that the only safe method to diagnose a case of acute amoebic dysentery is by the presence of the actively motile amoebae in the stools.

**Microscopic Picture in Chronic Amoebiasis.**

Amoebic dysentery is commonly thought of as being the most common form of amoebiasis but it seems quite probable that more people suffer from chronic amoebiasis than from acute amoebic dysentery. This commonly expresses itself as a chronic colitis and the patient may suffer from varying degrees of impaired health and from general malaise.

In the diagnosis of such cases one does not expect commonly to find motile amoebae in the stool nor to notice a particular type of cellular exudate. The diagnosis of chronic amoebiasis is made by finding the cysts of *E. dysenteriae* in the stool the presence of which indicates that the motile amoebae are living in the bowel.

In the event of the presence of cysts of amoebae in the feces, it is always necessary to differentiate morphologically between the cysts of *E. dysenteriae* and the cysts of other intestinal protozoa. The best method for the beginner is to learn carefully the distinguishing characteristics of *E. dysenteriae* cysts and then by a process of elimination to disregard all other cysts encountered.

The outline descriptions that follow will serve in giving the differential morphological characteristics.

**Morphological Differences of the Intestinal Protozoa.**

I. The Amoebae.

There are certain morphological structures found in intestinal amoebae which vary in different species and it is by these structures that we are able to differentiate species.

(a) In the trophozoites the type of pseudopodia, the structure of the endoplasm, and the type of food inclusions are important. It is difficult, however, to differentiate with certainty between the trophozoites of the common intestinal amoebae on nuclear structure alone.

(b) In considering the cysts, their size and shape, the size and color of the glycogen mass, the shape of the chromatoidal bodies, the number of the nuclei present and the nuclear structure are important.
<table>
<thead>
<tr>
<th>Endamoeba dysenteriae</th>
<th>Endamoeba histolytica</th>
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<tbody>
<tr>
<td><strong>Trophozoite.</strong></td>
<td><strong>Trophozoite.</strong></td>
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<tr>
<td>Pseudopodia hyaline.</td>
<td>Pseudopodia when present</td>
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<tr>
<td>Endoplasm usually finely</td>
<td>show a finely reticulate structure</td>
</tr>
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<td>granular without many</td>
<td>(Pl. 2, Fig. 15). Endoplasm</td>
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<tr>
<td>vacuoles (Pl. 1, Fig. 1).</td>
<td>finely granular with no vacuoles</td>
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<tr>
<td>Food inclusions usually</td>
<td>which contain ingested bacteria.</td>
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<td>absent with the exception</td>
<td>Erythrocytes may or may not</td>
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<td>of ingested erythrocytes</td>
<td>be present.</td>
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<td>which are commonly</td>
<td>Stained nucleus of trophozoite</td>
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<td>present in acute dysen-</td>
<td>not always distinct morphologically</td>
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<td>tery.</td>
<td>from nucleus of \textit{E. coli}</td>
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<tr>
<td></td>
<td>or of \textit{C. hominis}.</td>
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**Cysts.**

\textit{Cyst Wall.} — Distinct but thin.

\textit{Size.} — 5 to 20 μ usually

\textit{Shape.} — Usually spheroidal, infrequently asymmetrically rounded or irregularly shaped.

\textit{Cytoplasm.} — Bright greenish yellow.

\textit{Glycogen.} — Reddish brown, commonly dispersed but may appear in a single mass.

\textit{Chromatoidal Body.} — Indistinctly visible in iodine-eosin stain. Rod shaped when present.

\textit{Nuclei.} — 1 to 4 in number. Relatively distinct with heavy nuclear membrane and distinct central karyosome.

**In permanent Iron-haematoxylin Stain**

**Trophozoite.**

Pseudopodia when present show a finely reticulate structure (Pl. 2, Fig. 15). Endoplasm finely granular with no vacuoles which contain ingested bacteria. Erythrocytes may or may not be present. Stained nucleus of trophozoite not always distinct morphologically from nucleus of \textit{E. coli} or of \textit{C. hominis}.

**Cysts** (Pl. 4, Figs. 27-41)

\textit{Cyst wall.} — Thin, hyaline.

\textit{Cytoplasm.} — Alveolar, often irregularly vacuolated.

\textit{Glycogen.} — Appears as clear area or vacule, since glycogen has been dissolved out in staining process. May appear as a single large vacuole (Pl. 4, Fig. 27) or as dispersed vacules (Pl. 4, Fig. 32).

\textit{Chromatoidal Body.} — Usually beam like. One or more bars with rounded ends present (Pl. 4, Fig. 30). May also appear spheroidal (Pl. 4, Fig. 31). Present in about 50% of cases.

\textit{Nuclei.} — Membrane distinct with plaques of encrusted chromatin. These may be evenly distributed (Pl. 4, Fig. 28) or massed in areas forming a crescent (Pl. 4, Fig. 30). Karyosome massed and usually central.
### Distinguishing Characteristics of Intestinal Protozoa.

<table>
<thead>
<tr>
<th></th>
<th>In preliminary Iodine-eosin Stain</th>
<th>In permanent Iron-haematoxylin Stain</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Endamoeba coli</strong></td>
<td><strong>TROPHozoite.</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pseudopodia granular.</td>
<td>Pseudopodia granular.</td>
</tr>
<tr>
<td></td>
<td>No clear line of demarcation between ectoplasm and endoplasm (Pl. 1, Fig. 2.)</td>
<td>Endoplasm coarsely granular with numerous vacuoles containing inclusions (Pl. 2, Fig. 16).</td>
</tr>
<tr>
<td></td>
<td>Food inclusions usually numerous consisting of ingested bacteria and fecal debris.</td>
<td></td>
</tr>
<tr>
<td><strong>Cysts.</strong></td>
<td>Cyst wall.—Distinct, thicker than <em>E. dysenteriae</em>.</td>
<td>Cyst wall.—Hyaline.</td>
</tr>
<tr>
<td></td>
<td>Size.—10-35μ usually 14-20μ.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Shape.—Spheroidal, seldom irregular.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cytoplasm.—Yellowish brown, coarsely but uniformly granular.</td>
<td>Cytoplasm.—Uniformly granular.</td>
</tr>
<tr>
<td></td>
<td>Glycogen.—Dark brown and usually in large central mass.</td>
<td>Glycogen.—Usually one large vacuole (Pl. 6, Fig. 66).</td>
</tr>
<tr>
<td></td>
<td>Seldom found in cysts with more than four nuclei.</td>
<td>Chromatoidal body.—Present in only about 10% of cysts and is usually in the form of splinter-like rods. Occasionally they group together in masses or the remnants may appear as small spheres.</td>
</tr>
<tr>
<td></td>
<td>Chromatoidal body.—Seldom apparent.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nuclei.—1-16 in number. Commonly 8 in ripe cyst.</td>
<td>Nuclei.—Nuclear membrane usually distinct with encrusted chromatin plaques, at times arranged regularly around whole nucleus and at times only four or five clumps apparent. Karyosome massed and eccentric.</td>
</tr>
<tr>
<td></td>
<td>Distinct with granular bead like borders and karyosome.</td>
<td></td>
</tr>
<tr>
<td><strong>Councilmania lafeuri</strong></td>
<td><strong>TROPHozoite.</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pseudopodia hyaline with clear line of demarcation between ectoplasm and endoplasm (Pl. 11, Fig. 4) Endoplasm and food inclusions similar to <em>E. coli</em>. May ingest erythrocytes.</td>
<td>Pseudopodia reticulate in structure but clearer than the endoplasm. Endoplasm coarsely granular with numerous vacuoles containing inclusions (Pl. 2, Fig. 13).</td>
</tr>
<tr>
<td>In preliminary Iodine-eosine Stain</td>
<td>In permanent Iron-haematoxylin Stain</td>
<td></td>
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<tr>
<td>------------------------------------</td>
<td>-------------------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Cysts.</strong></td>
<td><strong>Cysts.</strong> (Pl. 5, Figs. 54-60).</td>
<td></td>
</tr>
<tr>
<td><strong>Cyst wall.</strong> Distinct and even heavier than <strong>E. coli.</strong></td>
<td><strong>Cyst wall.</strong> Thick but hyaline.</td>
<td></td>
</tr>
<tr>
<td><strong>Size.</strong> 10-35 µ.</td>
<td><strong>Cytoplasm.</strong> Coarsely granular, often flaky.</td>
<td></td>
</tr>
<tr>
<td><strong>Shape.</strong> Spheroidal to ellipsoidal.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Glycogen.</strong> Dark brown and usually in large central mass. Seldom found in cysts with more than four nuclei.</td>
<td><strong>Glycogen.</strong> Similar to <strong>E. coli.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Chromatoidal Body.</strong> Seldom apparent.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Bud.</strong> A small bud outside but attached to the cyst wall may occasionally be found.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Nuclei</strong> 1-16. Usually 8, distinct.</td>
<td></td>
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</tr>
</tbody>
</table>

**Endolimax nana**

**Trophozoite.** Small with hyaline pseudopodia. (Pl. 1, Fig. 6).

<table>
<thead>
<tr>
<th><strong>Cysts.</strong></th>
<th><strong>Cysts.</strong> (Pl. 4, Figs. 42-47).</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cyst wall.</strong> Thin.</td>
<td><strong>Cyst wall.</strong> Thin.</td>
</tr>
<tr>
<td><strong>Size.</strong> 3-16 µ.</td>
<td><strong>Cytoplasm.</strong> Evenly vacuolated, vacuoles usually larger than in <strong>E. dysenteriae.</strong></td>
</tr>
<tr>
<td><strong>Shape.</strong> Usually ovoidal but often spherical.</td>
<td></td>
</tr>
<tr>
<td><strong>Cytoplasm.</strong> Pale green with numerous refractive vacuoles.</td>
<td></td>
</tr>
</tbody>
</table>
### Distinguishing Characteristics of Intestinal Protozoa

<table>
<thead>
<tr>
<th>Iodamoeba bütschlii</th>
<th>Iodamoeba williamsi or Endolimax williamsi</th>
</tr>
</thead>
</table>

#### Trophozoite

- **Glycogen**.— Usually one, but indistinctly visible.
- **Chromatoidal Body**.— Not apparent.
- **Nuclei**.— Usually one, but indistinctly visible.

#### Cysts

- **Cyst wall**.— About the same as *E. dysenteriae*.
- **Size**.— 8μ-14μ.
- **Shape**.— Spheroidal, lobed or irregular.
- **Cytoplasm**.— Yellow-green often with small refractive inclusions.
- **Glycogen**.— Often present. Usually a single mass, dark brown in color.
- **Chromatoidal Body**.— Not apparent.
- **Nuclei**.— Usually one, but indistinctly visible.

#### In preliminary Iodine-eosin Stain

- **Glycogen**.— Not common but when present is usually a little darker than the glycogen in *E. dysenteriae*.
- **Chromatoidal body**.— Not apparent.
- **Nuclei**.— 1 to 8 usually 4. Quite indistinct as a rule.

#### Trophozoite

- Similar to *E. nana* though commonly larger (Pl. 1, Fig. 5).

#### Cysts

- **Cytoplasm**.— Irregularly vacuolated.
- **Glycogen**.— One or several large glycogen vacuoles present.
- **Chromatoidal Body**.— One or more small irregularly shaped ones present.
- **Nuclei**.— Usually one. Nuclear membrane thin. Karyosome massed and eccentric. A crescent of darkly staining granules is common within the nucleus.

#### In permanent Iron-haematoxylin Stain

- **Glycogen**.— One large vacuole or several dispersed vacuoles when present.
- **Chromatoidal Body**.— One or more, small and irregular in shape, often located in a vacuole and often mistaken for karyosome of a nucleus.
- **Nuclei**.— Membrane thin and usually indistinct. Seldom encrusted with chromatin. Karyosome large, massed and eccentric though it may appear central if nucleus is turned to an angle of 90° from the position in which karyosome appears eccentric.

#### Cysts

- **Cytoplasm**.— (Pl. 5, Figs. 61-65).
- **Glycogen**.— One or several large glycogen vacuoles present.
- **Chromatoidal Body**.— One or more small irregularly shaped ones present.
- **Nuclei**.— Usually one. Nuclear membrane thin. Karyosome massed and eccentric. A crescent of darkly staining granules is common within the nucleus.
### II. The Flagellates.

The three most common and widely distributed intestinal flagellates are *Giardia*, *Chilomastix*, and *Trichomonas*. Other flagellates which have been reported from the human intestine, though less commonly, are *Embodomonas* and *Enteromonas*.

<table>
<thead>
<tr>
<th></th>
<th>In preliminary Iodine-eosin Stain</th>
<th>In permanent Iron-haematoxylin Stain.</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Dientamoeba fragilis</em></td>
<td><strong>TROPHOZOITE.</strong>&lt;br&gt;Usually possesses two nuclei (Pl. 1, Fig. 7.)</td>
<td><strong>TROPHOZOITE.</strong>&lt;br&gt;Nuclear membrane indistinct with chromatin plaques near margin. Usually two nuclei present (Pl. 4, Figs. 49-53).</td>
</tr>
<tr>
<td><strong>Cysts.</strong></td>
<td>Size.—4μ-12μ&lt;br&gt;Shape.—Spherical&lt;br&gt;Glycogen.—Similar to <em>E. nana</em> except that glycogen vacuoles are more often found. Glycogen is dispersed and stains a dark brown.</td>
<td><strong>Cysts.</strong>&lt;br&gt;Cytoplasm.—Evenly granular with numerous vacuoles.</td>
</tr>
<tr>
<td><strong>Chromatoidal Body.</strong></td>
<td>Not evident.</td>
<td><strong>Chromatoidal Body.</strong>—Small, rare.</td>
</tr>
<tr>
<td><strong>Nuclei.</strong></td>
<td>Commonly two, more distinct than in <em>E. nana.</em></td>
<td><strong>Nuclei.</strong>—Two, occasionally 1 or 4. Scattered chromatin masses around margin of nuclear membrane.</td>
</tr>
</tbody>
</table>

*Giardia intestinalis, Giardia lambia,* or *Giardia enterica.*

**TROPHOZOITE.**

Size.—10μ-18μ in length.

Bilaterally symmetrical with anterior ventral sucker and posterior tail-like process which marks the termination of the axostyle. Eight flagella, arranged in pairs, an anterior pair, a middle pair, a ventral pair, and a caudal pair. No mouth is present. (Pl. 7, Figs. 89 and 90) and (Pl. 1, Fig. 8).

**Cysts.**

Ellipsoidal in shape with two, four or more nuclei; 10 to 14μ in length. Parabasal bodies, and axostyles are apparent both in the iodine-eosin stain and when stained with iron haematoxylin (Pl. 7, Figs. 91 and 92).
Distinguishing Characteristics of Intestinal Protozoa.

**Trichomonas hominis**

**Trophozoite.**

Pear shaped organism measuring from 7-20μ in length. Axostyle projects beyond the posterior end. Undulating membrane arranged laterally and terminates in a free flagellum. Four other anterior flagella are present. Small mouth is located anteriorly. Nucleus and food vacuoles commonly apparent. Cysts of this species unknown. Trichomonas is easily distinguishable from the other intestinal flagellates by the presence of the undulating membrane. (Pl. 7, Fig. 97 and Pl. 1, Fig. 9).

**Pentatrichomonas ardini delteli**

Same as above except that five anterior flagella are present instead of four as in *T. hominis*. (Pl. 7, Figs. 100 and 101).

**Chilomastix mesnili** or **Chilomastix daiuainei**

**Trophozoite.**

Size.—7-18μ in length.

Pear shaped, rounded anteriorly and pointed posteriorly. Body of a spiral shape. Cytopharynx prominent. Three long anterior flagella and a fourth shorter one which is found in the cytopharynx (Pl. 7, Fig. 93 and Pl. 1, Fig. 10).

**Cysts.**

Pyiform in shape, 6-9μ in length. Usually a single nucleus is present and fibrils which support the cytopharynx are prominent. (Pl. 7, Figs. 94, 95 and 96).

**Embadomonas intestinalis.**

**Trophozoite.**

Small ovoid flagellate measuring 5-6μ in length and 3-4μ in breadth. Two anterior flagella are present; one projecting anteriorly and the other lying near the cup-shaped cytopharynx. (Pl. 7, Fig. 107).

**Cysts.**

Similar to *Chilomastix* only smaller. (Pl. 7, Fig. 108).

**Embadomonas sinensis.**

**Trophozoite.**

Pyiform to elongate-oval, measuring about 14μ long by 4,2μ in breadth. Flagella like those of *E. intestinalis*. Cytopharynx is a deep groove. (Pl. 7, Fig. 102).

**Cysts.**

Oval, elongate, 6 by 3 microns.

**Entermonas hominis.**

**Trophozoite.**

Size.—4-8μ in length.

Oval or rounded in shape. Cytopharynx, axostyle and undulating membrane absent. Three anterior flagella. (Pl. 7, Figs. 102 and 104).

**Cysts.**

In general similar to cysts of *E. nana* except that nuclei always occupy a characteristic position at poles of cysts. (Pl. 7, Figs. 105 and 106).
III. The Coccidia.

The classification of the Coccidia is for the most part based upon the characteristics found in the oöcyst and spores. Of importance are the size and shape of the spores, the number contained in each oöcyst, and the number of sporozoites found in each spore. The intestinal coccidia of man belong to two different genera, *Isospora* and *Eimeria*.

*Isospora.*

The genus *Isospora* is represented in man by *I. hominis* the oöcysts of which are characterized by their elongate and slightly ovoid shape. They measure from 25μ—33μ in length by 12μ—16μ in breadth at the widest part. The wall of the oöcyst consists of two layers, is thin and smooth but very resistant to the common stains. A micropyle can often be distinguished at the smaller end of the oöcyst. Immature oöcysts may be found in the feces in which stage the contents are unsegmented and merely contracted into a small mass of refractile granules leaving large clear areas at either end of the oöcyst (Pl. 8, Fig. 107). Developmental stages (Pl. 6, Fig. 110) may be encountered which are intermediate between the early stage and that of the ripe oöcyst which contains two spores, each one containing four sporozoites (Pl. 8, Fig. 111).

*Eimeria.*

Several species of *Eimeria* have been described from man but they have been found in few cases only. As a type *Eimeria wenyoni* is figured. The oöcysts of *Eimeria* are different from *Isospora* in that they are spherical in shape, the diameter ranging from 20μ—40μ and that each oöcyst contains four ovoidal or elliptical spores each of which contains two sporozoites (Pl. 8, Fig. 112).

