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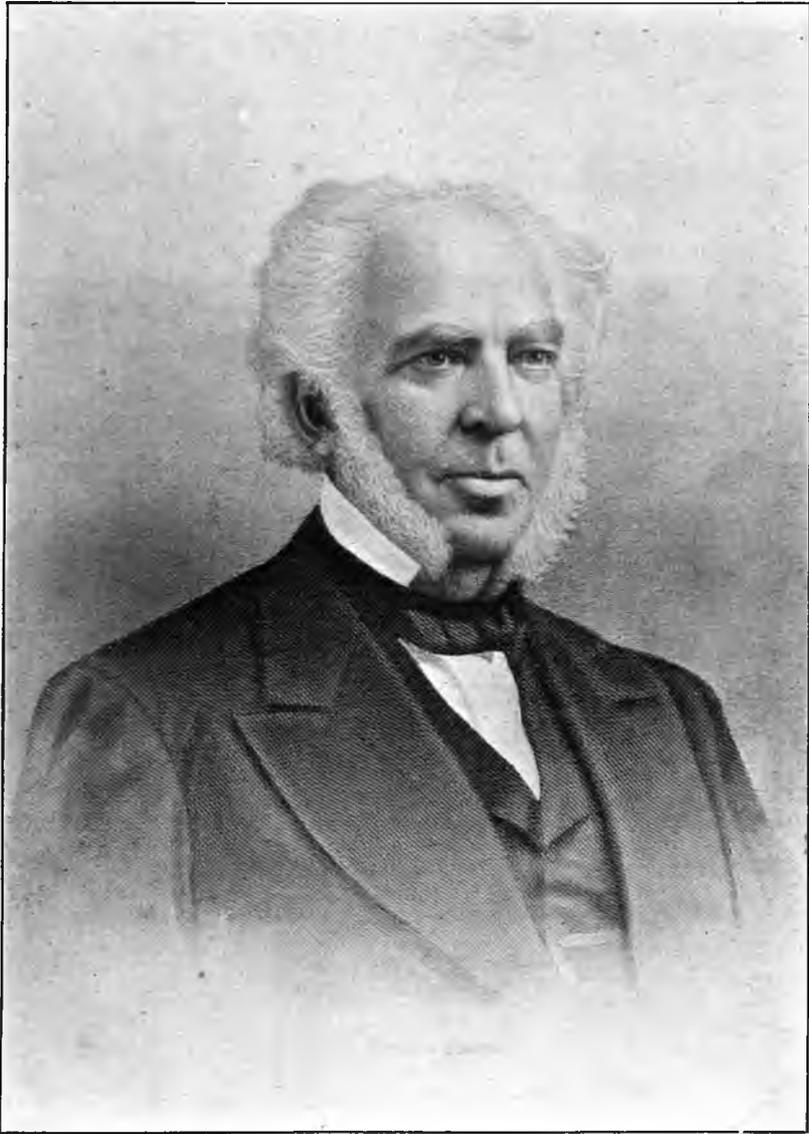
No. 2.

EPITHELIOMA.*

By FRANK L. MELNEY, M.D., Associate in Surgery, Peking Union
Medical College.

The nomenclature of epithelioma is gradually being more and more clarified, so that now everyone in speaking of an epithelioma means just one thing—a *malignant tumor of squamous epithelium*, leaving the term carcinoma for a malignant tumor of glandular tissue. In spite of the fact that at the present time we know very little about cancer, it is surprising, in looking over the literature, to find with what uniformity the authorities speak of the cause of cancer. Paine,¹³ director of the Cancer Research Institute in London, believes that cancer is not a specific disease due to a specific parasite, but that it is a disorderly growth of epithelium, due to chemical or physical irritants, of which the toxins of bacteria are the most important. Ewing,⁷ in his textbook on neoplastic diseases, in speaking of epithelioma, says that he believes that in almost every case the disease is due to chronic traumatism. He says that it arises from normal epithelium after a period of overnutrition and overgrowth, during which the subepithelial tissues show some changes which make them less resistant to the down growth of epithelium. Those changes are lymphatic infiltration, mucoid or other forms of degeneration, atrophy of elastic tissue, fibrosis and chronic edema; and they usually, but not always, precede the down growth of epithelium. He says we must consider that normal epithelium has the power of becoming malignant if the proper conditions are brought about, but that there must be inherent in the epithelial cell itself some controlling influence which makes it grow outside of its normal limits. Broders and MacCarty,⁶ who are pathologists at the Mayo Clinic, believe that chronic degeneration of any specific tissue results in pathological, histological and clinical changes in that tissue. The histological changes are hyperplasia, hypertrophy and migration of the cells; the biological changes are hyperactivity and regeneration, and the clinical changes are either malignancy or benign-