IV. The Ciliates.

*Balantidium coli* (Pl. 8, Fig. 113) is the most common ciliate encountered in the intestine of man. Several other ciliates have been reported but are apparently rare. *B. coli* is a typical ciliate with cilia arranged regularly over its body. It measures commonly from 50μ—70μ in length and has a breadth of about 40μ—60μ and is slightly pointed at the anterior end where a definite cytopharynx is located. A kidney shaped macronucleus is present and a small spherical micronucleus is found in close promimity.
Two contractile vacuoles, one located dorsally and slightly anterior to the middle, and the other posteriorly and dorsally, are apparent in living specimens, and may also show in stained material.

*Enterobius vermicularis* encysts in the intestine and its cysts as well as motile forms may be found in the feces of the host. The cysts (Pl. 8, Fig. 114) are round. They are slightly ovoid and measure 50 μ to 60 μ in diameter. The cilia are not present in the encysted stages but the cysts are distinguishable by their large size and by the presence of the large macronucleus.

*Balantidium coli*, a smaller species, which attains a length of 32 microns or less, is also encountered in man.

**Bibliography.**

The following is a list of books and papers, not all of which are cited in the text, but which the reader will find useful for special reference:

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Distinguishing Characteristics of Intestinal Protozoa.

PLATE II.
Distinguishing Characteristics of Intestinal Protozoa.
Distinguishing Characteristics of Intestinal Protozoa.

PLATE VI.
PLATE VII.
Distinguishing Characteristics of Intestinal Protozoa.
DESCRIPTION OF PLATES.

The drawings that follow, with the exceptions indicated, were made from material collected in the parasitology laboratory of the Peking Union Medical College. The smears were stained with Heidenhain's iron haematoxylin, and the figures were drawn by the writer, originally to a magnification of 3,200 times and later reduced to a magnification of 2,000.

Exceptions: From Dobell and O'Connor, Figures 1, 2, 5-10, 82, 83 and 103-114; from Kofoid and Swezy, Figures 48-53, 55 and 57; from Haughwout and de Leon, Figure 101; from Faust, Figure 102. Figures 3 and 4 are sketches of living organisms in a fresh smear made by the writer. Figures 11 and 12 were originally drawn to a magnification of 1,000 instead of 3,200, times.

PLATE I.

TROPHOZOITES OF THE COMMON INTESTINAL PROTOZOA AS THEY APPEAR IN FRESH SMEARS IN A NORMAL SALINE PREPARATION.

Figure 1.—A partially rounded trophozoite of Endamoeba dysenteriae—Endamoeba histolytica, containing single nucleus and red blood corpuscles. Note the hyaline pseudopodia and the more granular endoplasm which contains very few vacuoles.

Figure 2.—Slightly rounded trophozoite of Endamoeba coli containing a single nucleus and many large food vacuoles in which are ingested bacteria. Note that the granular endoplasm extends to the margin of the amoeba and no hyaline pseudopodium is evident as in E. dysenteriae.

Figure 3.—Active trophozoite of E. dysenteriae containing a single nucleus and ingested red blood corpuscles. Note the elongated shape of the amoeba and the hyaline ectoplasm at the anterior and posterior ends. (It should be mentioned that occasionally, when the amoebae are in very rapid motion, the endoplasm flows so rapidly that a line of demarcation between the endoplasm and the ectoplasm is difficult to distinguish).

Figure 4.—Trophozoite of Councilmania lafleuri containing a single nucleus and food vacuoles in which are ingested bacteria. Note the hyaline pseudopodium which differentiates the motile Councilmania lafleuri from Endamoeba coli.

Figure 5.—Trophozoite of Iodamoeba bütschlii—Iodamoeba williamsi—Endolimax williamsi.

Figure 6.—Trophozoite of Endolimax nana.

Figure 7.—Trophozoite of Dientamoeba fragilis.

Figure 8.—Trophozoite of Giardia intestinalis—Giardia lamblia—Giardia enterica. Note the ventral cup-like sucker at the anterior end, the two nuclei, the posterior tail, and the position of the eight flagella.

Figure 9.—Trophozoite of Trichomonas hominis (modified after Dobell and O'Connor) showing four anterior flagella arranged with three in a single group and the fourth trailing slightly posteriorly, a fifth flagellum extending posteriorly and marking the margin of the undulating membrane and the projecting axostyle which forms a tail-like process.
Distinguishing Characteristics of Intestinal Protozoa.

Figure 10.—Trophozoite of *Chilomastix mesnili*—*Chilomastix davainei*. Note the group of three anterior flagella, the deep cytopharynx which contains a small flagellum trailing posteriorly, the spiral groove, and the elongated tail-like process.

**Plate II.**

**Figures 11-12.**—**Typical appearance of cellular exudate in stools of amoebic and bacillary dysentery.**

Figure 11.—Note two large rounded trophozoites of *Endamoeba dysenteriae* and contrast them with the slightly smaller macrophage to the right. Compare the size of the nucleus of *E. dysenteriae* and of the macrophage. The cellular exudate around the amoebae is composed almost entirely of erythrocytes and degenerating nuclei of body cells. This stool contained Charcot-Leyden crystals.

Figure 12.—Characteristic cellular exudate from a stool of bacillary dysentery. Note the preponderance of normal polymorphonuclear leukocytes and the four large body cells, the two lower being macrophages, one in a division stage; the two upper cells are probably an endothelial cell and a plasma cell.

**Figures 13-17.**—**Trophozoites of common intestinal amoebae.**

Figure 13.—Of *Councilmania lafleuri*, showing vacuolation of the endoplasm and hyaline pseudopodia.

Figure 14.—Of *Endolimax nana*, showing characteristic nuclear structure and hyaline pseudopodia.

Figure 15.—Of *E. dysenteriae*, showing ingested red corpuscles and characteristic nuclear structure. The fine reticular structure of the ectoplasm which makes up the pseudopodia gives the characteristic hyaline appearance.

Figure 16.—Of *Endamoeba coli*, showing a granular pseudopodium, vacuoles in the endoplasm, and the characteristic nuclear structure.

Figure 17.—Of *Iodamoeba bütschlii*, showing nucleus with large karyosome and hyaline pseudopodium.

**Plate III.**

**Rounded trophozoites of Endamoeba dysenteriae and Endamoeba coli compared with cells of exudate from bacillary dysentery.**

Figure 18.—*E. dysenteriae* showing a characteristic nucleus and ingested cells. Note the hyaline margin of ectoplasm.

Figure 19.—*E. coli* containing vacuoles in which are ingested bacteria.

Figure 20.—Large macrophage containing nucleus and inclusions of unknown origin.

Figure 21.—Smaller macrophage without nucleus containing ingested nuclei of polymorphonuclear leukocyte and inclusions of unknown origin.

Figure 22.—Rounded macrophage containing inclusions of unknown origin. Note the absence of a nucleus.
Figure 23.—Two attached endothelial cells. Note the size of nuclei in comparison with nuclei of amoebae and the irregular arrangement of nuclear chromatin.

Figure 24.—Rounded polymorphonuclear leukocyte containing three nuclei, two of which resemble the nuclei of a cyst of *E. dysenteriae* and the third nucleus being elongate. The nuclei in polymorphonuclear leukocytes are more like the nuclei of parasitic amoebae than the nuclei of any other cells encountered in cellular exudate of diarrheic stools.

Figure 25.—Probably a plasma cell.

Figure 26.—Two attached columnar epithelial cells.

**Plate IV.**

Figures 27-41.—Cysts of *Endamoeba dysenteriae—Endamoeba histolytica.*

Figure 27.—Large mononucleate cyst with single glycogen vacuole and two chromatoidal bodies.

Figure 28.—Large mononucleate cyst with single glycogen vacuole. No chromatoidal bodies present.

Figure 29.—Large mononucleate cyst with glycogen vacuole and nucleus in early division stage. Small chromatoidal bodies are arranged around margin of vacuole.

Figure 30.—Binucleate cyst showing dispersed glycogen and three chromatoidal bodies. Note the difference in arrangement of the chromatin incrusted on the nuclear membrane of the two nuclei in this cyst.

Figure 31.—Three-nucleate cyst showing single glycogen vacuole and two chromatoidal bodies which are more spherical than is common.

Figure 32.—Large four-nucleate cyst with dispersed glycogen and five chromatoidal bodies. Note the excentric position of karyosome.

Figure 33.—Large four-nucleate cyst with remnants of glycogen in center. No chromatoidal body is present. Note the variation in the arrangement of incrusted chromatin on nuclear membranes.

Figure 34.—Medium-sized cyst containing four nuclei, small glycogen vacuole and two typical chromatoidal bodies.

Figure 35.—Medium-sized binucleate cyst with two glycogen areas and single small chromatoidal body.

Figure 36.—Small mononucleate cyst with dispersed glycogen and no chromatoidal body.

Figure 37.—Small mononucleate cyst with dispersed glycogen and three chromatoidal bodies.

Figure 38.—Small binucleate cyst containing two glycogen areas and two chromatoidal bodies.

Figure 39.—Small ovoidal four-nucleate cyst with little glycogen and four chromatoidal bodies.

Figure 40.—Very small binucleate cyst with dispersed glycogen and two chromatoidal bodies.

Figure 41.—Very small four-nucleate cyst showing glycogen and single chromatoidal body.
Distinguishing Characteristics of Intestinal Protozoa.

Figures 42-47.—Cysts of Endolimax nana

Figure 42.—Four-nucleate cyst with all nuclei lying in such a position that the karyosomes appear to be arranged centrally. This cyst might be easily confused with cysts of E. dysenteriae. Note, however, the large size of the karyosomes, the very faint nuclear membrane upon which little or no chromatin is incrusted. Note two small chromatoidal bodies in the lower part of cyst.

Figure 43.—Mononucleate cyst with karyosome in division stage. Small chromatoidal body present.

Figure 44.—Binucleate cyst, upper nucleus showing the typical excentric arrangement of karyosomes in Endolimax nana, and lower nucleus showing the central appearance of karyosome when nucleus is turned to an angle of 90° from the position of the upper nucleus.

Figure 45.—Four-nucleate cyst, of which three nuclei show the typical excentric arrangement of the karyosome. Small chromatoidal body present.

Figure 46.—Small cyst containing four nuclei.

Figure 47.—Eight-nucleate cyst. Note small chromatoidal body just above the two lower nuclei.

Figures 48-53.—Dientamoeba fragilis

Figure 48.—Spherical cyst with single nucleus, large vacuoles, and small chromatoidal body.

Figure 49.—Rounded-up active amoeba with single nucleus. Note the faint nuclear membrane and peripheral chromatin granules.

Figures 50, 51 and 52.—Binucleate amoebae with vacuolated protoplasm and food vacuoles.

Figure 53.—Rounded-up active amoeba with four nuclei.

Plate V.

Figures' 54-60.—Cysts of Councilmania lafleuri.

Figure 54.—Mononucleate cyst with large glycogen vacuole around the margin of which chromatoidal bodies are present.

Figure 55.—Binucleate cyst showing single glycogen vacuole. Nuclei show early anaphase of mitosis. Note the eight chromosomes which are just separating, the spindle fibers, and large centrosomes.

Figure 56.—Small four-nucleate cyst. Note the dispersed glycogen, faint nuclear membrane, and dispersed central karyosomes.

Figure 57.—Medium-sized four-nucleate cyst. Nuclei in late telophase.

Figure 58.—Typical spheroidal eight-nucleate cyst showing faint nuclear membrane and central dispersed karyosome. No chromatoidal bodies present.

Figure 59.—Eight-nucleate cyst showing bud containing a single nucleus, characteristic chromophile ridge and typical chromatoidal mass with irregular frayed ends.

Figure 60.—Spheroidal eight-nucleate cyst showing chromophile ridge and characteristic arrangement of chromatin within the nuclei. No chromatoidal bodies present.
Figures 61-65.—Cysts of *Iodamoeba butschlii*—*Iodamoeba williamsi*—*Endolimax williamsi*.

Figure 61.—Large irregular mononucleate cyst. Note the large glycogen mass and small chromatoidal body. The nucleus shows the characteristic faint membrane upon which little or no chromatin is incrusted and the typical large, massed karyosome.

Figure 62.—Small spherical mononucleate cyst with chromatoidal mass. The karyosome in the nucleus is in the early division stage.

Figure 63.—Binucleate cyst with single glycogen mass.

Figure 64.—Mononucleate cyst with single glycogen mass, and small chromatoidal body near its margin. Note the heavy central karyosome in nucleus, above which is a crescent of chromatin granules.

Figure 65.—Mononucleate cyst with two glycogen masses and two small chromatoidal bodies. Note the faint nuclear membrane, the massed excentric karyosome, and the crescent-like body of the nucleus.

**PLATE VI.**

Figures 66-72.—Cysts of *Endamoeba coli*.

Figure 66.—Large mononucleate cyst with single large glycogen vacuole.

Figure 67.—Binucleate cyst with glycogen vacuole around the margin of which are small splinter-like chromatoidal bodies. The upper nucleus shows a typical excentric karyosome and heavy amount of chromatin material incrusted on nuclear membrane. The lower nucleus shows the karyosome dispersed in the condition of an early prophase.

Figure 68.—Binucleate cyst, the upper nucleus showing spindle, six chromosomes (separating to form twelve) and the lower nucleus being in late telophase just prior to division.

Figure 69.—Four-nucleate cyst. All nuclei in mitotic division stages.

Figure 70.—Four-nucleate cyst with nuclei in characteristic resting stage. Typical chromatoidal bodies are present. A cyst of this type might be mistaken for *Endamoeba dysenteriae* if it were not for the splinter-like chromatoidal bodies.

Figure 71.—Typical eight-nucleate cyst showing the excentric arrangement of the karyosomes and heavy chromatin masses on nuclear membrane. The two nuclei near the center show a dispersed condition of the karyosome either in late telophase or early prophase. Note the two small spherical chromatoidal bodies in the lower portion of the cyst.

Figure 72.—Typical eight-nucleate cyst showing the normal excentric arrangement of karyosomes of nuclei in resting stage and typical chromatoidal bodies.

Figures 73-88.—Organisms found in stools which should be differentiated from parasitic protozoa.

Figure 73.—Large *Blastocystis hominis*. Note the large, lightly staining central area which might be confused with a glycogen vacuole. There are, however, no characteristic nuclei present but instead an irregular
arrangement of dark chromatin masses around the periphery of the cyst. Occasionally these masses are found in the central region of the cyst in vacuoles where they resemble the nuclei of protozoa.

Figure 74.—A Blastocystis of irregular shape with darkly staining central area.

Figure 75.—Small Blastocystis with lightly staining central area and characteristic chromatin masses in the marginal region.

Figure 76.—Spherical yeast with lightly staining central area and darkly staining masses in the margin, some of which have light centers.

Figure 77.—Small yeast with dispersed, lightly staining areas and a single mass of chromatin material which might be confused with a nucleus of Endolimax nana.

Figure 78.—Small intestinal yeast with two irregularly-shaped darkly staining areas which are similar to chromatoidal bodies of protozoan cysts, and small spherical area with dot in center which might be confused with nuclei of E. nana or of E. dysenteriae.

Figure 79.—Ovoidal yeast with large, lightly staining area in the middle of which is a large black mass and the peripherally arranged nuclei-like masses.

Figure 80.—Small yeast with large central area resembling a glycogen vacuole. Four smaller vacuoles are found around the margin, three of which contain small black masses and might be confused with nuclei of E. nana or of E. dysenteriae.

Figure 81.—Oval yeast showing lightly staining area in which is a darkly staining mass and three peripheral masses, two of which resemble nuclei.

Figure 82.—Active flagellate of Cercomonas crassicauda.

Figure 83.—Cyst of Cercomonas crassicauda.

Figure 84.—Trophozoite of Copromonas subtilis.

Figure 85.—Cyst of Copromonas subtilis.

Figure 86.—Motile stage of Hartmannella hyalina. Note the hyaline pseudopodia and structure of nucleus which might be confused with the nucleus of E. nana or of Iodamoeba bütschlii.

Figure 87.—Cyst of Hartmannella hyalina with single nucleus. Note the small chromatoidal inclusions and the thick irregular cyst wall.

Figure 88.—Cyst of Dimastigamoeba gruberi similar to the cyst of Hartmannella hyalina with the exception that the cyst wall is regular in contour.

PLATE VII.

INTESTINAL FLAGELLATES

Figure 89.—Trophozoite of Giardia intestinalis—Giardia lamblia—Giardia enterica, in ventral view. Note the two nuclei, anterior ventral cup-like sucker, two heavy parabasal bodies just posterior to the sucker and the arrangement of the eight flagella.

Figure 90.—Giardia intestinalis, lateral view.

Figure 91.—Eight-nucleate cyst of Giardia intestinalis.
The China Medical Journal.

Figure 92.—Four-nucleate cyst of *Giardia intestinalis*.

Figure 93.—Trophozoite of *Chilomastix mesnili*—*C. davainei*. Note the three anterior flagella, the spiral shape of the body, the single nucleus, and the cytopharynx.

Figure 94.—Side view of cyst of *Chilomastix mesnili*. Note the pear shape, the single nucleus, and the internal thread-like inclusions which mark the flagellar structure surrounding the cytopharynx.

Figure 95.—Bi-nucleate cyst of *Chilomastix mesnili*.

Figure 96.—End view of mononucleate cyst of *Chilomastix mesnili*. Note the similarity between this nucleus and a nucleus of *Endamoeba dysenteriae* and the possibility of confusing a cyst of *Chilomastix* in this position with a cyst of *Endamoeba dysenteriae* unless the internal flagellar structure is considered.

Figure 97.—Trophozoite of *Trichomonas hominis* showing undulating membrane by which Trichomonas can be distinguished from the other intestinal flagellates. Note the four anterior flagella, single nucleus, and the axostyle.

Figure 98.— Rounded trophozoite of *Trichomonas hominis* with the flagella missing. Care should be taken not to confuse forms of this type with precystic amoebae.

Figure 99.—A biflagellate organism probably *Bodo sp*. In the parasitology laboratory of the Peking Union Medical College, this organism has been found repeatedly in large numbers in freshly passed human stools where there has been no possibility of contamination.

Figure 100.—Trophozoite of *Pentatrichomonas ardin delteilii*. Note the five anterior flagella.

Figure 101.—Pentatrichomonas ingesting red corpuscle (after Haughwout and de Leon).

Figure 102.—Motile *Embodomonas sinensis* (after Faust).

Figures 103 and 104.—Trophozoites of *Enteromonas hominis*.

Figure 105.—Mononucleate cyst of *Enteromonas hominis*.

Figure 106.—Four-nucleate cyst of *Enteromonas hominis*.

Figure 107.—Active trophozoite of *Enteromonas intestinalis*.

Figure 108.—Cyst of *Embodomonas intestinalis*.

Plate VIII.

Figures 109-112.—Coccidia.

Figure 109.—Oocyst of *Isospora hominis* with unsegmented protoplasm, as usually passed in the stools.

Figure 110.—Later stage of *Isospora hominis* with protoplasm segmented into sporoblasts.

Figure 111.—Fully developed oocyst of *Isospora hominis* containing two spores, each containing four sporozoites.

Figure 112.—*Eimeria wenyonii*. A ripe oocyst containing four fully formed spores (after Wenyon).

Figures 113, 114.—Balantidium.

Figure 113.—Trophozoite of *Balantidium coli*.

Figure 114.—Cyst of *Balantidium coli*.
Mercurochrome-220 soluble and Gentian Violet.

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Mercurochrome is now fairly well known as a germicide; it is the disodium salt of dibrom-oxymercurv fluorescin, dibrom-fluorescin being an anilin dye. Mercurochrome-220 soluble (2 per cent solution) has been accepted by the Council on Pharmacy and Chemistry of the American Medical Association for inclusion in the list of Nonofficial Remedies. Gentian violet, medicinal, has also been accepted.

Some time ago H. H. Young, E. C. White and E. O. Swartz reported their successful experiences with mercurochrome-220 soluble and with gentian violet, administered intravenously, in the treatment of general sepsis and local infections. Since then several other writers have reported their trial of these new remedies in various infections, including not only general and local infections of the pus producing organisms, but also such diseases as chronic gonorrhea, and scarlet fever with erysipelas and streptococcic septicemia. The results have been so uniformly encouraging that I obtained a supply of these drugs and determined to give each a trial. The following brief case reports of my early experiences with these drugs, in which I am coming to have more and more confidence, give an indication of their value.

Case 1. (Hosp. No. 743-2133).—Patient, a housewife, Korean, about thirty-five years of age. Admitted to hospital, May 29, 1924, with abdomen tender all over, and muscular rigidity over both flanks. The tenderness was most marked over the left upper quadrant of the abdomen, though the rigidity there was not quite so marked.

History.—The patient had been suffering from abdominal pain and tenderness since the birth of her baby three weeks before her admittance to hospital. Previous to the beginning of this last pregnancy she had for a long period a very copious vaginal discharge. During her illness she had been very constipated and for this condition had been taking native medicines. There had been no vomiting, but following the ingestion of food she had suffered so severely from abdominal pain that for days she had eaten almost nothing. The temperature range was typically septic in character.

Laboratory examinations.—Urine: specific gravity, 1020; reaction, alkaline; quantity, 800 c.c. in twenty-four hours; no albumin or casts; some pus present.
Blood.—On May 29th, 1924, total count W.B.C. 8,400; differential count showed polymorphonuclears, 58 per cent, and lymphocytes, 42 per cent, which was somewhat surprising in view of her clinical appearance. On June 1st, W.B.C. 12,200, with polymorphonuclears 70 per cent, and lymphocytes 26 per cent. On June 2nd, W.B.C. 19,400, with polymorphonuclears, 92 per cent, and lymphocytes, 8 per cent. Clinically, her illness was becoming steadily more severe. A diagnosis was made of generalised peritonitis, probably of gonorrhoeal origin.

Treatment.—The usual treatment for peritonitis was given: Fowler's position, hot applications to the abdomen, administration of morphine, nothing by mouth, fluids by rectum, and hypodermoclysis. The patient continued to lose ground. The septic temperature became more marked, though at no time did it warrant her general prostrated appearance. Her pulse increased out of proportion to the increase of temperature. On June 2nd, her condition was so serious as to make recovery seem very doubtful. It was then decided to try mercurochrome since she was apparently going to die unless some effective remedy was found. That afternoon I gave her intravenously 0.2 gm. of mercurochrome—220 sol. (approximately five mg. per kg. of body weight) in thirty c.c. of water. The injection was followed by a severe chill, high fever, and diarrhea lasting for two days. But the patient felt much better the next day in spite of the diarrhea. The abdominal tenderness and rigidity had entirely disappeared. The next morning (June 4th), after giving the mercurochrome, her blood count showed W.B.C. 14,800, with polymorphonuclears, 86 per cent. On June 7th, W.B.C. 12,600, with polymorphonuclears, 61 per cent.

On June 8th the patient's temperature rose to 39°C, but since she did not seem to be very ill and I was reluctant to subject her to the severe reaction of the mercurochrome again, I gave her a dose instead of gentian violet (0.2 gm.). The next day her temperature rose to 37.5°C and the day after to 37.3°C. On the following day it was normal. Insisting that she was entirely well the patient on June 11th went home. She was readmitted on June 19th for rheumatism in her left shoulder. This was treated and she was also given an anthelminthic for hookworm disease. She was discharged on July 5th entirely well. During her second stay in hospital she never complained of abdominal trouble, nor did she have fever at any time. The last blood count, on June 22nd, showed W.B.C. 9,000, with polymorphonuclears, 64 per cent; lymphocytes, 34 per cent; large mononuclears, 1 per cent; eosinophils, 1 per cent. In my opinion the patient would have died had she not been given the mercurochrome.

Case 2.—(Hosp. No. 884-2171). Patient, male, aged 34. Occupation, a farmer. Diagnosis, empyema of right side of chest. Was admitted on June 12th, with a history of chills, cough, fever which was septic in character, sweats, profuse bloody expectoration, pain on right side. These symptoms had lasted for about a month. Patient was very emaciated. In short, he presented all the signs of severe empyema which was about getting the best of him. Operation was performed on June 13th, 1924. Rib resection
and free drainage. A large quantity of thick pus was removed. His sub-
sequent condition showed no improvement. Sputum, negative, no tubercle
bacilli being found or Distoma ova. Blood count showed W.B.C. 10,600, with
polymorphonuclears 73 per cent, and lymphocytes 27 per cent. Hemo-
globin, 60 per cent. Although the drainage was free the patient continued
to have a marked septic temperature range, and steadily lost ground. On
June 30th, the blood count showed W.B.C. 11,600, with polymorphonuclears
82 per cent.

The patient's condition was now so grave that I told him he was
going to die, an opinion concurred in by my assistants and helpers. On
July 6th, as he looked as if he could not live much longer, the question of
trying mercurochrome occurred to me, but I thought he was too weak to
stand the severe reaction caused by this drug. As his infection was in the
main due to a staphylococcus, which is easily killed by gentian violet, I
decided to try this drug rather than mercurochrome, especially as it is said
gentian violet does not usually cause any reaction. Accordingly I gave
him intravenously 0.1 gm. of gentian violet dissolved in 25 c.c. of water.
I gave him only half the usual dose as I felt it was best to proceed very
cautiously in order to avoid the slightest shock. He developed the usual
cyanotic appearance caused by the presence of the dye in the blood, but
this passed off in a few hours without any subjective reaction or any
discomfort. Two days later I gave him another injection, this time of 0.2
gm. (approximately 5 mg. per kg. of body weight). Following this
injection he had a mild chill but no particular discomfort. After another
interval of two days I repeated the injection (0.2 gm); there was no
reaction. On the second day after this injection his temperature was
sub-normal for 24 hours. During the remainder of his stay in the hospital
he had no fever. The discharge of pus from the chest cleared up within a
very few days. The opening closed and the wound was entirely healed by
July 18th, twelve days after the first injection of gentian violet. He was
discharged on July 21st in good condition, almost well. He was still under
his normal weight, although he had gained greatly during the last few days,
and rather quickly became short of breath on exertion. I should add that
his food was always brought to him from his own home and on July 17th
he had an attack of amebic dysentery; but this cleared up after a few
injections of emetin and his recovery went on rapidly in spite of this added
burden.

Case 3.—(Hosp No. 995-2172). Patient, a Korean coolie, aged 42. Admitted
to hospital on June 27, 1924, with compound unreduced fracture, received
ten days before, of the radius and ulna of the right arm just above the
wrist joint. The ends of the bones were protruding and were bathed in
pus. The patient was in a very septic condition and his appearance was
bad. He refused amputation, which I energetically advised, so I opened
up the affected parts freely, cut off all necrosed tissue, put the bones in
proper alignment and hoped for the best. On June 27th his blood count
showed W.B.C. 15,200, with polymorphonuclears 83 per cent. On June
30th, W.B.C. 20,000, with polymorphonuclears 80 per cent. On July 9th,
W.B.C. 15,200, with polymorphonuclears 77 per cent. The patient was steadily losing ground; his arm was swollen to the shoulder which was almost as large in circumference as his thigh; his condition was profoundly toxic and the temperature curve was characteristically septic. His case seemed about as hopeless as it could be. On July 9th I gave him 0.2 gm. of mercurochrome intravenously in 20 c.c. of water. Two days later another intravenous injection was given; this time the full calculated dose for his weight was given (0.23 gm). The injection was repeated at the end of another two days. He then began to show signs of mild salivation. After each injection there was the usual severe chill, fever and diarrhea. On July 13th, between the second and third injections, his temperature fell to normal and it did not rise again during his stay in hospital. The third injection was given simply to make sure there would be no risk of recurrence. The wounds healed well, the bones united, but he was left with a stiff wrist. One night some weeks afterwards, when he was entirely well and only waiting for funds to come from his home to pay his hospital bill, he got tired of waiting and ran off. His recovery was complete. He had a strong arm and was able to do his usual work.

Case 4.—(Hosp No. 1204-2186). Patient, a Korean housewife, aged about 27. Admitted to the hospital on July 20th, with all the usual signs and symptoms of peritonitis following abortion, which had occurred during the previous week. For several days she had been having severe and increasing abdominal pain with constant vomiting. On admission the symptoms were fever, abdominal tenderness and general muscular rigidity of the abdominal wall. Blood count showed w.B.C. 11,000, with polymorphonuclears 85 per cent. On examination of the urine casts were found and a slight trace of albumin. There was no doubt as to the diagnosis and the patient seemed very ill.

Having already acquired quite a degree of confidence in mercurochrome I immediately gave her 0.18 gm. (5 mg. per kg. of body weight) intravenously in 20 c.c. of water. She failed to have the usual reaction and this I took to be a bad sign, indicating she was too ill to react. Next day her temperature rose as usual to 40°C. On the following day, when it again started to rise, I repeated the dose of mercurochrome. She manifested a fairly severe reaction this time, but not as severe as usual. She had a chill and this was followed by two soft movements. Two days later she began to show slight signs of salivation. That night her temperature became sub-normal. It did not again rise above normal during her stay in hospital. The next day, to make matters sure, since she could not be given any more mercurochrome because of the salivation, I gave her a dose similar in amount of gentian violet. It hardly seemed to be really necessary but I did not wish to take any chances of her infection flaring up again. In addition to the injections of mercurochrome and gentian violet she had the usual treatment for peritonitis: fluids by hypodermoclysis, morphine, Fowler's position and so forth. I am convinced the mercurochrome was the cause of her spectacular recovery. She was discharged on June 28th entirely well.
These are the brief reports of my first four cases in which I administered mercurochrome and gentian violet. Since then I have used one or other of these drugs in other cases with entire success. The cases reported were all of great severity, as at first I was unwilling to try such a radical experiment except on a patient that I felt sure no other remedy would save. I was fortunate in having these cases in quick succession. The more I use these drugs the more confidence I feel in them. I am now using them in less severe cases but I still think they should be used with extreme caution and only in selected cases in which it is feared there may be possibly a fatal outcome. In two of the cases the mercurochrome was pushed to mild salivation and this has occurred in other cases but I have never given more than three injections at three-day intervals. The drug seems to me to have the surest effect when so pushed. Had I stopped short of salivation in the two cases mentioned it is extremely doubtful if the result would have been so wonderfully successful. A mild salivation does not hurt the patient and it gives a definite point towards which to aim.

As to the technique of administration, it is described fully by Young and Birkhaug in their paper reporting the results of giving mercurochrome in a severe case of scarlet fever with complications. The mercurochrome or gentian violet is dissolved in hot distilled water to form a one per cent solution, which is injected intravenously. The mercurochrome dissolves easily; the gentian violet is hard to dissolve. Both are hard on the hypodermic needle. The solution should be freshly made for each injection. The easiest and most economical way is to have the medicine weighed out and dissolved just before administration. The hypodermic needle and dishes are sterilized, but it is hardly necessary to sterilize the solution as it is made sterile by the medicine dissolved in it.

References


AURICULAR FIBRILLATION*.


In reading this paper on auricular fibrillation it was my hope that I would be able to show you actual polygraphic records of cases treated. Unfortunately, circumstances make this impossible, and after careful thought I have decided not to discuss what may be called the theoretical side of the disease, but rather to confine my remarks to those things which are necessary to its practical understanding and successful treatment. In this way I hope that the paper may prove helpful.

Our knowledge of the anatomy and physiology of the heart which bears on the subject of fibrillation may be quickly summarised. At the junction of the superior vena cava with the right auricle there is a node of specialised nerve tissue, the sino-auricular (s.a) node (remains of the sinus venosus) to which the vagus and sympathetic nerves are connected. The auriculo-ventricular (a.v) node, a small mass of nervous and muscular tissue, is situated in the wall of the right auricle near the coronary sinus. In this node originates the auriculo-ventricular bundle (bundle of His) a special band of muscular fibres which passes through the inter-ventricular septum and ramifications in the walls of the right and left ventricle respectively. The stimulus for contraction normally arises at the sino-auricular node, the so-called "pace-maker" of the heart. The rhythm of the sinus venosus governs the rhythm of the remaining segments of the heart. The impulse travels as a wave of contraction from the sino-auricular node to the auricles and the auricular systole then takes place. The stimulus then travels to the auriculo-ventricular node and bundle of His and so to the ventricular muscle.

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Auricular Fibrillation.

As recorded on the polygraph the normal heart beat shows the following tracing.

![Polygraphic Curve]

Fig. 1.—A Polygraphic Curve showing the three waves of the physiological venous pulse in the upper tracing, which was taken from the veins of the neck. The lower tracing is from the radial artery. With each systole of the ventricle are two waves, c and v. Preceding c in each cycle, and pre-systolic in time, a wave a is seen, which is the result of auricular systole (Lewis).

When the "A" wave is present it is called the auricular type of venous pulse. When in a venous curve there is no "A" wave, it is known as a ventricular type of venous pulse and signifies that the auricle is not contracting in a normal manner. The etiology of the condition will be considered later when we are in a better position to appreciate the various theories which have been advanced as to the cause of the disease.

Auricular fibrillation is present in about 60 per cent of cases which suffer from heart failure with dropsy. It is a condition in which the auricle does not beat as a whole but in a series of incoördinate contractions of individual muscular fibres; therefore incoördinate impulses pass through the bundle of His which lead to irregular and rapid ventricular contractions. These contractions are irregular both in force and frequency and so have been described as an irregular irregularity. By taking a tracing of the radial pulse and jugular vein we can register at one and the same time the action of ventricle and auricle respectively, and so can discover how these chambers are functioning.

A typical tracing taken in this manner is here given.

![Auricular Fibrillation Tracing]

Fig. 2.—Polygram of auricular fibrillation (Neuhof).
Here we see the absolute irregularity of the pulse both in force and time. In the venous pulse the diagnosis is also obvious for we see that the auricular wave "A" of the normal beat is replaced by a series of fibrillary movements.

Fig. 3.—Absence of auricular wave.

A tracing of this kind is typical of a heart with a pulse rate of 140 to 160, and therefore little difficulty should be experienced in diagnosing the condition from the mere taking of the pulse. Clinically, I wish to emphasise the fact that in my opinion there are many cases of what I call slow fibrillation missed, that is, with a pulse rate of 80 to 90. In fact, as I shall mention when we consider the treatment, it is sometimes extremely difficult to pick up the irregularity by taking a pulse running at this rate, though with the polygraphic record it becomes clear. From the accompanying tracing of the radial artery, we can fully understand why and from what a patient may complain. For it presents evidence of a good strong beat giving a normal output, and many contractions giving little output, and therefore there is diminished forward pressure. Note that while there is a diminished forward pressure, there is also, ipso facto, an increased backward pressure.

Symptoms.

As to symptoms, fibrillation of the auricles invariably commences suddenly. A fairly common history is for a patient, who is feeling perfectly well, to fall suddenly to the ground having intense dyspnoea and cyanosis. Later on, the signs referable to diminished forward pressure appear, such as insomnia, headache, extreme fatigue, inability to do any exertion whatsoever. The other systems are correspondingly affected, but I mention only the early and important symptoms. Especially would I call your attention
to the condition of dyspnoea. For with this I have noticed that in certain cases, when fibrillation commences, the first desire of some patients is to assume the upright position in bed, while other patients desire to lie down. This and some other facts which I shall mention later, have proved very disturbing to my peace of mind for they must be dependent upon some other factor. I shall be pleased to hear if your experience has been similar to mine and the explanation you give. Palpitation is a sign which, in my opinion, is not always present, but if trouble is taken in questioning patients one will elicit in some cases the word "quiver" or "flutter" instead of palpitation, and this I think is of diagnostic value.

I come now to an observation which I have noted since leaving Sir James Mackenzie, that is, the low acidity of the stomach contents which these patients show after a test meal. Invariably it is below 30, and sometimes as low as 10. This may or may not have any relation with the original condition of auricular fibrillation. This is a point that can only be decided after many observations and checks. At present I cannot believe it is the result of fibrillation for I have always attempted to give a test meal within 24 hours. Perhaps it should be mentioned that such a test meal is the same as that used when testing the acidity in cases of doubtful carcinomata or of ulcer of the stomach. It consists of one thick slice of toast and one cup of tea without sugar or milk. The contents are drawn off half an hour later and are tested by the usual methods of gastric analysis.

**Pulsus Alternans.**

Under the heading of description I have left to the last, in order to emphasise it, the mention of the pulsus alternans which sometimes occurs in auricular fibrillation. Just before I left Sir James Mackenzie, he impressed upon me the importance of this pulse for there is little known about it. Graphically, it is easily noticed. The beats are alternately large and small, the intervals remaining the same. You will remember that the pulsus bigeminus, due to extra systoles, gives the following tracing.
Strange to say, two weeks after the interview which I have recorded, while passing through Edinburgh I went round the wards of a hospital there with a former chief, and saw the case of a woman of 65 with cerebral haemorrhage and unconscious. Being young and energetic perhaps I devoted more time to the pulse than otherwise I would have done. However, I thought I felt the pulsus alternans and therefore asked permission to take a polygraphic tracing. I commenced at 12 o'clock noon and obtained both radial and jugular graphs (some people do not show the jugular wave). After three hours the woman died, and so I had a graphic record of three hours duration, lasting till the moment of death. Now I come to the point of these remarks. On looking at the tracing I was pleased to see the pulsus alternans, but there were only 6-4 at 12.30 and only 2 at 2.30 p.m. half an hour before her death. Now what relation is there between this pulse and death? How long before death does it appear and why? These and other questions require answering, and, as Sir James Mackenzie says, it is to the practitioners we must look for the necessary information, for they are in touch with their patients year after year and their observations are invaluable if only they will take the trouble to jot them down. Every textbook on medicine will tell you that the pulsus alternans is of grave significance, but what does that really mean? It certainly means little or nothing when a prognosis has to be made.