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PETER PARKER, M.D., FIRST MEDICAL MISSIONARY TO CHINA.
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nancy. Broders,³ who has very extensively summarized the material from the Mayo Clinic, believes that cancer is not a degenerative process but a regenerative process; that the cells regenerate in response to an irritation, but that not only do they have the power of regeneration but also the power of invasion and migration. Whereas the regenerative qualities are helpful to the normal body, the invasion and migration of these cells have a harmful result.

It is interesting that these four authors who have written recently on epithelioma are so alike in their impression that irritation is the most striking cause. What evidence have we of the possible truth of this theory? There is no definite proof as yet, but the fact that epithelioma develops in the exposed parts of the body, the parts that are constantly exposed to irritation, and also that there are certain specific occupational forms, is significant. Chimney sweeps and paraffine workers develop epithelioma in the thigh. In India a form of epithelioma called Kangri cancer appears on the abdomen, and it has been demonstrated that the natives there cause frequent irritation to the abdomen by holding a hot stove against it, for warmth or for some other purpose. It is well known that epithelioma develops on top of chronic ulcers, chronic osteomyelitis with sinuses, burns and scars, on X-ray burns, on lupus vulgaris, on eczema and other chronic lesions of the skin. This is the clinical evidence which we have that irritation is the cause of epithelioma.

What statistical evidence have we? Broders,^{3,4,5} who has collected a large series of cases from the Mayo Clinic, has produced the figures shown in the following table, in his recent review of squamous celled epithelioma of the skin, squamous celled epithelioma of the lip and basal celled epithelioma. For our purposes, I have combined some of his figures into a single brief table.

TABLE I. Broders' Statistics.

	Lip	Skin	Basal celled
Male Predominating	49-1	4-1	3-2
Farmers	56%	53%	Predominate
Average age... ..	57 yrs.	59 yrs.	56.7 yrs.
History of injury or irritation	See below*	24%	Irrelevant
Following other lesions	63%	51%	37%
Average duration before being seen	2.6 yrs.	4.8 yrs.	7 yrs.
Location above clavicle	Lower lip, 96%	78%	96%
	Upper lip, 3.5%		
*Of cases of epithelioma of the lip	80% are smokers		
Of 500 normal individuals	80% are smokers		
Of epithelioma cases who are smokers	78% use the pipe		
Of normal individuals who are smokers	38% use the pipe		

The table gives us statistical evidence of the effect of irritation or other lesion as an antecedent to the malignant growth. The figures in regard to pipe smoking are particularly interesting. In the skin epitheliomata, 24 per cent were found to have a history of injury, and 51 per cent had some other form of lesion preceding the tumor. Inasmuch as, in the history, the diagnosis is made by the patient it is difficult to be certain, of course, whether there was actually a different lesion or whether it was a form of the epithelioma which the patient did not recognize as such. In epitheliomata of the lip, other forms of lesions, including ulcers, were found in 63 per cent. The same uncertainty holds here. In the basal celled epitheliomata, a history of injury was irrelevant, but previous lesions were found to have been present in 37 per cent.

We have then this clinical and statistical evidence that irritation may be the cause of epithelioma or cancer. It is obvious that this is much easier to demonstrate in epithelioma, which is a surface cancer, than it is in the deeper cancers, such as those of the breast, of the stomach, gall bladder or liver. And it must be remembered that we have no real proof that irritation is the sole cause.

Of the various classifications of epitheliomata that have been suggested, Broders and McCarty's⁶ is the most complete and satisfactory. They consider¹ squamous celled epithelioma,² basal celled epithelioma,³ and⁴ pigmented and non-pigmented melanotic epithelioma,⁵ adamantinoma, and⁶ a mixed type of squamous and cylindrical tumor.

Squamous Celled Epithelioma. The squamous celled epithelioma is found wherever squamous epithelium occurs in the body—in other words, all over the skin, the mucous membrane of the mouth, down the esophagus to the stomach, the mucous membrane of the penis, the vagina, the cervix of the uterus, and the anus. It is also found where transitional epithelium occurs and in places where normal squamous epithelium does not exist—in the lungs, in the bronchi, in the trachea and in the gall bladder, which have cuboidal or columnar epithelium. This fact brings out a point in regard to the origin of squamous celled epithelioma. Does it come from the normal squamous epithelium or from embryonal cell rests, composed of cells which are destined to become squamous epithelium but which are misplaced? Some men consider one origin and some another. Adami and McCrae¹ and Ewing⁷ believe that normal squamous epithelium is always the source of surface squamous celled epithelioma, and in those places where columnar epithelium is normally found it may actually change over into malignant squamous epithelium. MacCallum,¹² on the other

hand, suggests rather than those epitheliomata found in places where normally squamous epithelium does not occur, arise from embryonal rests, which exist from the time the embryo is formed, and under certain conditions start to grow. This means that the rest must lie dormant for fifty or sixty years in some cases. On the other hand, there seems to be evidence that cylindrical epithelium can change into squamous epithelium. If there is complete inversion of the uterus the exposed surface may develop squamous epithelium. The same is true if there is a complete prolapse of the rectum. So it may be also for the lungs, gall bladder and other regions from some other form of irritation.

Adami and McCrae¹ say that serial sections have shown that a squamous celled epithelioma may have more than one point of origin. Ewing⁷ believes that this and other cancers may have several foci of origin, which later fuse, and that as they grow they extend in part by the gradual transformation of previously normal cells. MacCallum¹² and others are of the opinion that malignancy begins at one point and spreads in all directions, pushing aside the normal epithelium but not actually changing the normal into the abnormal. Kilgore's¹¹ recent study lends weight to this opinion.

Squamous celled epithelioma may grossly appear in a number of different forms. It may appear as a papillary growth which is raised above the surface of the surrounding structures; it may appear as a cauliflowerlike growth; it may be flat, and level with the skin, with simply a small raised margin, or it may be depressed and ulcerated. It may be soft or it may be indurated.

The microscopic appearance of squamous celled epithelioma is most interesting. We know that the normal epithelium of the skin is bounded by a very definite basement membrane. In the upper layer we have the keratinized dead cells, then the stratum lucidum, then the prickle cell layer, and at the deepest part the basal cells and the basement membrane. The basal cells are cuboid or columnar. They are dark-staining and have round nuclei, with very little cytoplasm. The cells of the prickle layer have a considerable amount of cytoplasm and tend to take a squamous form, and their nuclei are pale. The most striking change which occurs in squamous celled epithelioma is that the basement membrane, which normally is very definite, is lost. It becomes indistinct or absent altogether. The epithelial cells seem to be tumbling down from the surface like water over a dam. They grow wildly without restraint. There may also be seen the changes in the subepithelial tissues which Ewing describes—lymphocytic infiltration,

edema, mucoid degeneration, fibrosis. Secondly, there is evidence of rapid growth. Mitotic figures are found—one in every three or four high power fields, or sometimes several in a single field. Thirdly, the cells themselves become abnormal. Broders has brought out a very interesting point in this regard. He has divided squamous celled epitheliomata into groups, according to the degree of abnormality of the cell. He uses the terms “differentiated” and “undifferentiated.” A differentiated cell is one which is like the normal adult squamous cell; the undifferentiated cell is supposed to have more primitive characteristics. It may look like a sarcoma cell; it may look like an embryonal cell. Let us consider this point for a moment. Kettle⁹ in his article on the polymorphism of the malignant epithelial cell says, “Everyone recognizes that the epithelial cell is capable of polymorphism, . . . but without going so far as to say that the adult epithelial cell can actually become changed into a connective tissue cell, I am convinced that some carcinomata may possess such extreme power of polymorphic growth that their cells, losing all trace of their epithelial¹ origin, may become indistinguishable from connective tissue elements.” The differentiated type tends to form pearls. A pearl is a group of squamous cells which have gone on to keratinization. Broders³ says that pearls and the cells immediately around them are not cancer cells because they have become adult squamous epithelial cells and have lost the power of growth. I believe, however, that his statement is misleading. I agree that those cells have lost their power of growth, because they are dead, but it is certain that they were *once* cancer cells. If a pearl is found in a lymph node, for instance, one must say that the cells which formed it are cancer cells, because they had the power to leave the normal epithelium and invade the lymph node. Likewise if epithelium dips down into the deeper tissues as a malignant growth and later the cells go their way to the adult form and become keratinized, a pearl is formed from cancer cells. The epithelial pearl is one of the striking features of squamous celled epithelioma, but there are squamous celled epitheliomata without pearl formation. In the less differentiated type of growth fewer pearls are formed. The cells do not grow to the point of keratinization. In the different grades of epithelioma we have all degrees of differentiation, from the embryonal cell to the epithelial pearl. If there is complete differentiation the epithelium is normal. If the cells are one-fourth undifferentiated Broders classifies the tumor Group I. If there are equal portions of undifferentiated and differentiated cells he places it in Group II. If three-fourths are undifferentiated he places it in Group III. If all the