**Etiology of Auricular Fibrillation.**

As a result of the preceding discussion we are now in a position to consider the etiology of auricular fibrillation. As you know, it is associated with many heart diseases due to acute rheumatism, but I cannot believe that acute rheumatism is its sole cause. I had the pleasure of examining the records of Sir James Mackenzie while in London, and though I do not remember the actual figures, I err on the right side in saying that only 20 per cent of his cases of auricular fibrillation had a history of rheumatism. As regards the opinion that backward pressure is the cause this is now denied by most authorities. Let us ask ourselves the question
Auricular Fibrillation.

Why does cardiac muscle fibrillate? When other muscles do so we know it is dependent upon a nerve being cut, or the centre for that nerve being injured or destroyed, as in progressive muscular atrophy. In the case of the woman with pulsus alternans which I mentioned just now, at the moment of death fibrillation was shown on each of the graphs i.e. over the radial artery, jugular vein, and recti. So you will agree that at least there is a field here for further investigation. Personally, I have come to no definite conclusion as to what the readings mean. Sir James suggested local fibrillation of muscle. It would take too long to state the reasons why I am inclined to disagree, especially as I am still working on the problem, but I will mention here that the tracing also showed a paralyzed diaphragm, and Sir James had only seen one such case before but had no graphic record of it. I shall be glad to hear if those present have any knowledge of this condition. The little work I have done on the subject inclines me towards what I call the central theory of the origin of auricular fibrillation. Whether the origin is toxic or organismal will have to be found out.

TREATMENT.

In considering the treatment of this condition perhaps it will be more interesting if I tell you of a particular case, first recalling to your minds that there are two schools of thought concerning the therapy of digitalis, one school holding that full doses of the drug are necessary, while the other favours small dosage. A man, 58 years of age, had been complaining for one month of breathlessness on slight exertion, insomnia, and extreme fatigue. His physician prescribed tincture of digitalis, two minims, three times daily. When first seen the patient was sitting up in bed, cyanosed and breathless, and with slight oedema of the ankles. Clinically, the pulse was diagnostic. The tracing showed fibrillation of the auricles with a pulse of 168; respirations, 23. Let me digress for a moment to refer to the action of digitalis. This drug is supposed to depress the conductivity of the bundle of His. The heart while in the condition of auricular fibrillation is peculiarly susceptible to the action of digitalis, a characteristic of the abnormal heart. Accordingly, the great number of incoordinated stimuli are not allowed to pass to the ventricle and therefore this chamber beats more slowly and regularly. Now in auricular fibrillation we must not only relieve the distressing symptoms, but must also find out
how far the heart is capable of responding to the treatment, and to exertion, in order that we may give a correct prognosis. With that end in view we take what is called the patient's "response to effort". Having taken a record while the patient is at rest direct him to make some constant exertion, such as walking up 10 or 20 stairs, and then take another record after the effort has been made. By comparison of the records day by day we can see the progress of the case and therefore be able to give a reasonable prognosis. Indeed, if it is possible to take the "response to effort" on seeing the patient for the first time, one can invariably decide whether the treatment will be efficacious or otherwise. 

To return to the patient whose condition I am describing. Twenty minims of tincture of digitalis were given three times daily (one dram a day). When first seen, pulse, 168; respiration, 23. On the morning of the second day, pulse, 145; respiration, 23. The patient felt better; his pulse was less irregular. On the morning of the third day, after he had taken on the whole 2 drams of digitalis, the pulse rate was 120; respiration, 20. He was now allowed to be up and out. After "response to effort" (10 stairs), pulse rate, 130; respiration, 22. This was very good. On the fourth day (Tr. digitalis, 3 drams), pulse, 120; respiration, 20. Fifth day (Tr. digitalis, 4 drams), pulse 100; respiration, 20. Sixth day (Tr. digitalis, 6 drams), pulse 85; respiration, 21. On each day there had been a good "response to effort". The tincture of digitalis was now stopped. Altogether, the patient had been given 6 drams. The pulse had decreased from 168 to 85, and I remember well it was just possible to diagnose the pulse clinically. On the morning of the seventh day the pulse rate was 70, but patient was not so bright and the pulse was more irregular. Therefore no digitalis was given for some days, until the pulse reached 120. It is in such cases that a record is invaluable in order that we may reach the right dosage per day, for by comparing the daily records we can see the type of pulse giving the rate and regularity conducive to good "response to effort". In this case a pulse of 80 to 90 was decided upon, and to keep it so required daily, tincture of digitalis 15 minims, or one Nativelle granule (gr. $\frac{1}{2}$). 

Three months later I had occasion to visit this patient and he then informed me that he only took four Nativelle digitalis granules in the week, which is the equivalent roughly of about 8
minims of Tr. digitalis per diem, and he was working normally. As to these granules I do not think they possess any added therapeutic value; they are dearer, though more convenient to carry than the tincture.

With excessive dosage of digitalis there may be produced irregularity of pulse, diminution of urine, nausea, vomiting and diarrhea. In my opinion, nausea is the first symptom to appear and therefore one ought always to be on the watch for it. Recalling what I said a short time ago about the low gastric acidity in this condition, if you find this to be the case then the administration of dilute hydrochloride acid half an hour after meals will be most beneficial. But I suggest that a definite diagnosis of low acidity be made only by means of a test meal, otherwise one may go on treating the dyspepsia as being due to low gastric acidity when it is really due to intolerance of digitalis. At times insomnia may prove a troublesome symptom. I consider it is best treated with ammonium bromide, giving a small preparatory dose before the evening larger dose. I cannot give the explanation but certainly I have found ammonium bromide more efficacious when given in this manner than when given in one large dose.

Referring to what I have called slow fibrillation and the difficulty of diagnosing it by the fingers alone, I have found this slow fibrillation is to be particularly looked for in women at the menopause. As the early symptoms are so very similar, the tendency is to prescribe for the symptoms thought to be due to the menopause, forgetting to pay attention to the pulse. I plead guilty myself to having missed auricular fibrillation in one of my patients for some days. It was only after I treated her for the fibrillation that the so-called menopausal symptoms disappeared.

As illustrating the ease with which one may miss this condition, I will mention one more case. While at Dairen I was asked to see a woman 68 years of age. I was told she had had pneumonia twice before. On the day of my visit, at 11 a.m. her temperature was 99.2° F. Respiration, 22. Pulse, 90. I thought the pulse seemed irregular but passed it over. Both bases of the lungs showed congestion and there were mitral and aortic systolic murmurs, but no diastolic murmurs. At 3 p.m. her temperature was 103.8° F. Respiration, 24; pulse, 100. Not wishing to examine the lungs again, this time I paid more attention to the
pulse and had little difficulty in deciding that the auricles were fibrillating. Five minims of tincture of digitalis were given, followed one hour later by 30 minims, and she slept well that night. In all she was given less than one dram of digitalis and after four days she was ready to get out of bed. I received a letter from her son two days ago in which he says; "Mother is fine to-day, normal, with splendid appetite." For a few hours I had been drawn away by the previous history of pneumonia, but closer questioning with regard to it led me to the conclusion that on both occasions temporary fibrillation had set in which, the vis a fronte being absent, caused the congestion, and this had cleared when the heart assumed its normal rhythm. Such cases of temporary fibrillation are well known, always lasting from a few hours to days. In my opinion this leads more than ever towards the central theory of the origin of auricular fibrillation.

THE COMPOSITION OF HENS' EGGS IN RELATION TO SIZE.*

By Ernest Tso, M.D., Peking.

The average size or weight of hens' eggs as given in most books on dietetics is 60 grams, of which the shell weight is about 6 grams; the white, 36 grams; and the yolk, 18 grams. The egg contains, in round numbers, 70 per cent. of water, 12 per cent. of proteins, 12 per cent. of fat, and 1 per cent. of mineral matter. The fat in the egg is contained in the yolk of which it constitutes about 30 per cent. Hens' eggs in China are generally smaller and far from being uniform in size. In North China, eggs weigh on the average about 40 grams each. Eggs weighing 50 grams—65 grams are uncommon and are marketed as a special variety. It is possible that the larger eggs are constantly being picked out for export to other countries.

Does the composition of small eggs, as regards particularly the proportions of white in relation to yolk and the amount of yolk-fat, remain essentially the same as in large eggs? Is the caloric value of two eggs weighing 30 grams each to be calculated as equal to that of one large egg of 60 grams? These questions seem to be of

*From the Department of Medicine, Peking Union Medical College, Peking.
practical significance from the point of view of physicians in China who have to deal with the diets of children, and of diabetic and other patients whose food intake as regards the calories and the proportions of proteins, fat, and carbohydrates, has to be ascertained.

The results of a study on the relation of size to the composition of eggs are presented in this paper to show that the difference between an egg of 30 grams and one of 60 grams is not only in the size but also in the relative amounts of white, yolk, proteins, and fat, and consequently in their caloric values as well.

METHODS OF ANALYSIS.

The eggs were analysed mainly according to the methods given by Leach. Drying to constant weight was entirely carried out in air at 45°C, since according to Blunt and Wang all but a fraction of one per cent. of the water in the egg is lost during the process. Extraction with redistilled sulphuric ether by the Adams-Soxhlet method was continued for from 8 to 10 hours. The dried ether extract was considered as "fat." The combined weight of the dried extract and residue was in most instances only 10 to 20 mg. less than the amount of yolk (1.2 to 1.4 gms.) used for extraction. The percentage of fat was calculated from the dried yolk rather than the combined weight of the dried extract and residue. Proteins were estimated by difference, i.e. the extraction residue was considered as yolk protein, and the dried egg-white as egg-white protein, in either case allowance being made only for ash.

In all, 62 eggs ranging in weight from 28 grams to 76 grams and including one twin-yolk egg were analysed. The results are presented in Tables I, II, III and IV, and Chart I., from which the following observations are made.

1. The larger the egg, the greater is the proportion of egg-white to yolk. This increase, however, is relative and not strictly proportional to the size of the egg. For instance, the ratios by weight between freshly boiled egg-white and yolk in eggs weighing on the average 32 grams, are 2 : 1.5, and in eggs weighing 60-75 grams, 2 : 1. The ratios between the white and yolk in dried condition, are, in the case of small eggs, 2 : 5.6, and in the case of large eggs, 2 : 3.8.

2. Irrespective of the size of the egg as a whole or of the yolk in particular, the average percentage relation of yolk-fat to yolk is
The percentage of proteins in the whole egg, on the other hand, does not seem to vary, directly or indirectly, with the size of the egg. This is accounted for by the fact that the relatively strikingly constant. Since, however, there is relatively greater increase of egg-white than of yolk in large eggs, the average percentage of fat is smallest in the whole egg which is largest in size. Thus, small eggs contain on the average between 12 and 15 per cent. of fat, whereas large eggs have only 9 to 11.5 per cent. of fat.

Chart I.—Percentages of Yolk-fat in Relation to Size of Eggs.

3. The percentage of proteins in the whole egg, on the other hand, does not seem to vary, directly or indirectly, with the size of the egg. This is accounted for by the fact that the relatively
higher content of yolk proteins in small eggs balances the greater amount of egg-white proteins in large eggs. In other words, small eggs are relatively richer in yolk proteins but proportionally poorer in egg-white proteins.

4. Owing to the differences in the relative amounts of yolk-fat, the average increase in caloric value does not keep pace with the increase in the size of the egg. For example, the computed caloric value per 100 grams of small eggs weighing 28-35 grams is about 12 per cent. higher than the caloric value per 100 grams of large eggs weighing from 60 to 75 grams each. It is interesting from an economic point of view that the difference in the market price for two small eggs as compared with one large egg is in favor of the small eggs.

**Table I.**—Ratios by Weight Between Egg-white and Yolk According to Size of Eggs.

<table>
<thead>
<tr>
<th>No. eggs in group</th>
<th>Range of size</th>
<th>Average size</th>
<th>White : yolk (Boiled)</th>
<th>White : yolk (dried)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gms.</td>
<td>Gms.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>28-38</td>
<td>32.32</td>
<td>2 : 1.50</td>
<td>2 : 5.6</td>
</tr>
<tr>
<td>10</td>
<td>43-49</td>
<td>45.97</td>
<td>2 : 1.12</td>
<td>2 : 4.4</td>
</tr>
<tr>
<td>10</td>
<td>50-59</td>
<td>54.98</td>
<td>2 : 1.10</td>
<td>2 : 4.1</td>
</tr>
<tr>
<td>20</td>
<td>60-76</td>
<td>66.76</td>
<td>2 : 1.00</td>
<td>2 : 3.8</td>
</tr>
<tr>
<td>1 Twin yolk</td>
<td>72.25</td>
<td>2 : 2</td>
<td>2 : 6</td>
<td></td>
</tr>
</tbody>
</table>

**Table II.**—Proportions of Shell, Egg-white, and Yolk According to Size of Eggs.

<table>
<thead>
<tr>
<th>No. eggs in group</th>
<th>Average size</th>
<th>Shell to egg</th>
<th>Dried white to egg</th>
<th>Solids in white</th>
<th>Dried yolk to egg</th>
<th>Solids in yolk</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>32.32</td>
<td>11.91</td>
<td>6.46</td>
<td>11.97</td>
<td>17.60</td>
<td>49.0</td>
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<tr>
<td>10</td>
<td>45.97</td>
<td>11.24</td>
<td>7.33</td>
<td>13.73</td>
<td>16.1</td>
<td>49.5</td>
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<tr>
<td>10</td>
<td>54.98</td>
<td>10.91</td>
<td>7.55</td>
<td>13.15</td>
<td>15.8</td>
<td>49.9</td>
</tr>
<tr>
<td>20</td>
<td>66.76</td>
<td>10.40</td>
<td>7.87</td>
<td>13.16</td>
<td>14.7</td>
<td>48.8</td>
</tr>
</tbody>
</table>
The China Medical Journal.

**Table III.—Proteins and Fat Content in Relation to Size of Eggs.**

<table>
<thead>
<tr>
<th>No. eggs in group</th>
<th>Average size</th>
<th>Proteins</th>
<th>Fat</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>In white</td>
<td>In yolk</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gms</td>
<td>Gms</td>
</tr>
<tr>
<td>21</td>
<td>32.32</td>
<td>2.09</td>
<td>2.12</td>
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<tr>
<td>10</td>
<td>45.97</td>
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<td>2.76</td>
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<td>10</td>
<td>54.98</td>
<td>4.14</td>
<td>3.31</td>
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<tr>
<td>20</td>
<td>66.76</td>
<td>5.26</td>
<td>3.71</td>
</tr>
</tbody>
</table>

*Shell not included.

**Table IV.—The Computed Caloric Values of Eggs of Different Sizes.**

<table>
<thead>
<tr>
<th>No. eggs in group</th>
<th>Average size</th>
<th>Caloric value of white</th>
<th>Per 100 gm. white (fresh)</th>
<th>Per 100 gm. yolk (fresh)</th>
<th>Calories Per 100 gm. eggs with shell</th>
<th>without shell</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gms</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>21</td>
<td>32.32</td>
<td>8</td>
<td>42</td>
<td>49</td>
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<td>156</td>
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<td>45.97</td>
<td>14</td>
<td>54</td>
<td>52</td>
<td>393</td>
<td>149</td>
</tr>
<tr>
<td>10</td>
<td>54.98</td>
<td>17</td>
<td>63</td>
<td>53</td>
<td>391</td>
<td>145</td>
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<tr>
<td>20</td>
<td>66.76</td>
<td>21</td>
<td>72</td>
<td>54</td>
<td>358</td>
<td>139</td>
</tr>
</tbody>
</table>

References.

1. Leach. 1914. "Food Inspection and Analysis."

**The Flocculation Test for Syphilis, in Small Clinics.**

P. V. Early, M.B., (Lond.), Fatshan, Kwangtung.

It is now established that in various modifications of the Sachs-Georgi flocculation reaction we have a valuable aid to the diagnosis of syphilis and also a means of gauging the results of treatment. Owing to its greater simplicity of technique, the flocculation reaction is more widely available than the Wassermann reaction and should find a great field of usefulness in small hospitals that have only modest laboratory facilities, or in which the sera to be tested are comparatively few and do not arrive in regular batches at fixed times.
The Flocculation Test for Syphilis.

The comparative tests which have been carried out between the flocculation reaction (F. R.) and the Wassermann reaction (W. R.) are now fairly numerous. In particular, a very fully analysed series in which the Sigma reaction of Dreyer and Ward is compared with the Wassermann reaction has been published by the British Medical Research Council. The evidence seems to show that in strong syphilitic sera the F. R. is at least as reliable as the W. R. while in early primary cases and in treated cases the F. R. may be even more delicate than the W. R. Probably a much larger series of comparative tests than those which have been carried out so far, are necessary to establish finally the relative values of the two methods. The purpose of the present note is to emphasize the fact that in the F. R. we have a test for syphilis which is of real diagnostic value, and which does not demand specialist training or elaborate equipment.

The Sigma reaction of Dreyer and Ward has been standardised to give quantitative results, and is probably the method which will be most largely employed in comparative tests with the Wassermann reaction and in work in which precise readings are required. For work in small clinics, in which qualitative readings are chiefly required, and in which often very little time is available for laboratory diagnosis, such a method as that described by Urquart is adequate and more practicable.

The following notes are based on experience gained in only 160 tests (including 9 on cerebro-spinal fluids) carried out in the hospital here in the course of the present year, and the Wassermann reaction has not been employed. The notes therefore add nothing to the existing knowledge as to the value of the flocculation reaction. As, however, the tests have been performed in the midst of busy clinical work, they may serve to illustrate the practicability of a simple flocculation technique where diagnosis is the chief object and time is an important matter.

The Sera—In our series the sera have been heated to 55° C. or 56° C. for about 20 minutes. Tests have shown that no advantage is obtained by a more prolonged inactivation; this is of importance in a laboratory in which an automatically regulated water-bath working at 55° C. is not available, for an improvised bath heated by a spirit lamp requires watching carefully during the heating of the sera.
The Extracts:—Three different heart-extracts have been used. Two of them were prepared according to the method described by Dreyer and Ward, except that pig's heart was substituted for calf's heart as being more easily procurable locally. The method, in outline, is as follows:

100 gm. of minced heart muscle (free from fat) is placed in ordinary alcohol for 5 days, shaking occasionally; the filtered residue is dried in the incubator for 24 hours; 200 c.c. pure acetone is added, and left at room temperature for 7 days. The filtered residue is similarly treated with 100 c.c. acetone for one day. The residue is dried for 2 hours in the incubator, and 200 c.c. ordinary alcohol is added; this is left for 10 days at room temperature and then filtered. The filtrate is the extract used in the test.