cells are undifferentiated he classifies the tumor Group IV. Broders claims that he make a very definite prognosis from his grouping, quite independent of the clinical history and the age of the lesion. I believe that a more exact prognosis could be made if the age of the lesion were also considered. For instance, a Group III case developing in two months would be more rapidly fatal than one which had existed for two years. But this may be drawing too fine a point.

The following table gives Broders' statistics.^{3,4,5} This table gives the incidence and the mortality in the four different groups five years following the best operation that could be performed in the case. The mortality percentage indicates the prognosis. There is a striking similarity between the two types.

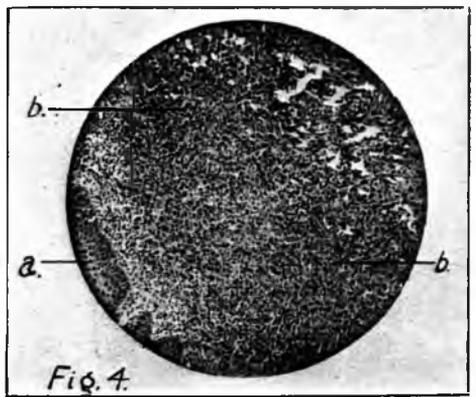
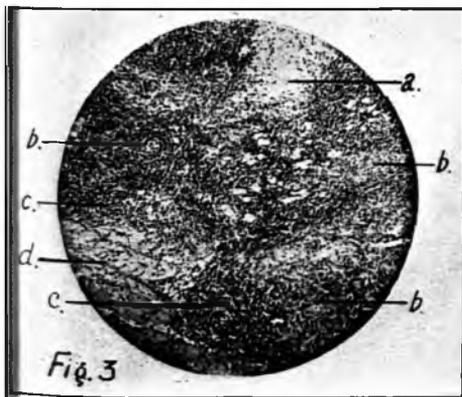
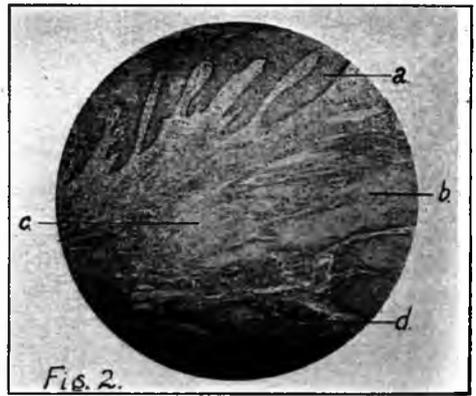
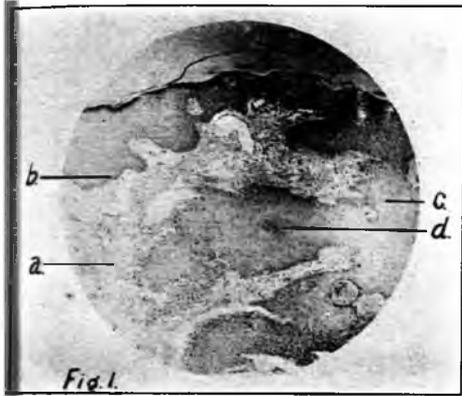
TABLE II.

			Group I.	Group II.	Group III.	Group IV.
Lip incidence	...	...	15%	62%	21%	1%
Deaths	...	...	0	55%	84%	100%
Skin incidence	...	...	8%	69%	17%	5%
Deaths	...	...	0	61%	85%	100%

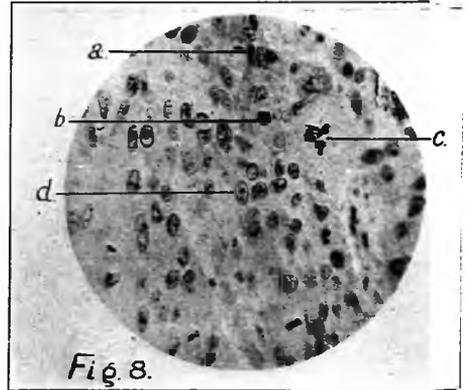
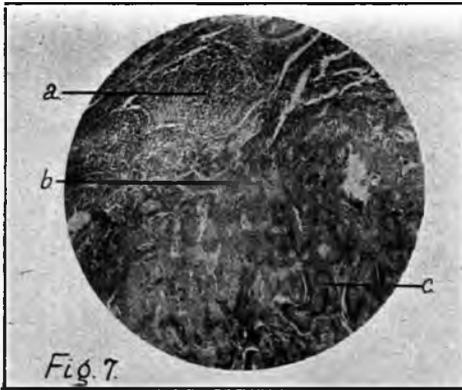
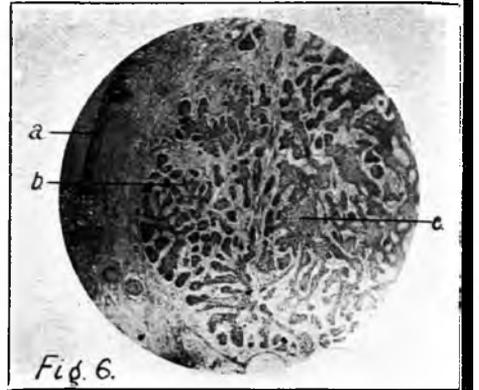
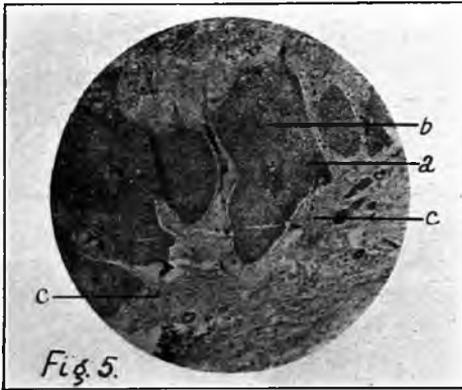
From these figures we may say that the more undifferentiated the cells are, the more malignant and the more fatal is the disease. A microscopic examination is obviously an invaluable aid to prognosis. I think that this classification should be followed up in more laboratories and hospitals, to see if these figures hold true elsewhere. This grading is the most significant work that has been done recently on epithelioma.

Among other changes which occur is the appearance of what is called the one-eye cell. This cell has a large oval nucleus, with a single, very densely staining nucleolus. Some tumors show many of these cells, others few. Their significance is not apparent. Also the mitotic figures are very frequently abnormal in appearance. They are distorted into bizarre shapes and have not the regularity of development which is normally seen in the mitotic figure. There may be three or four distorted mitotic figures in a single cell.

What defense has the body against epithelioma? There is often a lymphocytic barrier between the epithelium and the deeper tissue. There are also endothelial leucocytes, which occasionally fuse to form giant cells. Also fibrous tissue seems at times to block off the growth of the epithelioma. But that is all the body can do. The outcome seems to depend upon the virulence of the cell rather than upon the resistance of the individual.



EPITHELIOMA



EPITHELIOMA

Basal Celled Epithelioma.—The distribution of the basal celled epithelioma is chiefly on the face. Ninety-six per cent of the cases are above the clavicle, and ninety per cent are above the line from the mouth to the mastoid⁵. This is a very striking localization. Occasionally they appear in other parts of the body, in the deeper tissues and sometimes in the small intestines.

Krompecher¹¹, in 1900, was the first carefully to describe this form of tumor, which he said came from the basal cells of the epithelium—the cells which line the basement membrane. The cells of a basal celled epithelioma, for some reason or other, have not the power to become adult squamous epithelial cells; they cannot develop keratin; they do not form epithelial pearls; they remain small and round or polygonal and are dark staining. Borrmann² believed that they do not come from the basement membrane but from embryonal rests. This theory has grown out of the fact that in some cases basal celled epitheliomata are found which seem to have no relation whatsoever to the surface epithelium but lie entirely beneath it. Janeway⁸ believed that these epitheliomata might come from either embryonal rests or normal epithelium. Ribbert¹⁴ was of the opinion that they all come from normal basement epithelium.

It is surprising that the basal celled epitheliomata, which are composed of undifferentiated cells—young cells that have not the power to become adult cells—are less malignant than the squamous celled epitheliomata. This paradox has not been explained so far. Here we have undifferentiated cells but the tumor is very benign. It lasts a long time without killing the patient; it almost never metastasizes and it can be relatively easily cured.