The method of making the suspension has been that described by Urquart. A titration of the optimum amount of cholesterol to be added to the extract is carried out by mixing the extract with a 1% solution of cholesterol in absolute alcohol, in the proportions 9:1, 8:2, 7:3, 6:4, and 5:5, making suspensions of the different mixtures, and testing them with known positive and negative sera. The mixture giving the strongest readings is used in the tests. The control with a negative serum is needed because an excessive proportion of cholesterol may lead to a false positive reading on incubation.

The suspension is prepared by dropping 9 c.c. of 0.9% saline from a burette on to 1 c.c. of the extract-cholesterol mixture in a large test-tube from a height of 6 inches. This gives a homogeneous and fairly opaque suspension.

The third extract used has been the Sachs-Georgi antigen supplied by Messrs. Burroughs Wellcome. This is put up in 1 c.c. ampoules, and is already cholesterinised. The suspension (1 in 20) is prepared according to the directions supplied with the antigen. This extract gives a shimmering suspension, and not a homogeneous one.

In the majority of the tests in our series two or three of these extracts have been used concurrently. The results given by the different extracts have corresponded closely. The granularity of the suspension of the Wellcome Sachs-Georgi antigen makes the reading of a fine flocculation less clear-cut than is the case with the
The Flocculation Test for Syphilis.

Homogeneous suspensions, and this is a disadvantage when reading the reactions of weak sera, as in the case of treated patients. But for diagnostic purposes, the three extracts give closely parallel results. The extracts keep indefinitely, and the cholesterol titration need not be repeated; but the extract-cholesterol mixture should be made up at the time of using.

Dilutions of Sera.—The serum dilutions are made by setting up six small test-tubes (outside measurements about 1 cm. x 6 cm.) and running in saline from a burette as follows: tube 1, 1.6 c. cm.; the other five tubes, 1 c. cm. each. To tube 1 is then added .4 cm. of the serum (previously heated to 55° C. for 20 minutes), the contents of the tube mixed, and 1 c. cm. pipetted out and added to tube 2; and so on throughout the 6 tubes, the 1 c. cm. from tube 6 being discarded. We thus have dilutions of serum as follows: 1 in 5, 1 in 10, 1 in 20, 1 in 40, 1 in 80, and 1 in 160. To each tube .5 c.cm. of the extract suspension is added; the tubes are again inverted sharply in succession (commencing with the highest dilution) to mix the contents, and the rack placed in the water-bath at 37° C. the water level being adjusted so that from one-half to two-thirds of the column of fluid in the tubes is immersed.

In a positive serum, definite flocculation can generally be recognised after 2 or 3 hours. This reading is noted, and a final reading taken after 18 hours. An incubation of 18 hours is long enough to give a completed reaction with most sera. A control tube with saline and extract only must be included.

Each tube with flocculations visible to the naked eye is noted as " + "; those requiring a lens to see the flocculations are "tr" (trace); and those which show no change are " --- " This is a rough method of notation, but sufficiently precise for ordinary clinical purposes. Thus, one serum may be ++++ +++, another +++tr ---, and another --- --- ---. Such a reading as tr tr --- --- must be returned as doubtful, and must be considered in connection with the clinical findings. For instance, in one of our patients there was a swelling on the side of the nose which resembled a gumma: the F. R. reading was tr --- ---; the swelling was incised and a portion of it removed and sections cut, when it proved to be an epithelioma; as gummata generally give a strongly positive F. R. the very doubtfully positive reaction in this case suggested that some other diagnosis should be sought for.
Comparing the F. R. results in this series with the opinions formed clinically on the cases, it can be stated very roughly that the F. R. results agreed with clinical expectations and history (whether "positive" or "negative") in about 80 per cent of the tests; in about 15 per cent the clinical diagnosis was quite uncertain; and in some 5 per cent of cases the reaction gave a result definitely contrary to clinical expectations.

Cerebro-spinal fluid is put up undiluted in tube 1, diluted 1-in-2 in tube 2, and so on. The F. R. is usually weaker than that given by the blood serum; but out of the 9 fluids tested in this series, a positive reaction was obtained in each of the 7 cases which had clinical manifestations of cerebro-spinal syphilis.

A number of sera were tested at intervals during treatment, and showed definite falling-off in the strength of the F. R. as is shown in the following selected cases:

**Case 1.**—I. Y. C. Husband was syphilitic. The only manifestation in patient was some vague "bone pains". F. R. tr tr — — — —. Wassermann (by Dr. Heanley of Hongkong) was returned as "positive". An injection of 3 gm. novarsenobillon was given, and a week later the F. R. was ++++. After 6 weeks treatment (3.3 gms. N.A.B.) F. R. was still ++++ — —. After a further course of 2.4 gms. N.A.B. combined with bismuth, the F. R. was +++ tr — —. The interest in this case lies in the fact that a provocative dose of N.A.B. changed a doubtful positive F. R. into a strongly positive one.

**Case 2.**—L. K. Gummatous ulceration of skin. F. R. ++++ after 6 weeks treatment (2.7 gms. N.A.B. with potassium iodide and mercury by the mouth), F. R. was + tr — —.

**Case 3.**—N. Y. S. Gumma of calf of leg. F. R. ++++ — —. (Cerebro-spinal fluid, — — — — — —). After 7 weeks of bismuth and mercury injections, with potassium iodide by the mouth, F. R. was +++ tr — —. After 11 weeks treatment F. R. was ++ tr tr — —. After 26 weeks treatment F. R. was + tr tr — —.

**Case 4.**—S. P. Phagedenatous ulceration of the penis with much destruction of tissue and a history of syphilis. F. R. ++++. After 4 weeks (3.15 gm. N.A.B.) penis nearly healed, F. R. ++++ tr — —. After 7 weeks (total 4.45 gm. N.A.B. with bismuth) F. R. ++ tr tr — —. After a further 1.8 gm. of Stabilarsan, F. R. was still ++ tr tr — —.

**Case 5.**—W. S. Syphilitic iritis. F. R. ++++ tr. After 2.25 N.A.B., F. R. ++++ — —. After 12 weeks treatment (5.85 gms. N.A.B. and Stabilarsan) F. R. + + + tr. Four months later (potassium iodide at intervals) F. R. was + + + —.
Tumours of the Eyelids.

Case 6.—L.S. Severe rupial eruption of trunk, limbs, and face with extensive crusted and ulcerated areas. F.R. was ++++ (with Wellcome S.G. antigen) and ++++ (with heart-cholesterol extract). Treated with Soamin (Burroughs Wellcome and Co.) by the mouth, 2 to 3 grains daily. Also 1 injection of .3 gm. Stabilarsan. After 5 weeks treatment F.R. was ++++ and ++++ respectively. After 62 days treatment (total 129 grains Soamin) F.R. was “weak + + tr—” and “— — — ” respectively. All the skin lesions were healed.

Six cases of leprosy were included in the series. All denied having had syphilis. Five gave a negative F.R. and one a weak positive; the latter was a very severe case of leprosy of the whole body, with the skin packed with leprosy bacilli; syphilis could not be definitely excluded.

References.


Tumours of the Eyelids

W. J. Evans, M.D., Sianfu, Shensi.

The patient attended hospital with solid elastic growths of the eyelids (see photograph), which had commenced several years before. Lately, the growths had become so much larger as to entirely obstruct the vision of the left eye, and almost obstruct the vision of the other. On the left side the tumour had the shape of the eyelids, which were rendered prominent. The upper and lower parts of the tumour were connected at the inner canthus where the growth was felt to go deeply. The overlying skin was normal and freely movable. The conjunctiva was apparently normal, but in some places it was papillary. The cornea (seen with difficulty) was somewhat cloudy on the surface. On the right side the tumour was less advanced, and the conjunctiva was more papillary.
Operation.—The operation was performed by B. C. Broomhall, F.R.C.S., assisted by the writer. The tumour of the left eyelids was dissected out. The conjunctiva covering it was so adherent that it could not be retained. The raw area which remained was skin-grafted at the same time by placing Thiersch grafts over moulds made of ambrine wax (one for the upper eyelid, and one for the lower). These moulds were inserted under the eyelids, the graft being made to cover the raw area and retaining a fornix. The eye was then bandaged and left in position for four days.

After result.—The grafts took, but the eyelids had not entirely healed when the patient, unwilling to remain longer in the hospital, was discharged and treated for a time as an out-patient.

Pathology.—The tumour was encapsuled. Microscopically, it was found to be a fibro-adenoma (?) of the Meibomian glands.
OUR NEW PRESIDENT

Samuel Cochran, M.D.,
Dean of Medical School, Shantung
Christian University, Tsinan.

Our Association consists of several hundred members and to become its President for a biennium is a laudable ambition for it is the highest honour the Association can bestow. All members are eligible for this office, and it may be assumed that all who have been out here for some time are worthy of the honour. It is therefore remarkable that very rarely is there an election contest, and it goes almost without saying that never is there any intrigue, "wire-pulling," "log-rolling," or any other of the dubious manoeuvres which sometimes mar elections to high office by political and even ecclesiastical assemblies. We always seem to be guided to the right man and he is elected without dissension. It is evidence of the good fellowship which prevails among us and of our discernment that particular men at particular times are well fitted to be leaders.

At the recent Hongkong Conference, Dr. Cochran, of Tsinanfu, was unanimously elected President for the biennium, 1925-1927. After taking his medical degree at Columbia University, New York, and acquiring prolonged and most valuable hospital experience at home, Dr. Cochran came to China in 1899. He was fortunate in being able to spend two whole years in language study in Nanking. His fine knowledge of the Chinese language has proved most serviceable and it has determined to some extent the nature of his work. Would that all medical missionaries in the past had been given the same time and facilities for acquiring the language! In the spring of 1902, Dr. Cochran, his brother, Mr. Lobenstine and Mr. D.B.S. Morris began hospital and mission work generally in Hwaiyuan, Anhwei. Dr. Cochran remained there seventeen years. During this period, in addition to his heavy medical and surgical work, he found time to write articles for the
China Medical Journal, and for medical research. His investigations into the origin and spread of kala-azar received so much attention abroad that he was awarded a grant from the Craggs Research Fund of the London School of Tropical Medicine to enable him to continue his researches. In 1919, on being transferred to the Medical School of the Shantung Christian University, Tsinanfu, he returned to the United States where he spent a year with Zinsser, the well-known bacteriologist, in order to qualify fully for his position as Professor of Bacteriology. In February, 1922, he was made Dean of the Medical Faculty, and in the absence of Dr. Balme has been acting temporarily as the President of the University.

Dr. Cochran is thus well qualified to deal with the many questions which come before the Executive Committee and the various committees and councils, because of his experience in at least three departments of medical missionary work—the large general hospital, the medical school, and medical research. Fortunately, medical education is now on a firm basis and not likely to give rise to much further discussion. Perhaps the grading of hospitals is the next most important task. It should be clearly understood that in the effort to grade our hospitals there is no inquisitorial or invidious intent. The grading will only be made in response to voluntary applications. If the grading is high it will be a satisfaction to all. If a hospital does not reach the desired standard, the independent judgment of the officers of the Association to that effect will support the request of those in charge of the hospital to the Home Board for whatever assistance is required to conform to the standard. During the next biennium it will also be necessary to work out carefully the details of our organisation caused by the changes in the Constitution. And other important matters will require attention. For in these days the work of a President of our Association has a wide range and makes considerable demands upon his time and strength. We are grateful that the service is always so ably and ungrudgingly given. We can assure Dr. Cochran that he will have the hearty support of all members of our Association during his term of office whether we are the C.M.M.A. or the C.M.A.
By the unanimous vote of the members of the China Medical Missionary Association present at the recent Hongkong Conference, it was decided that on and after July 1st, 1925, the Association shall be known as the "China Medical Association", and that all physicians in China and other parts of the Far East who are properly qualified and of good moral character shall be eligible for membership. At the same time the ideals and activities heretofore maintained by the China Medical Missionary Association are to be preserved and continued by its members, who will become organised as an integral part of the new Association under the name of the "Medical Missionary Division". There is a change of form but practically the work of the Association as a whole will be much the same as before.

Changes of this kind are usually disturbing, and no doubt some of the members of the old Association will feel not a little regret over this enlargement of the place of our tent and stretching forth of the curtains of our habitation. For the China Medical Missionary Association has been in existence nearly 40 years and its history is a record of which its members are justly proud. During this period it has brought missionary physicians together in brotherly fellowship, especially during the periods of difficulty and danger which were not infrequent in the past, and the lonely worker has been cheered and strengthened by the thought that while his individual work did not seem very great or influential, the work of the members of the Association in the aggregate was accomplishing great things. The missionary name of the old organisation will never be forgotten, and we shall always cherish the memories of the good and loyal comrades who belonged to it, not a few of whom have entered into their rest. But the change means no essential loss. In a new form under an abbreviated name the old organisation lives on in the new Association as vigorous as ever. It is simply that the times are changing and we must make corresponding changes. The unanimity of the Conference vote shows that enlargement of the basis of membership was inevitable. The number of physicians in China, both foreign and Chinese, who are well qualified in every sense of the word but who are not avowedly missionaries, is increasing year by year. We are constantly meeting with them professionally and socially and this naturally tends towards sympathy and fellowship.
Undoubtedly the Hongkong Conference itself had a considerable influence in the same direction. The hospitality shown to our delegates by the doctors and other friends in Hongkong was gratefully appreciated; also the cordial welcome extended to the Conference by the University of Hongkong; its conferring of academic honours upon Dr. H. S. Houghton, Dr. P. B. Cousland and Dr. E. W. Hume, members of our Association, and the accompanying graceful speech by the Vice-Chancellor who referred as follows to the value of our work as a missionary Association and the desire of others to associate themselves with us in benefiting the Chinese: "The University of Hongkong welcomes this accession to the ranks of its honorary graduates. We are glad of this opportunity of complimenting, through our new honorary graduates, that great body of devoted men and women, who by their work in China and elsewhere are doing what in them lies, to reduce the sum of human misery. We are glad to associate ourselves with those who are working in China and elsewhere in the same field as we are, and we hope that this Congregation will inaugurate an era of increased sympathy and enhanced mutual understanding." Dr. G. E. Aubrey, President of the British Medical Association section of the Conference, spoke in the same spirit. All this tended to strengthen the movement towards a broader Association.

There was the less inclination to resist the change that has been made as it will not, or should not, weaken in the least our medical missionary work. On the contrary, it should draw missionary physicians closer together. The Medical Missionary Division sharing with others the task of strengthening Western medicine in China will now be able to devote more time and strength to the consideration of missionary interests. The minor changes of organisation owing to change of title affect no missionary interests adversely and will be made gradually; there will be no unpleasant break with the past.

The China Medical Association as now formed should increase in strength very rapidly as it ought soon to include within its ranks all who are eligible for membership. It will then be able to exert, from the purely professional point of view, a deeper and wider influence than ever before on the development of Western medicine in China, and perhaps do much to weed out incompetent and unworthy practitioners of medicine, both foreign and Chinese.
Two years have now passed since the present Secretary was appointed but as he was unable to take up the position till arrangements had been made in regard to his former work, he has been actively engaged in secretarial duties for little more than a year. While during this period the secretary has been able to visit a number of the important centres of medical activity in China, he has been disappointed in not being able to get to more of the country hospitals owing partly to the work of re-organizing the office and partly to the difficulties in getting about that the political condition of China has entailed.

Attention may be drawn here to two or three phases of special activities. A good deal more time than was originally intended has been taken up in the preparation of an index of the *China Medical Journal* up to the end of 1923, comprising 37 volumes in all. This has long been a crying need if the very large amount of really valuable material that our Journal contains was to be made available to all who are interested in the study of the diseases of China. It is ready for the press at the time this report is written and will perhaps be on sale at the Hongkong Conference.

The medical situation in its relationship to educational work at Canton has given rise to a good deal of thought and the prospects for the consummation of this long cherished plan are now much brighter than previously. It has been almost tragic that such a settlement should have been delayed so long.

The position of technical education for selected hospital assistants has engaged much of the time of your Executive Committee. It is a special joy to note that here too the prospects of immediately beginning work are excellent. This, however, will be dealt with under another section of the Conference's activities.

The question of the health of schools has received very serious attention and a conference of our own physicians with representatives of the Council on Public Health and a group of education-
alists has succeeded in formulating principles for solving the problems that have arisen. This also will be dealt with later on in the Conference and a series of resolutions arrived at and approved by the Executive Committee will be submitted to you for your further confirmation. It is to be hoped that these will lead alike to more satisfactory health conditions in the schools and at the same time help to remove the somewhat anomalous position in which medical missionaries have often been placed in their position of quasi-medical officers to schools, often with a good deal of responsibility but little authority and usually without any trained assistance at all in the schools themselves to see that their medical instructions were carried out.

The question of the health of missionaries was passed on to the Executive Committee by the last Conference for further consideration and action. In view of this a circular was drawn up and sent to all Mission Boards at home and to the mission bodies on the field calling attention to the need for further action in the matter. A very gratifying response was made to this appeal and in view of this a committee was appointed to investigate the question of the possibility of an annual health examination for missionaries and to draw up a form for such examination which it was hoped would commend itself for general adoption. Copies of this form are now in your hands.

The question of changes in the Constitution and By-laws of the Association was also referred to the Executive Committee by the last Conference and has received prolonged and very careful attention. As this matter will come up separately for consideration at this Conference no further remarks about it are needed here.

A scheme for the registration of approved medical schools, has been drawn up, as instructed by the Biennial Conference, and up to the present five schools have applied for registration. Decision on these applications had not been made when this report was written, but will be dealt with in the Report of the Council on Medical Education.

This registration of approved medical schools leads naturally to the further question of the grading of mission hospitals. The need for this is two-fold. On the one hand it is hoped that in not a few cases it may be possible for the last or interne year of medical
education to be taken not necessarily in the hospital attached to the medical school but in other hospitals outside. If this interne year could be taken in a hospital in the district from which the student came it is felt that it might attach him more firmly to the place where his future sphere of work should be, whereas we all recognize that at present the risk is great that having graduated from a school in some large centre the chance of getting such a man back to country work is small. The second reason in favour of the grading of hospitals has been given me several times by men who find it hard to get their hospitals up to the standard that they desire and which they feel that they ought to attain. A system of grading they feel would strengthen their hands very much in appealing to the Home Boards for the necessary help. The Executive Committee after carefully considering this matter adopted the following resolution:

"That with a view to assisting mission hospitals to attain accepted standards of staff and equipment, we approve of the policy of facilities being afforded for the voluntary registration of such hospitals as desire this recognition and as conform to the standards to be adopted for each type of mission hospital."