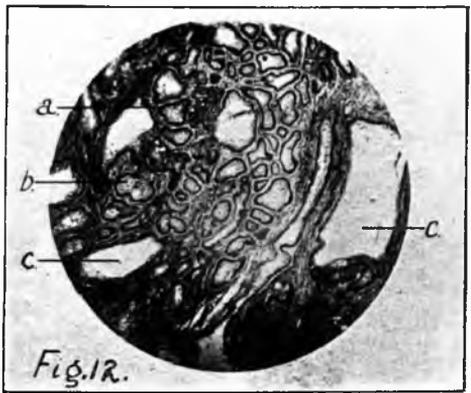
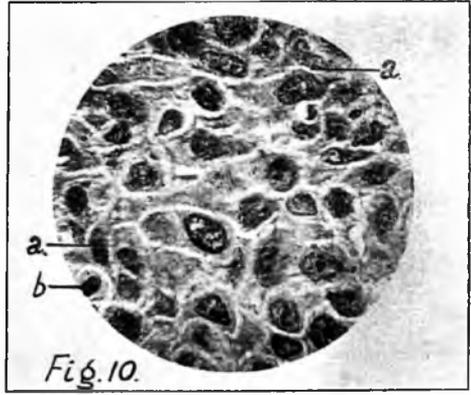
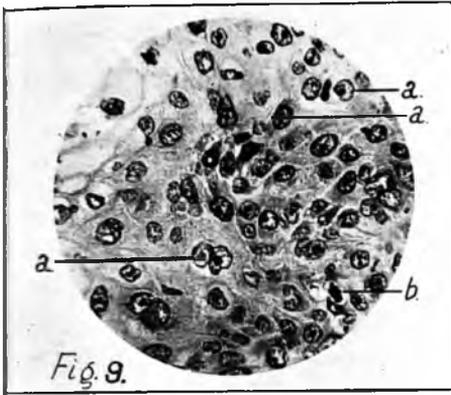
The gross appearance of the basal celled epithelioma is often that of a nodule underneath the skin. It appears sometimes as a little sebaceous cyst or an adenoma; or it may appear as a persistent pimple; or as an ulcer which grows and does not show any tendency to heal, or tends to heal and then breaks out again; or it may appear as a scaly lesion with a coarse scabbing which forms and then rubs off. The basal celled epithelioma spreads out laterally without penetrating very deeply. It will go sometimes to the fascia and stop there. On section it may show a fairly definite limitation at the fascia. Or it may break through at one point and spread down to the muscle or bone and be checked there, and later break through the periosteum and get into the bone. When it occurs around the eye or nose or ear it may destroy large areas of the face and get into the sinuses.

Let us consider the microscopic appearance. The cells appear as small, dark-staining round cells, which do not show prickles; and although they may show enormous numbers of mitotic figures and grow very rapidly, the tumor is relatively benign. Instead of forming epithelial pearls the center of a cell mass will often simply show cellular debris. Sometimes these cell masses contain cystlike cavities, and the tumors have been diagnosed alveolar sarcoma or endothelioma.

Going on to the other forms, I will run over them very briefly, because although they are important they are relatively infrequent.

Melanoepithelioma.—The origin of this type of growth is supposed to be the mole cell which lies immediately beneath the epithelium covering a mole. In the pigmented moles these cells have pigment in and about them. It is a debated question whether these mole cells are really epithelium or connective tissue, and there has always been much discussion as to whether these tumors were melanosarcomata or melanoepitheliomata. The more recent opinion seems to be that they really have an epithelial origin. They may occur anywhere on the surface of the body; they are not often found inside the body, although other melanotic tumors do occur. Broders and MacCarty^f have divided these tumors into two classes—the non-pigmented and the pigmented. Sometimes the partial removal of a pigmented mole will start a melanoepithelioma, or it may start spontaneously. The gross appearance may show a large fungating mass of dark colored tissue or a small raised area resembling a blood blister, with the main mass of the tumor lying deep. On section one may find a single mass of black tissue, or there may be an unequal distribution of the pigment. Microscopically at the edge of the tumor one can generally observe the continuity with the normal epithelium, but the cells of the main tumor show very little differentiation. They very quickly lose the normal appearance of squamous epithelial cells and often resemble sarcoma cells. The cells are large and generally show many mitotic figures. One may see small areas packed with pigment and other areas with no pigment at all. The pigment may be within the cells or outside of the cells. It is a very malignant tumor, with 100 per cent mortality. It metastasizes very rapidly to the lymphatic glands, and may spread all over the body. It is curious that sometimes the metastases have no pigment at all, whereas the tumor itself is full of pigment, or vice versa.