Your Executive Committee has felt that it is doubtful whether the medical mission forces in China are always used to cover the field in as effective a manner as might be done. In some places, especially where the work is of long standing, numerous small hospitals have sprung up which, owing to lack of sufficient staff, nearly always fall short of full efficiency, while large areas of country are left untouched. In one such city there are no fewer than seven hospitals and proposals are on foot for building an eighth. This seems to show a bankruptcy of effective mission medical policy which is very painful. Quite a number of missions have now consented to give the C.M.M.A. a chance of expressing its views before a final decision on the building of a new hospital is arrived at. This is a most desirable plan. It binds the Home Boards to nothing and yet ensures that all the facts of the case are placed before them before final action is taken.

The Secretary hopes to take a short furlough after this Conference is over, as it is more than five years since he has seen his family and urgent reasons require his presence at home just now. He hopes at the same time to have an opportunity of meeting the
leaders of medical mission work in America, though his time there must necessarily be very short, and in England. He is hoping that he may be able in this way to rouse up still more interest in the cause at home and he is open to any suggestions as to how problems of the different phases of medical work here may be best brought to the notice of the Home Boards.

Finally, he would like to express again how greatly he esteems the honour that the Association has given him in asking him to occupy the position of Secretary and his hearty thanks for the great kindness that has been shown him wherever he has had the opportunity of visiting the hospitals and medical centres.

JAMES L. MAXWELL
Executive Secretary.

REPORT OF TREASURER

Financial statements are usually either dull or depressing. Dull if income covers expenditure and depressing if it fails to do so.

The Treasurer's statement on this occasion is both. It conforms to the first description in that there is no deficit in the accounts. On the other hand we can show a considerable balance to the credit side. It partakes of the latter description, however, in that we owe our solvent condition to the generous gift of the China Medical Board and this comes to an end in another two years' time. Whether the donors will be prepared to continue their contribution to our support I do not know, but in any case it is unsatisfactory that we should be so largely dependent on this one source of outside help.

Our income from internal sources is mainly membership dues, subscriptions, sales and advertisements in the Journal. These cover about half of our total expenditure, which of course has been greatly increased by the appointment of a full time paid Executive Secretary and by the cost of travelling involved in our increasingly energetic and effective Councils and Committees. For the other half we have had to depend on the gift mentioned above. While
all the items of our own proper income are on the increase they can never be expected to cover the Association’s expenditure. I think that in hardly any learned Society can direct income cover expenditure but in the home lands these societies have an appeal to generous donors among the public that we can hardly have.

We cannot increase membership dues further with justice to the constituency that we serve, nor are our other sources of income indefinitely expansible. It seems to me that the time is coming, indeed has already come, when we should seriously consider the raising of an endowment fund to meet the increasing needs of our work. Gifts might be asked, ear-marked for this purpose, from those amongst us who are endowed with more than the average of this world’s goods. Unfortunately such men are very few. I put it to you, however, whether some of you could not interest wealthy friends in the home lands to wisely dispose of some of their superfluity in this way. Certain it is that if our Association, which is rapidly growing in influence, and in the power for good, is to be placed on a really firm basis something of this kind must be done.

In presenting this financial statement, I want to stress one other point. Our membership dues compared to every other medical association are very small, and few, if any, can be seriously inconvenienced by them. This being so it is very unfair that when members go on furlough their dues are forgotten or definitely allowed to lapse. This is not done with other societies—why with our medical association? While those that do this are not many yet they are an appreciable number. Our reasonable claim for steady income is thereby adversely affected and great trouble is caused to the office when this occurs. Further the members themselves are apt to considerably resent the fact that when they return again from furlough they find themselves either off our books or with back payments to make up and the Treasurer in not a few cases is blamed therefor. I am sure a hint like this if properly understood is all that is needed.

Appended to this is the balance sheet for 1924.

James L. Maxwell,
Treasurer.
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<td>Total...$35,104.24</td>
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Audited and found correct.

(Sd.) WALTER MILWARD.
6th January, 1925.

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**RESERVE FUND, 1st January, 1925.**

1. Hongkong & Shanghai Bank Fixed deposit of $2,000 with interest $100...

2. Shanghai Municipal Council, 7% debentures 1922...

3. Shanghai Municipal Council, 8% Dollar Loan...

4. Hongkong & Shanghai Bank Fixed deposit...

Deposit receipts and debentures examined and found correct.

(Sd.) WALTER MILWARD, 6th January, 1925.

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**REPORT OF EDITOR OF “CHINA MEDICAL JOURNAL.”**

At the last Conference the bold venture was made of changing the Journal from a bi-monthly to a monthly publication. There were editorial misgivings as to whether sufficient “copy” would be sent in, or could be otherwise obtained, to last through the biennium. Fortunately, with the aid of a few borrowed articles,
either of special clinical value or containing information relating to the public health of the Chinese, the material was just sufficient to meet the need. As it is sometimes the subject of discussion, the following Table showing the proportion of strictly medical articles contributed respectively by the P.U.M.C. and by other members of the C.M.M.A. may be interesting.

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<tr>
<th>Authors</th>
<th>No. of Articles</th>
<th>Percentage of articles</th>
<th>No. of pages</th>
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<td>210</td>
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<td>Other members of C.M.M.A.</td>
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</table>

Of articles not strictly medical, P.U.M.C. authors wrote six, and other authors wrote fourteen. The Association is therefore much indebted to the P.U.M.C. staff as without its strong support the Journal could not have been issued monthly.

Of course the Journal may still be greatly improved and the occasional criticisms and comments on this point are always carefully considered. Some of the criticisms are here mentioned in order to elicit further opinions.

1. Not a few of the articles, while eminently scientific, are of little practical value to the missionary physicians on the "firing line." To some extent, perhaps, this may be conceded. In reply it is suggested that a general medical journal must receive articles relating to medicine in all its branches, and that there are few subjects, even the most recondite, in which a considerable number of members are not interested. It should also be remembered that in these days our knowledge of the causation and treatment of disease rests on a vast amount of research that was not always immediately productive of practical results. Further, in the department of "Current Medical Literature" in the Journal, the attempt is made to garner material clinically helpful. Lastly, the editor has to depend on the articles members choose to send him; he ties into a bouquet the flowers he receives.

2. The Journal is not half as interesting as it ought to be; it lacks brightness, sparkle, "pep." This also may be true. At one time good stories and jokes used to be inserted, but were not always received well; then the jokes were scattered among the
advertisements to beguile readers into scanning the advertisements; at last the jokes vanished and our seriousness is now seldom intentionally disturbed. Yet it almost goes without saying that a journal published in China ought to be distinctive in some way or other. The editor personally would like to see published short reports of unusual clinical cases, and the numerous quaint and interesting incidents and stories connected with the practice of medicine in China, which must be common in every station. He has appealed for these several times, but answers are few and far between. If the Journal is to be made brighter and more interesting, it can only be done by hearty co-operation.

3. The Journal does not give sufficient space to the consideration of the evangelistic side of our work; in its general make-up it hardly differs from any other respectable medical journal. This criticism makes the editor feel uncomfortable. In defence it can be said that sermons by members and papers on the religious side of our work are published when available, and in the reviews of hospital reports there is usually a sympathetic reference to the evangelistic work. It is hoped that the whole tone of the Journal shows unmistakably its missionary standing. It would be easy to publish our hospital reports in full with accounts of the successful evangelistic work accomplished, illustrated by the histories of conversions and of faithful Christian service, but this would require considerable enlargement of the Journal, and it may be doubted whether long religious reports, intended mainly for the laity at home, would be generally acceptable in our medical Journal. Then a letter is occasionally received for publication from a very earnest member urging medical missionaries in China to attain to a higher spiritual life and to avail themselves of all the spiritual power they may obtain for their work of healing. In the editor’s judgment exhortations of this kind between ourselves should be made by private communication, or personally at one of our biennial Conferences. At the same time, it is also his opinion that the Journal should be widely and more fully used as an agency to strengthen the spiritual fellowship of members, for perhaps the days are coming when the success of Christian missionary effort in China will depend more than ever before on the spiritual influence of our hospitals and dispensaries, and the way in which we stand together in purpose and friendship. The
manner and form in which the Journal should be used for this purpose might well be discussed at one of the Conference meetings.

In closing the editor can only say that in the future, as heretofore, with the advice and support of the Executive Committee it will be his constant desire to make the Journal whatever the Association wishes it to be.

EDWARD M. MERRINS,
Editor.

REPORT OF COUNCIL ON PUBLIC HEALTH, 1923-1925.

The Council on Public Health desires to submit the following report for the biennium.

Two stated meetings have been held during this period. The first of these was held in Shanghai at the time of the last Conference, when sub-committees were appointed to consider the various phases of Public Health in which the Association is interested.

At the meeting held in Peking on June 26, 1923, the reports of these committees were acted on as follows:—

(1). The committee on College and Middle School Health Activities, under the chairmanship of Dr. Paul Wakefield, suggested the organization of a School Health Association and the publication of a manual for the use of school doctors and educators, covering

(a) Personal health of students.
(b) General school sanitation.
(c) The teaching of health habits and physiology.

The Peking meeting of the Council approved this report, but referred it to the Council on Health for execution.

(2). The sub-committee on Health in Primary Schools, under the direction of Dr. Ida Belle Lewis, submitted an outline of minimum health requirements in mission primary schools. This was approved and also referred to the C. H. E. for execution.

(3). A sub-committee on Child Health, under the chairmanship of Dr. V. B. Appleton, drew up recommendations for work in mission hospitals for the prevention of
infant mortality and the promotion of child health to cover
(a) More adequate provision for obstetrical care.
(b) Provision for instruction to mothers in child care.
(c) Care of school children.
Your Council also referred this to the C. H. E. for execution.

(4) Dr. Wampler, Chairman of the sub-committee on Community Health, submitted the recommendations of this group to the effect that mission hospitals undertaking general Health work should select those problems affecting the whole country, and specifically mentioned smallpox and anti-fly campaigns as desirable activities. The report of this committee was approved and referred to the Council on Health Education for action.

Other routine and incidental matters were considered at the Peking meeting, but the above were the main points discussed. The fact that your Council recommended to the C. H. E. for execution the chief health activities that it felt the Association might profitably enter into led the members of the Council, with one exception, to recommend that, with existence of the C. H. E. as a specific health agency to which the Association was contributing, there was no justification for the continuance by the C.M.M.A. of another Health body. It was, therefore, suggested to the Executive Committee that the Council be discontinued.

REPORT ON PUBLICATION AND TRANSLATION BY THE PUBLICATION COMMITTEE, 1923-1924.

Since your Committee last presented its report it has steadily pursued its work along the lines sketched out at the Conference held in Shanghai, 1923, and good progress has been made in spite of the severe handicap of small staff and difficult language leading to slow output both as regards translation and printing. Some new books have been published, other books have been revised, and the quality of our output has decidedly improved. In several cases it has been necessary to reprint without revision owing to unexpectedly rapid sales. Our optimism in hoping to have frequent
revisions made has led us to issue rather small editions—an optimism that has not always been justified. In other cases only a partial revision has been possible.

All the work done has its terminology problems and has been hampered by the unsettled state of the same. But progress is being made by the Joint Terminology Conference held annually and as in previous years your Committee has sent its representatives. From time to time members of the Committee have prepared draft lists of terms for the Conference which involve much work as they contain English, German, Japanese and Chinese equivalents. No outsider would believe the labor involved in revising a book according to the latest foreign edition and in putting in the new terminology, for when the book is finished it is about the same in bulk and appearance as before!

Much time has been spent on the Lexicon which has been revised for the fifth time and which gives as far as possible the latest decisions of the Joint Terminology Conference.

The continuance of the Committee's work on its present scale has been rendered possible by the yearly grant-in-aid from the China Medical Board and we desire to express our deep appreciation and gratitude for this assistance. With this aid we have been able to carry on without raising the price of our books in spite of the increased cost of press work and pundits. The China Medical Board, however, in pursuance of its present policy will withdraw this grant after 1926. We regret the loss of their co-operation but appreciate being notified in advance so that we may make arrangements as to whatever may be necessary in the way of increase of prices, decrease of output and change of program for the future.

We are glad to report that valuable aid in translation has been received from new sources both Chinese and Foreign. In other cases we have had to decline proffered aid. Medical translation is proving to be a highly specialized branch of work and it has become evident that much experience is absolutely necessary for the turning out of good work. Thirteen foreign and five Chinese doctors have rendered more or less help, not to mention our small but invaluable Chinese literary staff. Thus, owing to limitation of resources and personnel, the Committee has had to decide to restrict its operations to the publication of certain text books on main subjects only.
Books on Nursing are now taken charge of by the Nurses’ Association of China and it is hoped that in the future Chinese presses will increasingly assume the burden of some standard medical books. In this connection the Commercial Press and the National Medical Association have been approached with a view to co-operation, but so far without definite results.

**Statistics.**

The net sales for 1923 amounted to $20,784.39
and for 1924 to $23,858.19

The number of books published during the two years amounted to copies 21,270, pages 8,637,500 and Hospital Forms 570,000.

On Behalf of the Committee,

PHILIP B. COUSLAND.

**List of Books Published or in Preparation**

**New Works:**
- Gray's Anatomy, completed work.
- May's Diseases of the Eye.
- Porter's Diseases of the Throat, Nose and Ear.
- Hospital Forms, Nos. 13, 19, 20.
- Heimberger on Syphilis.

**New Editions:**
- First Aid and Stretcher Drill; 3rd edition.
- Penrose's Gynecology; 3rd edition, reprint.
- Read's Materia Medica Tables; 5th edition, reprint.
- Hutchison and Rainy’s Clinical Methods (Physical Diagnosis section); 2nd edition.
- Medical Lexicon; 4th and 5th editions.
- Evans' Laboratory Experiments in Physiology; 2nd edition.
- Hare's Therapeutics; 3rd edition, reprint.
- Bruce’s Materia Medica; reprint.

**In the Press or in Preparation:**
- Osler’s Medicine; 3rd edition, Vol. II.
- Rose and Carless’ Surgery; 3rd edition, Vol. II.
- Halliburton’s Physiology; 8th edition.
- Stitt's Practical Bacteriology, Blood Work and Parasitology.
In presenting this report it would be well to refer to the precise instructions given to the Council on Medical Education by the Conference of 1923.

These read as follows:—

"The retiring Council recommends the following needs for the consideration of the new Council during the next biennium:

1. The revision of the requirements for an A-grade medical school which were approved in 1915 by the C.M.M.A.

2. The standardization of a curriculum of medical study to be approved by the C.M.M.A."

These instructions were dealt with at a meeting held on June 25th, 1923, and the recommendations of the Council were adopted by the Executive Committee on June 29th, 1923, and published in full in the *China Medical Journal* for July of the same year.

These recommendations covered the following matters:—

1. The requirements for admission to approved schools.

2. The mechanism of registration for schools approved by the Association.

3. The eligibility of graduates of these schools for admission to membership in the Association.

4. The minimum standards of the medical curriculum.

5. A syllabus of pre-medical studies.

Following on the adoption of these minutes by the Executive Committee, a form for registration of schools was prepared and copies were sent to medical schools in China. Nine applications for registration have been received. The Executive Committee referred these applications to the Council for scrutiny and report. After considering the recommendations of the Council, the
Executive Committee decided that one school should receive full recognition and that provisional registration should be granted to six others, on the understanding that efforts would be made within a reasonable time to bring these schools up to the full standard required by the Association.

Such provisional recognition had been approved by the Executive Committee in the following minute of May 2nd, 1924:—

"Resolved, That provisional registration may be granted by the Executive Committee to any medical school in China of good standing, which is unable to attain fully to all medical requirements specified by the Council on Medical Education on the understanding that the necessity of conforming to the original standard is fully recognized, and that every effort will be made to comply with all requirements within a reasonable time."

The applications from two schools were refused.

This Council suggests to the Conference the following recommendations for the in-coming Council:—

(1) The adoption of certain verbal changes in the forms of application for registration which experience has shown to be desirable.

(2) That the report of the Pre-medical Committee dealing with a revision of the pre-medical syllabus, which reached the Council too late for action, should receive early consideration.

(3) That the Council recommends to the Conference the consideration of whether Grade B schools are desirable and suggests that, should the Conference approve of such schools being formed, the matter be referred to the Council on Medical Education for a consideration of the standards required.

EDWARD H. HUME,  
Acting Chairman.

REPORT OF COUNCIL ON HOSPITAL ADMINISTRATION, 1923-1925.

As the designation of the Council suggests, we have been principally concerned during the past two years with such questions and problems as arise from matters of hospital administration.

The pages of the China Medical Journal, placed at our disposal by the good editor, Dr. Merrins, demonstrates clearly the liberal advantage we have taken of our privilege. Survey, hospital evangelism, follow-up-work, standardization of staff, outfit and apparatus, training of nurses, technicians, schemes of examination
for such, hospital plans and general principles of hospital construction for China are some of the items which have engaged our attention.

To-day in Conference, in the interests of efficiency, economy and cleanliness we seek to share with you serious consideration of the question of more frequent use being made of hospital hostels. While the matter is chiefly one which concerns those contemplating additions to old or planning new hospital plant, we suggest that the day has come when instead of erecting an elaborate general medical mission hospital plant a policy should be adopted of urging the creation of smaller, well equipped hospitals for acute cases only, and that hostels should accommodate convalescent and semi-convalescent cases.

The need for securing a more uniform scheme of salaries to be paid our Western trained Chinese doctor-colleagues is another matter which we feel should at this time claim the earnest attention of the Conference. Whether the solution of the present difficulty is that adequate uniform salaries should henceforth be paid in respect to employment in various types of hospitals and medical work, or on account of special training and qualifications, or that some kind of geographical arrangement of the matter can be brought about, is for the Conference finally to decide upon.

We are still hesitating to offer suggestions as to how busy physicians can best fit in time for the proper health care of mission staff and school inmates. Nor are we able to urge any particular method whereby the many other demands upon a medical worker's time could be carried out. These questions find their place, at least in part, in the official programme of this Conference. Naturally our final approach to the subject will depend in great measure on decisions reached in Conference assembled.

The problem of how best to follow-up hospital evangelistic efforts is constantly with us. While no general rule seems possible we still hope that at this and subsequent gatherings further light will break upon an old difficulty and lead to good results.

Other matters for investigation and report loom upon the horizon. The Association may rest assured that the most careful consideration will be given to these. Others which may be referred to the Council by the present Conference will also be most gladly accepted and cared for.

HENRY FOWLER,
Chairman of Council.
REPORT OF THE RESEARCH COMMITTEE, 1923-1925.