Adamantinoma.—The adamantinoma is a tumor of squamous epithelium which apparently originates from the enamel organ at the



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root of a tooth. The gross appearance is that of a tumor which may become as large as an orange. It is more often found in the lower jaw than in the upper. It has a thin bony shell on the outside, and on section shows many cystic cavities filled with yellow degenerated material. Under the microscope it presents a very definite picture. It consists of masses of squamous epithelium, the outer or basal layer of which is very dark-staining. The nuclei are round or oval and the basement cells are cylindrical. Inside of this layer the cells are first cuboidal and then squamous. In the center there is a degenerated area which may either be filled with cellular debris or may be empty, forming a cyst. They are relatively benign tumors, and if the gross tumor is removed they do not recur.

Mixed Tumor.—Broders and MacCarty⁶ have also described a mixed tumor which occurs rather infrequently in the palate. This is a mixture of squamous and glandular tumor tissue. It is so relatively infrequent that I will simply mention its occurrence.

The accompanying microphotographs illustrate the cardinal features of epithelioma.

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NOTATION FOR FIGURES:

Fig 1. Low power of Grade I squamous celled epithelioma of scalp. Path. No. 01272. *a.* Indistinct basement membrane of tumor cells. *b.* Distinct basement membrane of normal epithelium. *c.* Partially undifferentiated cells. *d.* Pearl.

- Fig 2.* Low power of Grade II squamous celled epithelioma of penis, Path. No. 0816. *a.* Normal hypertrophied epithelium. *b.* Differentiated tumor cells. *c.* Undifferentiated tumor cells. *d.* Pearl.
- Fig 3.* Low power of Grade III squamous celled epithelioma of lower eyelid. Path. No. 01311. *a.* Differentiated tumor cells and pearl. *b.* Undifferentiated tumor cells. *c.* Barrier of lymphocytes and eosinophiles. *d.* Muscle.
- Fig 4.* Low power of Grade IV squamous celled epithelioma of lower lip, Path. No. 01373. *a.* Normal surface epithelium. *b.* Completely undifferentiated tumor cells undermining the epithelium at this point but connected with it farther along.
- Fig 5.* Low power of basal celled epithelioma of scalp. Path. No. 306. *a.* Well defined mass of basal cells. *b.* Center is degenerated but not keratinized. *c.* Downward growth tends to be limited by fascia.
- Fig 6.* Low power of basal celled epithelioma of eyelid (inner canthus). Path. No. 0836. *a.* Normal epithelium. *b.* Small masses of basal cells showing no connection with the surface epithelium. *c.* Small area of undifferentiated cells.
- Fig 7.* Low power of metastasis in inguinal lymph node from Grade II squamous celled epithelioma of penis. Same case as Fig. 2. Path. No. 0816. *a.* Lymphoid tissue. *b.* Undifferentiated cells. *c.* Differentiated cells and pearls.
- Fig 8.* High power of Grade III squamous celled epithelioma of penis. Path. No. 0919. Showing many mitotic figures in a single field. *a.* Mitosis. *b.* Other stages of mitosis. *c.* Multiple mitosis in a single cell. *d.* "One-eyed" cell.
- Fig 9.* High power of Grade III squamous celled epithelioma of anterior surface of wrist. Path. No. 01661. *a.* "One-eyed cells." *b.* Mitotic figure.
- Fig 10.* Oil-immersion of Grade III squamous celled epithelioma of anus. Path. No. 01374. *a.* Intercellular bridges, spines or prickles. *b.* Mitotic figure.
- Fig 11.* Low power of melanoepithelioma of foot. Path. No. 0840. *a.* Normal hypertrophied epithelium, no pigment in basal layer. *b.* Pigment present in basal layer. *c.* Margin is lost. *d.* Undifferentiated cells.
- Fig 12.* Low power of adamantinoma of mandible. Path. No. 01620. *a.* Basal layer of densely staining cuboidal or columnar cells. *b.* looser squamous cells. *c.* Cystic degeneration of center of masses.

INTERESTING CASES OF THE YEAR 1920-21, BEING THE
FIRST YEAR OF THE REOPENED WOMEN'S
CLINIC AT THE UNION MEDICAL
COLLEGE, PEKING, CHINA.

An introductory address delivered at the first meeting of the Section on Obstetrics and Gynecology during the opening of the New Union Medical College and Hospital, Peking, September 1921.

BY J. PRESTON MAXWELL, Head of the Department of Obstetrics and Gynecology.

Before commencing the subject which we are to discuss this morning, let me welcome you all to the meetings of this section.