At the last biennial meeting of the C.M.M.A. a Research Committee was appointed to serve for the following biennium. This committee met before the close of the Conference and co-opted some additional members and assigned certain subjects of research to the members. The members of the Committee, as finally constituted, together with the subjects assigned to each were as follows:

W. W. Cadbury.—Chairman.
V. B. Appleton.—Vital Statistics, Nutrition and Growth of Childhood.
C. H. Barlow.—The Incidence, Distribution, etc. of the Various Intestinal Parasites of Man.
Davidson Black.—Physical Anthropometry and the Relation of Dentition and Dental Caries to Age.
E. W. H. Cruickshank.—Endocrine Disorders and Blood Pressure.
H. G. Earle.—Assessment of Physical Fitness with Special Reference to Physiological Anthropometry including Basal Metabolism, Vital Capacity, Pulse Rate, etc. in relation to Weight, Height, Chest and Stem Measurements.
J. R. Foster.—The Physical Examinations of Students and Physiological Data obtained thereby.
Dr. J. A. Maclean.—Pelvic Measurements of Women. Fetal Measurements. The Period of Onset of the Menses and of the Climacteric.
Prof. B. F. Reid.—Chinese Drugs of Therapeutic Interest to Western Physicians.
Dr. J. D. Van Buskirk.—Study of Diets and Foods, Urine Analyses, Deficiency Diseases.
Dr. C. W. Young.—Splenomegaly and Anemia.
Dr. G. Duncan Whyte.

At the outset we wish to express our sincere sense of loss as a committee in the death of Dr. G. Duncan Whyte in November, 1923. In him the Research Committee has lost its chief promoter and most ardent worker. Dr. Whyte may well be called the father of Research into Physiological Standards of the Chinese.
Reports have not yet been received from all of the Chairmen of the various sections although several have promised some contributions in their particular field.

A supplementary report will therefore be made at the time of the conference.

The only reports available now are the following:

From Dr. Appleton's section:


An Age-Height-Weight Study of Cantonese School Boys, by Noel Keys and W. W. Cadbury.

From Dr. Barlow's section:


From Dr. Black's section:

Report on the Chinese anthropometric records in the files of the Research Committee to September, 1924, by P. H. Stevenson.

A preliminary analysis of selected Chinese anthropometric data, by P. H. Stevenson.

Report on the records in the files of the Research Committee to September, 1924, by D. Black.

From Prof. Read's section:


Hospital Dialogue, with extensive Bibliography of Medicine in China.


The Influence of Chaulmoogra Oil upon Metabolism.

W. W. Cadbury.
SUPPLEMENTARY REPORT OF RESEARCH COMMITTEE.

In addition to the foregoing report we desire to add the following:—

1. Additional studies from Dr. Appleton.
2. A considerable number of important contributions in parasitology.
3. Two important papers from Dr. Cruickshank.
4. A report of studies by Dr. Earle.
5. Two studies by Dr. Foster.
6. Four papers from Dr. MacBean.
7. Some additional reports from Professor Read.
8. A contribution from Dr. Van Buskirk.

Thus of the ten sections outlined for research considerable work has been done under eight of the heads. This has generally been done either by members of the Research Council itself or under their direction or advice.

We wish to recommend that when our complete report is prepared that 1,000 copies be printed for distribution.

We also recommend that the Council be continued for another biennium and that the following topics be assigned for research:

2. Parasites.
3. Physical Anthropometry.
4. Dental Pathology.
5. Physiological Standards.
7. Study of Diets and Metabolism.
9. New drugs of interest to scientific medicine.

W. W. CADBURY,
Chairman.

PUBLICATION COMMITTEE.

It is quite essential that all users of the Medical Lexicon obtain a copy of the Fifth Edition recently issued, as previous editions are now out of date.

During Dr. Cousland's absence in Canada this spring and summer, Dr. P. L. McAll, Shantung Christian University, Tsinan, Shantung, will act as Editorial Secretary and Treasurer of the Publication Committee.
THE RESULTS OF TRYPARSAMIDE THERAPY IN SYPHILIS


The authors state that in primary and secondary syphilis, or in tertiary syphilis without nervous system involvement, the therapeutic effect of tryparsamide is so slight as to preclude its further general use in these types of infection. In neurosyphilis, on the contrary, tryparsamide therapy produces favorable clinical and serologic results, which it is believed cannot be equaled by other forms of treatment. This drug is of particular value in early general paralysis, in meningo-vascular neurosyphilis, and in the majority of cases of tabes. Advanced general paralysis, is benefited little, if at all. In early neurosyphilis, the comparatively feeble spirochetidal value of tryparsamide precludes its use unless in combination with an arsphenamin. The best method of use has not yet been developed. Visual disturbances following tryparsamide administration have occurred in 17.8 per cent of a series of 241 cases; but in only 2.8 per cent has noteworthy permanent visual injury resulted. This untoward effect may be largely obviated by appropriate ophthalmologic control of treatment.

PUERPERAL MASTITIS


In 2,000 consecutive patients delivered at the New York Women's Hospital there occurred 57 cases of mastitis or 2.8 per cent. Observations at this institution support the contention of De Lee that infections of the infant are an important etiological factor. Infections usually occurred in the second week post-partum. The number of breast abscesses was 0.4 per cent.

Among prophylactic measures, the authors believe that cleanliness is of first importance and that, in the case of depressed nipples, massage is advantageous. After delivery, they advocate nursing periods of from three to five minutes at from four to six-hour intervals until the milk appears. For damaged nipples they use tincture of benzoin, or bismuth and castor oil, or the nipple shield. In the interval the nipples are protected by a gauze pad held in place by adhesive strips. They think this dressing has decreased the number of cases of mastitis under their care. Accepting the use of the binder, catharsis, the limitation of fluids and the ice bag, they believe the breasts are best emptied by the infant until suppuration sets in. Massage and pumping may supplement nursing but must be carefully employed.
In case of suppuration, heat is applied, nursing and breast manipulation are stopped, free incision with counter drainage is instituted and the cavity irrigated with Dakin’s solution.

SPRUE IN COSTA RICA

The author asserts that cases of “sprue”, even those of long duration, may be cured rapidly with a diet that excludes cane sugar and flour of all kinds, leaving the patient free to take milk, fruits, meats and green vegetables. There is nothing disagreeable about this diet and the patients are able to live on it perfectly well, especially in the countries where the disease is prevalent and in which, as a rule, a great variety of fruits and vegetables are to be obtained all the year round.

TREATMENT OF DYSMENORRHEA

The author has come to the conclusion that no matter what may be the cause of essential dysmenorrhea, the site of the trouble is at the internal os, and that by severing this powerful, circular, fibromuscular ring and producing a dilatation, which is maintained long enough that the muscle does not contract again, nearly all cases of dysmenorrhea can be cured, or if not entirely cured, a sufficient measure of relief can be obtained to warrant the procedure. He reports the successful result of this operation in 230 cases.

APPENDICITIS AND INTESTINAL PARASITES

Massive infestations with Ascaris lumbricoides have been encountered in Johannesburg from time to time, particularly in cases in which they have given rise to intestinal obstruction. Four of these cases have shown such large numbers of these roundworms that they were considered worthy of record.

In the first case, 851 worms were recovered at operation, and 48 more subsequently; the proportion of male to female worms was approximately 1 to 6. The site of impaction was the jejunum, and the patient was an eleven year old Hottentot boy. The patient recovered.

The remaining three cases were European girls, all from the same orphanage. Each had been diagnosed as acute appendicitis, and in each an helminthic obstruction of the jejunum was found at operation to be the cause of the trouble. In one case, “several hundreds” of worms were removed, but were not sent to the Institute. Of the other two cases, the first was an eight year old.
girl, from whose jejunum 737 worms were removed at operation, and 253 were recovered subsequently from the stools. The proportion of male to female worms was 3 to 7. The child recovered. The second case was that of a ten year old girl in whom the intestinal obstruction had culminated in gangrene of the bowel and perforation. A portion of the resected gangrenous jejunum was found to contain 268 ascarides, but those removed at operation—“hundreds”—were thrown away and did not reach the Institute. The proportion of male to female worms in the resected gut was 5 to 12. This child died.

Amongst surgical specimens sent in for histological report, were six appendices and one Fallopian tube with deposits of ova in their walls, their presence being, so far as one could judge, the sole condition leading to the removal of these organs.

**PRESENT STATUS OF PARASITIC NEMATODE FAMILY ASCARIDAE.**

STILES AND BROWN, U. S. Public Health Reports, August 8, 1924.

The nematode genus, *Ascaris* Linn, 1758, represented by the common lumbricoid worm of man, contains so many and so varied species that they have gradually been assigned into three superfamilies, several families, and numerous genera. Gradually the genus *Ascaris* came to be restricted to parasitic nematodes with three lips. During the past few years the three-lipped ascarids have been considered to represent a special family, which has been divided into various sub-families and a number of genera. Since this group of parasites is of importance not only from a standpoint of human as well as of comparative medicine, Stiles and Brown in this report have brought the various genera together in one place for ready reference. At least five of these genera, (*Ascaris, Toxocara=Belascaris, Toxascaris, Lagochilascaris, and Fusaria sensu lato*) are reported as parasitic in man.


4. *Lagochilascaris* Leiper, 1909.—Alae extend entire length of body. Thick lips separated by furrow from body; small interlabia without "pulp"; the cutting angle of each lip bifurcated. Eggs thick-shelled with mosaic pattern. Mt. minor.

5. *Fusaria* Zed., 1800a, sensu lato.—Ascarids of uncertain generic position. Theoretically this is an objective synonym of *Ascaris*. Practically it is a collective genus in the sense of *Ascaris* sensu lato. In order that *Ascaris* s. str., type *lumbricoides*, may be restricted to a natural generic group, and no longer lose its taxonomic significance by being used as a collective group, it is suggested that *Fusaria* sensu lato be used as the collective group in which to place ascarids which cannot be located generically in the restricted genera.

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**PULMONARY PLAGUE AND INFLUENZA.**

Nicolle and Gobert, Arch. de l'Instl Pasteur de Tunis, June, 1924.

The authors say there is no doubt that two distinct forms of plague exist without any evident relation to each other. (1) Bubonic plague which passes generally from the rat to man, but rarely from man to man, and which is not accompanied by pneumonia, except on rare occasions when it is at a late period. This is the affection which, since 1896, occurs in all the ports of the Eastern countries; there are a few isolated cases which disappear without epidemics arising, unless the rats are persistently infected. (2) Pulmonary plague, in which the lungs are instantly affected, which is nearly always mortal, without buboes, has no connection with rat plague, and which is eminently contagious from man to man. This plague has prevailed in Manchuria with great intensity; it also prevails at times in North Africa; in Tunisia it is of recent existence. Pulmonary plague is not of maritime importation. F. Norman White is of the opinion that it is due to the association of the plague bacillus with an unknown microbe non-pathogenic for rodents; the authors agree with this, and regard the virus of influenza as the agent of association.

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**BLOOD PHOSPHORUS IN CANCER.**

Buckman, Minot, Daland and Weld, Arch. of Intern. Med., August, 1924.

Buckman et al., failed to find the total phosphorus content and the inorganic phosphorus content of the whole blood plasma and cells significantly altered in cancer. The total phosphorus content of the whole blood was roughly parallel to the hemoglobin content in all persons in whom the values for the total phosphorus in the plasma and corpuscles were within normal limits. The parallelism is due to the preponderance of phosphorus in the red corpuscles. Immature red cells probably contain more phosphorus than adult ones. The phosphorus quotient of Groebly and of Vorschütz is said to be of no value in the diagnosis of cancer.
INCONTINENCE OF URINE IN CHILDREN.
Comby, Bull. Méd., September 6, 1924.

Comby regards essential nocturnal incontinence of urine in children as a general affection, a morbid temperament, the enuresis a special functional feature of this temperament, a localised manifestation of an inherited neuropathic or arthritic predisposition. Treatment therefore should be that for neuropathies in general, with emphasis on outdoor life and avoidance of stimulants and excitement. Hydrotherapy is a useful adjuvant, and he orders in addition 5 drops of a solution of 0.01 gm. of atropin sulphate in 10 gm. of boiled water, to be taken at bedtime, increasing by one drop each night until 10, 15, or 20 drops are being taken according to the tolerance. If the incontinence is both diurnal and nocturnal, he gives one drop three times a day in addition. If the atropin fails, Joulie's solution of phosphoric acid might be tried (17 gm. of officinal phosphoric acid; 34 gm. of sodium phosphate, and 250 gm. of distilled water, the dose being a teaspoonful or dessertspoonful three times a day). Jeanbrau has recently reported favorable results with this treatment.

RICKETS AS INFLUENCED BY THE DIET OF THE MOTHER DURING PREGNANCY AND LACTATION.

In considering the question of influence of the diet of the mother on the subsequent development of rickets in her offspring, it is necessary to distinguish three distinct periods in the life of the mother: first, that which precedes the onset of pregnancy; second, the period of pregnancy itself, and third, the postnatal period of lactation, during which the young may be fortified or retarded by the nutrition of the mother.

For the last two years the authors have conducted a series of animal experiments arranged so that they might elucidate the rôle of material nutrition during these periods in its relation to the occurrence of rickets in the young.

Judging from the experiments, it would seem that rickets cannot be prevented by improving the diet of the mother, (a) previous to pregnancy, (b) during pregnancy, and (c) throughout lactation, although it can be mitigated to a certain degree. Supplementing the diet of the mother for two generations also failed to render the young refractory. Infants were not protected by giving the mother cod-liver oil during the last two months of pregnancy. On the other hand, the fact that premature infants are markedly susceptible to rickets shows that prenatal nutrition does play a rôle. A consideration of the experimental evidence, of clinical tests, of the susceptibility of bottle-fed compared to breast-fed babies, and the striking seasonal incidence leads to the conclusion that rickets is
mainly of postnatal origin. Although its incidence and severity may be influenced by improving the nutrition of the mother, our main efforts should be directed toward improving the environment and nutrition of the infant. Until these postnatal factors are corrected, we cannot hope to prevent rickets.

MALARIA TREATMENT OF GENERAL PARALYSIS IN JAVA.


The authors inoculated twelve men with general paralysis with the parasites of malignant (4) or benign (8) tertian malaria. One treated with the malignant tertian (the use of the malignant type was inadvertent) was seriously ill for a month but, when the malaria was cured under quinin, the general paralysis was found improved to such a degree that earning capacity was restored. All but four of the twelve were refractory to the inoculated disease, having lived in the tropics from birth. One in an early stage, treated with benign tertian was much improved. The natives of the tropics have a predisposition to ulceration of the skin, and the manifestations of syphilis display a predilection for the skin. As the skin seems to play an important part in the formation of antibodies, this may explain the refractory behaviour to inoculation of malaria. The course of the syphilis also may be influenced by the recurring febrile diseases common in the tropics.

TREATMENT OF SEVERE GASTRIC AND DUODENAL HEMORRHAGE


The author states that it cannot be emphasised too strongly that patients rarely die of a first hemorrhage. It is the repetition of the hemorrhage which is of such serious import. Operation, therefore, should be deferred. As regards the medical treatment of acute hematemesis the important points are:

1. Patient should be kept absolutely still in bed, no movement even of the hands or legs being permitted.
2. Tripier's hot water injections by the rectum; saline injections at a temperature of from 120° F. to 130° F. should be used.
3. An ice pack should be applied to the abdomen.
4. Nothing should be given by the mouth for at least four days, and then feeding should be commenced with teaspoonfuls of iced milk and egg. This amount should be gradually increased and the patient be kept on milk diet for two months, when some diluted beef essence may be added to the dietary. It is not safe to
commence Lenhartz's diet directly after a hemorrhage; sometimes recurrence has been apparently brought on by too early feeding. Saline injections, with half an ounce of glucose to the pint, are commenced soon after the hemorrhage has ceased. So-called rectal feeding is starvation except so far as fluids and salts are concerned, so that injections of beef-tea, milk and the like are valueless.

5. Small doses of morphine are valuable.

6. The subcutaneous injection of 10 per cent solution of sterile gelatine in 40 c.c. doses may be repeated daily.

7. If vomiting or hematemesis continue the stomach should be washed out very gently with warm water, and after the lavage a dose of crystalline bismuth subnitrate should be given through the tube.

8. It used to be taught that in hemorrhage from the so-called acute ulcer, subsequent operation is unnecessary unless the bleeding recur. If we could be certain that the ulcer which bleeds is an acute ulcer this teaching would be sound, but as we cannot make such a pathological distinction the only safe rule is that an acute hemorrhage requires surgical treatment to prevent recurrence. As to the time of the operation, the interval between the hemorrhage and the operation should be at least three months, and if the patient is still anemic transfusion of the blood before operation is a valuable adjuvant.

9. As regards the treatment of the chronic or recurrent hemorrhages, operation should, as a rule, be deferred for two or three months after the last hemorrhage, according to the condition of the patient, medical treatment being carried out in the meantime—rest in bed, Lenhartz's diet, saline and glucose injections by the rectum, and gastric lavage. It must be borne in mind that in large excavating ulcers septic processes in the ulcer may play a considerable part in causing the hemorrhage, so that it is important not only to rest the stomach but to keep it clean. Usually these measures can be relied on to prevent recurrence, but even if the hemorrhage be repeated the author would persevere with medical treatment. If in spite of absolute rest there is further recurrence, the question of operation may be considered, but—and this is the important point—absolute rest must have been tried and failed. Although personally the author has never had to depart from his usual practice of delaying operation for two or three months, if in spite of a thorough trial of medical treatment there were many small losses of blood or more than one hemorrhage of such severity as to cause obvious anemia, he would not hesitate to operate before the onset of another attack. His experience is that efficient medical treatment does not fail. If, however, operation be decided upon it should be preceded by blood transfusion.
FURUNCLES OF THE FACE


Dittrich stresses the importance of fever as a sign of a malignant tendency with furuncle of the face. The lesion was on the upper lip in nearly 50 per cent of his 88 cases, and 10 per cent in this lip group died. In the early, mild forms of furuncle of the lip, the main thing is to leave the lesion unmolested: at most, an alcohol cataplasm or boricated ointment or pure ichthyol, feeding fluids through a tube and forbidding the use of the voice; no compression, no early incision. In the graver forms, 5.9 per cent died of the 61 per cent of the total 88 cases treated by incision; none of the non-incised patients died. In the 40 upper lip furuncles, 13.6 per cent died of the 22 patients in this group treated by incision, and 5.5 per cent of the 18 not incised. A toothpick dipped in phenol and introduced, in the direction of the hairs, into the white center of the furuncle gave good results, as also electro-cauterization with fine needles.

POSTOPERATIVE GAS PAINS.


As the result of his own clinical observation and experiments on the cause and prevention of postoperative gas pains, the author has reached the following conclusions:

1. Regular diet may be given to within twelve hours of the operation.
2. Purgation is not only unnecessary but harmful.
3. Avoidable trauma to the abdominal contents during operation is too often the cause of postoperative gas pains.
4. The ether effect may be alleviated by the postoperative use of morphia and hyoscin hydrobromide and the post-anesthetic gastric lavage.
5. Peristaltic action should be stimulated immediately following operation; intermittent injections of saline or water being the method of choice. The use of drugs should be discouraged.
6. Postoperative nutrient rectal feeding predisposes to gas pains.
7. The disadvantages of the Murphy drip proctoclysis outstrip the advantages.
8. Morphin should not be denied whenever the patient’s discomfort demands it.
9. Pain, restlessness, sleeplessness and fear play an important part in the stasis of the gastrointestinal tract.

In connection with the study of medicine physical chemistry considers such subjects as the gas laws; the aqueous milieu of the life processes; diffusion and osmotic pressure; the behaviour of electrolytes in solution; the law of mass action and chemical equilibrium; the law of mass action applied to solutions of electrolytes; the determination of the concentration of hydroxide; the velocity of reaction and catalysis; enzyme action; the colloidal state; adsorption; the permeability of the cell membrane. The great advances which have been made in recent years through the application of the methods and teachings of physical chemistry to the study of physiology, bacteriology, and other branches of biological science underlying medical practice, have made it imperative for the student of medicine to acquire a good knowledge of this branch of chemistry. In the present volume the author covers the ground admirably. Those subjects which have found important applications in the medical sciences are discussed in a fairly elementary manner, but also in sufficient detail to enable the student to read with profit larger and more specialised works. The style is very clear and as far as possible it is made interesting even to those whose knowledge of the subject is rather limited. Thus in the section on surface tension, after remarking that it is owing to the existence of a special surface layer that it is possible to float a steel needle or a boat of wire gauze on the surface of water, he quotes in a note the verse from Lear:

“They went to sea in a sieve, they did,
In a sieve they went to sea,
In spite of all their friends could say,
On a Winter’s morn, on a stormy day,
In a sieve they went to sea.”

In medical education the work meets a great need. And practising physicians who have forgotten much of their chemistry and feel they ought to know more than they do about pH and other subjects of physical chemistry and biochemistry, so that they may better understand some of the recent advances in medicine, will find the volume very helpful.


The authors are all connected with the largest maternity hospital in Great Britain and also with other maternity institutions. Consequently they have had a very large experience of obstetrical work and its difficulties, some of which in Glasgow are due to the prevalence of rickets. Further, all the authors are engaged in the study and teaching of obstetrics. They are therefore well qualified to issue a work on the subject embodying their own views and practice, for the use of both practitioners and medical students. The bacteriology of morbid obstetrical conditions receives very careful consideration, also the properties of the various internal secretions so far as these have a bearing on maternal functions. The book is clearly written and the illustrations are numerous and helpful. It can be cordially commended as a sound exposition of obstetrical practice.

As this work has now reached its fourth edition its merits are evidently very much appreciated by a large number of students and practitioners. It incorporates the principles of physical diagnosis together with the physical findings in the commoner diseases of the respiratory and circulatory systems. In this connection anatomy and pathology have been considered from the clinical standpoint, emphasis being laid upon these subjects as they influence the physical manifestations of disease of the thorax and abdomen. In addition to the physical examination of the thoracic and abdominal viscera, the work also includes the principal diagnostic signs referable to the head, neck, and limbs, together with a minimum examination of the nervous system.

In the revision of this volume for the fourth edition minor alterations have been made in the sections covering myocarditis, aortitis and the graphic registration of the heart beat. The discussion of polygraphy is sufficiently clear to enable the practitioner of medicine to add the clinical polygraph to his diagnostic armamentarium with advantage. Students and practitioners will find that the volume well repays careful study.

Immunity in Natural Infectious Diseases.—By F. d’Herelle, Director of the Laboratory of the International Sanitary Council at Alexandria, Egypt. Authorised English edition by G. H. Smith, Ph.D., Associate Professor of Bacteriology and Immunology, Yale University School of Medicine. Price G. $5.00; Overseas G. $5.50. Publishers: Williams and Wilkins Co., Baltimore, 1924.

As the result of various culture experiments with pathogenic germs, the author was led to believe that in the human body there are strains of bacteriophagous ultramicrobes which are virulent to invading pathogenic organisms, preying upon them as parasites, and according as they win or lose in the struggle the patient recovers or succumbs to the disease. This view was expounded by the author in a previous book recently published. The discovery is of practical value. For instance, in the treatment of certain infective diseases, such as dysentery, the object from this point of view should be not so much to render the contents of the intestines sterile, as to preserve and reinforce the defensive bacteriophagous microbes. Consequently, instead of intestinal disinfectants, cultures of the bacteriophage should be prescribed.

In the present volume the author develops his conception of the functions of the bacteriophage. Acting like other organisms, the bacteriophage may be transmitted from one animal to another and in this way may help to confer immunity to disease. In the author’s own words: “A sick animal propagates disease. An animal in a state of active resistance propagates immunity. These few words sum up the whole history of epidemics.” Necessarily, this leads to discussion of immunity itself. In what does it consist? As already indicated, the author holds that in the production of immunity the bacteriophage plays a most important, if not the principal, part. His whole conception of the mechanism of immunity elaborated in the present volume involves a radical modification of some of the ideas which have hitherto dominated the thought of bacteriologists and immunologists, particularly with regard to agglutination, precipitation, complement fixation, bactericidal action, bacteriolysis, opsonic action, and anaphylactic sensitization.

The whole work is most interesting and suggestive. Probably there are bacteriologists not yet ready to accept the author’s statements as.
proved beyond all doubt, but all that he writes concerning the bacteriophage, infection, and immunity is well worth very careful consideration. The translator, who writes a cautious preface, has done his work extremely well.

Concealed Tuberculosis or "The Tired Sickness."—A Clinical Study upon the Exhaustion Type of Hidden Tuberculous Infections. By George Douglas Head, B. S., M. D., Price G. $2.00 net. Publishers: P. Blakiston's Son & Co., 1012 Walnut Street, Philadelphia, U.S.A.

Physicians are often consulted by patients who do not complain of any particular disease, or even of definite symptoms beyond the general feeling of constant physical and nervous exhaustion. Usually a diagnosis is made of neurasthenia, asthma, nervous exhaustion, effort-syndrome, or psychasthenia. The author is convinced that many of these cases harbour either pulmonary, pleural, glandular, peritoneal, bone or joint tuberculosis in so insidious a form that it escapes detection by the usual clinical methods of diagnosis. Specific tuberculin tests are necessary to establish the nature of the infection. To physicians who fear that by using the tuberculin test they may cause further dissemination of the disease in the body the author states that, from a large experience extending over many years with abundant opportunity to watch patients so tested from year to year, he has never observed any evidence to prove that tuberculosis was disseminated by the use of tuberculin subcutaneously. On the other hand, he has the firm conviction that this diagnostic test with a good reaction has a healing effect upon the lesions of this insidious and low-grade infection. In this volume he describes fully this clinical form of tuberculosis to which he gives the name of the "Tired Sickness." He gives records of many illustrative cases. The work is written in an easy pleasant style. The author has done well to call attention to these cases, as an early diagnosis with prompt treatment may be the means of their recovery.

JOURNALS AND PAMPHLETS


This is a valuable monograph, of special interest to parasitologists, on the structure and development of the calciferous glands of lumbricidae and diplocardia. The illustrations are very good.

The Caduceus.—Journ. of the Hongkong University Medical Society Vol. 3. No. 3. October, 1924. Hongkong.

In this number Dr. K.H. Digby has two good articles. The first, "A few observations of the Properties of Ivory as a Material for use in Bone Surgery," and the second, "A Suggestion for the Treatment of Early Phthisis by Upper Intercostal Nerve Block." Professor Shellshear writes suggestively on the anthropology of the Chinese. There are other interesting articles, and the review of current medical literature is really a review, not mere borrowing from other medical journals.


In this number Dr. W. W. Cadbury of Canton has a well written article on the "Height, Weight and Chest Measurements of Mongolian Peoples With Special Reference to southern Chinese." Wade, Lara and Nicolas consider the complaints of patients under antileprosy treatment: first, the nature and frequency of the complaints in cases receiving chaulmoogra ester preparations; and secondly, by Wade, a comparison is made of the
complaints made by patients receiving plain chaulmoogra ethyl esters and those made by patients receiving certain iodized preparations.


**Quarterly Journal for Chinese Nurses.** Volume 6, January, 1925 — Among the interesting articles in this number is one on "Approximate Food Values" accompanied by the various diet lists used in the Hunan-Yale Hospital in Changsha. Also a report of the first conference of the Nurses Association of China. Every hospital should subscribe for this Journal for the benefit of its nurses.

**Health Bulletin Central Epidemic Prevention Bureau Tientsin, Peking, Vol. 1 No. 1 January, 1925.**—The object of this new publication is to bring to the notice of the medical profession in China all recent advances in our knowledge concerning the etiology, diagnosis, prophylaxis, and treatment of communicable diseases and to serve as a medium for the exchange of medical news in general and public health news in particular. It will be printed in two editions—Chinese and English, and will be sent gratis to physicians in China.

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**Correspondence.**

Correspondents are requested to write on one side of the paper only, and always to send their real names and addresses. The Journal does not hold itself responsible for the opinions or assertions of correspondents.

To The Editor C.M.J.

Dear Sir—The editorial in the January number of the China Medical Journal upon "Hydrophobia" together with the letter by the North China Daily News correspondent at Liuchowfu upon the "Chinese Treatment of Hydrophobia", leads me to draw the attention of the medical profession in China to the Standard Book of "Instructions to Coroners" in China, with its methods of diagnosis of death from this disease and of methods of treating hydrophobia I quote directly from Giles' translation.

"Death From Bite By Mad Dog."

"Where a man has been bitten by a mad dog and died in consequence, there will be a mark of the wound, and the belly will have swollen up hard. The appearance of the victim in the first stages will be that of a man with a violent cold, terribly afraid of wind, barking every now and then like a dog, wanting to bite people, and tear their clothes, the belly pendulous, and micturition difficult."

"Treatment of Mad Dog Bites."

"Before the poison has had time to disseminate take seven cantharides (Mylabris eichorni), pull off their heads, feet and wings, and boil them with two hen's eggs; take out the insects and eat the eggs without salt, etc.; clots of blood will then appear in the urine. If the penis swells up and is painful, it is because the clots of blood have not entirely passed away. Another dose will clear them out and the pain will cease."

"Another method. Fry some of these insects with rice, wait till the rice is shrivelled and yellow, take out the insects, pound the rice to powder, boil an egg, and eat as in the former prescription. When the blood clots have all passed away, recovery will ensue."
Correspondence.

“Another method. On being bitten, go at once to a pond or river and wash the wound thoroughly, squeezing out the blood and drinking plenty of the juice of raw ginger. The poison may be thus counteracted. Close up the wound tightly with bandages so that the air may not get to it.

The Seven Scruple Powder.

Weight

Good red oxide...1 mace, 2 cand.
Genuine musk...1 " 2 li.
Borneo camphor 1 " 2 li.
Olibanum ... 1 mace, 5 "
Safflower ...1 " 3 
Myrrh ... 1 " 5 
Dragon’s blood...1 ounce
Catechu ... 2 mace, 4 cand.

“Procure the above drugs, choosing such as are bought from places most noted for producing them, and at noon on the 5th day of the 5th moon, mix them all up into a fine powder, stow them away in an earthenware jar, and seal the top with wax; the longer kept the better. No more than seven scruples should be taken as a dose, and must not be taken during pregnancy.

“Another prescription, much used in Szechuan is as follows:—
Old cash ... 1½ oz. boiled in vinegar.
Peroxide of iron...as the preceding.
Dragon’s blood (from the tail) as the preceding.
Olibanum ... "
Myrrh ... "
Catechu ... "

“The above ingredients, which should be all finely powdered, may be used for healing wounds from blows or falling. The prescription has often been tested with the most astonishing results. The powder should be mixed with wine and enough taken to cause intoxication. When the wounds are healed it will be necessary to coitus centum dies abstinerex.”

This, with much other most interesting information, is to be found in the original Chinese “Hsi Yuan Lu” (洗冤錄), or from the English translation by H. A. Giles, Proceedings of the Royal Society of Medicine 1924, Vol. XVII, p. 59.

Yours sincerely,

BERNARD E. READ.

MEETING OF THE SOUTH CHINA BRANCH OF THE C.M.M.A.

The regular annual meeting of the South China Branch of the C.M.M.A., was held at the Canton Hospital, January 8th, 1925. There were seventeen members present. Following the reports of the standing committees the election of officers for the coming year was carried out. The following were elected:

President ... ... ... ... ... ... Dr. P. J. Todd.
Vice-President ... ... ... ... ... Dr. W. W. Cadbury.
Secretary-Treasurer ... ... ... ... Dr. A. C. Siddall.
Chairman of Program Committee, Dr. F. Oldt.

The proposal for a change in the Constitution of the C.M.M.A. was discussed at some length. The Branch voted its approval of broadening the scope of membership of the Association as suggested in the proposed amended Constitution.

The chief item of the program was an instructive paper by Dr. W. W. Cadbury on “The Health of Missionaries in South China.”

A. C. SIDDALL, Secretary.
NEWS AND COMMENT.

BIRTHS

Kessel.—On January 23rd, 1925, at Peking, China, to Dr. and Mrs. J. F. Kessel, a son (John Delbert).

Van Gorder.—On January 30th, 1925, at Peking, China, to Dr. and Mrs. Van Gorder, a daughter (Elizabeth Rosalind).

DEATH

Dr. James Boyd Neal, who came to China in 1883 in connection with the American Presbyterian Church, was President of the China Medical Missionary Association, 1903-1904, and for a considerable period Dean of the School of Medicine, Shantung Christian University, died recently in the United States.—(By cable message).

W. B. Russell.—We regret to announce the death which took place on February 24, 1925, at Soochow Hospital, of Dr. W. B. Russell, M.D., F.A.C.S., surgeon in charge of Changchow General Hospital of the Southern Methodist Mission, South.

Dr. Russell returned to Changchow on February 1st, 1925 after visiting his wife and children at Kuling.

For 15 days and nights he laboured in his hospital, which is still full of soldiers wounded in the recent war. When he was first taken ill he and the Chinese physicians thought he had malaria. When he grew rapidly worse a physician was called from Soochow Hospital, who immediately transferred him to Soochow, where the disease was diagnosed as typhus fever, probably contracted from a soldier in Changchow Hospital. After a losing fight the end came on Tuesday night. Mrs. Russell had been summoned by telegram and arrived on the previous Sunday afternoon. On Monday afternoon he was conscious for the first time for days, and recognized his wife.

Dr. Russell was born at Russellville, Ky., in 1883, graduated in medicine at the University of Tennessee in 1908, and the following year came to China with his wife. For some months he was connected with the hospital of the University of Nanking and later transferred to the Methodist Hospital at Wuhu. On account of his wife's illness he returned to America after about a year's stay in China, and engaged in practice at Jackson, Tennessee. In 1914 Dr. and Mrs. Russell returned to Soochow, where Dr. Russell was a member of the staff of Soochow Hospital. In 1918 he moved to Changchow and opened a medical work which developed into the Changchow General Hospital of the Southern Methodist Mission.

On a recent furlough (1920-21), Dr. Russell was associated with the famous Mayo Brothers of Rochester, Minnesota. Dr. Russell was a surgeon of marked ability, and was held in very high esteem by a wide circle of Chinese friends. He leaves a wife and five children.—North China Daily News, February 27, 1925.

MARRIAGE

McCartney : Tufts.—On December 1, 1924, at Chungking, Szechuen, China, Dr. J. L. McCartney, now of Hankow, to Miss Edith Muriel Tufts.

THE EXECUTIVE SECRETARY.—Before this appears in print the Secretary will be on his way home on furlough after nearly six years away from his family. He expects to be back in China again in the autumn of this year.

During his absence Dr. Henry Fowler has very kindly consented to attend to any special business that arises. Dr. H. H. Morris has also promised to assist him in this. The ordinary routine work of the office will go on as usual and it would be a convenience if membership dues for the current year were sent in at an early date.

The Secretary hopes while at home to be able to further the
interests of medical mission work out here and that his time of furlough may not be altogether unprofitable.

C.M.M.A. Committee on Publication.—Dr. Philip B. Cousland will be absent in Canada from April to September of this year, during which time Dr. P.L. McAll of Tsian-an will act as Editorial Secretary of the Committee on Publication.

The China Medical Journal.—Owing to serious difficulties in the printing office, all our members, subscribers and advertisers are asked to be patient over the delay in the appearance of recent issues of the Journal. A strong committee is at work with the editor trying to put the business arrangements on a better basis.

Chinese Students and Western Civilisation.—It is reported as the consensus of opinion among missionaries in Peking that far more students go to the United States as Christian and return non-Christian than leave China non-Christian and return Christian.

Cure of Opium Smokers.—At a recent meeting in Kuala Lumpur, the Principal Medical Officer, Dr. E.A.O. Travers, reported the results of his method of anti-opium treatment, which seems to be principally by the administration of atropine.

Up to September 21, 1924, Chinese patients to the number of 980 had been admitted to the hospital. Of these 755 had completed the cure having remained in hospital 21 days. Six were discharged for bad conduct. Two died, one from pneumonia and one from hemorrhage from a perforated gastric ulcer. Two hundred and seventeen absconded, and of these 105 left the hospital within seven days and abandoned the treatment; 56 left between eight and 14 days, and 56 between 15 and 20 days. The latter 112 cases went through the atropine treatment and left because they could not afford to stay longer, or were afraid of losing their employment. Most of these had lost the craving for opium. In the opinion of Dr. Travers, a large majority of those who remained in hospital for the complete 21 days were actually cured of the opium habit. Patients who have not the necessary strength of mind or capacity for physical endurance usually abscond from hospital.

Information Wanted.—Will the writer of the article on "Hospital Esprit" please send his name and address to the editor so that the article may not be published anonymously.

Opium Conference in Geneva—Bishop Brent, the U.S. Delegate to the Conference holds that the main features of a desirable Treaty are:
1. The restriction by producing countries of production whether of raw opium or coca within the limits set by the medical and scientific needs of the world, which are easily ascertainable.
2. A strong international Central Board of supervision and control. This should be under the League.
3. The restriction of manufactured derivatives within the requirements of medicine and science.
4. Perfecting of system now in operation of export and import certificates.
5. An agreement between countries where opium smoking is temporarily permitted by which on a given date there will be a one-tenth reduction per annum for ten years, after which smoking opium will not be permitted.
6. A system of licensing and rationing during the ten-year period; propaganda to prevent new addicts; proper treatment of addicts.

Journal Reprints.—Contributors to the Journal desiring reprints of their articles are asked to write the request at the top of the first page of the manuscript, and also to study carefully the cost of reprints as given on the last page of each number of the Journal.
The China Medical Journal

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St. John's University. Office address, Missions Building, 23 Yuen Ming Yuen Road, Shanghai. Medical papers and other literary communications for the Journal, books for review, and exchange medical journals, should be sent to the Editor, P. O. Box 112, Shanghai.

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