The Department under whose auspices these sectional meetings are held, owes much already to the kindness of those who are working in China, and I would again invite your hearty co-operation in sending to us specimens of pathological interest, especially tumours, fetuses, monstrosities and the like. We are prepared to examine any pathological material sent to us, giving the sender a diagnosis at as early a date as practicable, but we would beg that the essential clinical data of the cases be sent to us at the same time as the material.

As you perhaps know, several years ago it was found necessary to suspend the out and in-patient women's work at the Union Medical College, and in view of the difficulty of restarting a work of this kind in China I thought that a review of the interesting cases of the first year's work might interest you.

Some of the cases quoted may seem to you to be commonplace ones, but it is not only the rare cases which are interesting and instructive. A modern obstetrical department is not complete without its antenatal side, and so we began with the consideration of several cases which raise problems of importance to us all.

VOMITING OF PREGNANCY.

No case of serious vomiting of pregnancy has been met with during the year, but quite a number of cases have been under treatment for the subacute form. Corpus luteum extract has been given these in doses of gr ii three times a day, and has proved very satisfactory both in primiparæ and multiparæ.

In a trouble of this kind which undoubtedly has its psychical aspect, it is difficult to estimate the value of a drug, but several patients, after using it for a few days, have begged for more supplies

of the drug, and were emphatic as to the relief it gave them. In one case the corpus luteum in pill form led to acute and immediate vomiting, but in this case the same drug given by injection proved very efficacious. This case was one where the first pregnancy had ended in a hydatidiform mole accompanied by pernicious vomiting for several weeks, and the second pregnancy is now well on its way without any untoward symptoms presenting themselves.

A couple of cases of intense salivation were not relieved to any marked extent, but improved of themselves as the pregnancy went on.

Three cases of definite pregnancy toxæmia have been under treatment by the Department. The first of these, a secundipara in the thirties, developed eclampsia in her first pregnancy and had a Cæsarian section performed three weeks before time.

In this pregnancy she developed albumen and acetone in the urine at the seventh month. Saline injections by the bowel, sodium bicarbonate by the mouth and abstinence from all meat, fish and eggs cleared the urine, and she was confined without any untoward occurrence a fortnight after her proper date of delivery.

There was no sign of the Cæsarian scar to be felt, but special care was taken to avoid overaction of the uterus and the patient was delivered by forceps.

The second case was a primipara, æt 24, who developed a small amount of albumen in the urine a few days before labor. There was also a slight degree of œdema of the ankles and legs with a measure of restlessness which was abnormal. Labor was precipitated by a dose of castor oil and quinine, and the albumen cleared up satisfactorily, though she gave us trouble with mastitis, contributed to by inverted nipples.

The third case was a secundipara who some hours after her first child was delivered, had an eclamptic convulsion, was comatose for 48 hours and extremely ill. During the early months of this pregnancy she suffered much from headache which was relieved by abstinence from meat and fish. During the last month she developed much œdema, a small amount of albumen and an occasional cast and the headaches began to reappear. As matters were not improving, labor was induced by bougies about a fortnight before time and she did excellently.

Two other curious accompaniments of pregnancy were encountered during the year. The first of these was in a case under the care of Dr. Douglas Gray. The patient was a secundipara, and towards the latter part of her first pregnancy she had developed an intense

gastrodynia, which cleared up as soon as the child was delivered. In the present pregnancy this symptom had reappeared about the sixth month and the attacks of pain were most severe, irregular in appearance, caused by any article of food or drink or sometimes coming on independently of the same, and in the worst attacks these were only relieved by morphia or opiates.

There was no sign of any organic disease either of stomach, gall bladder or kidney.

Towards the end of pregnancy these attacks of pain much improved and Dr. Gray informed me that they had entirely ceased after labor.

The second was a patient, aet 32, the wife of a doctor, who referred her to the Department because of certain abnormalities which had occurred during the pregnancy.

She had been married 7 years, had one healthy living child and there had been one miscarriage.

In 1909 she had an attack of hemianopia with intense headache but after a day in bed was alright again.

In 1911 whilst on holiday, had a second attack with headache and some confusion of speech.

In 1915 during the first days of pregnancy, she had very severe headache, a little temperature and the right arm was numb for 24 hours.

In 1916 she had one attack like the one in 1915.

In 1917 just before the miscarriage, she had an attack of hemianopia, confusion of speech and numbness mostly in the hand.

In November 1920 she had an attack of diarrhoea and was ten days in bed. After getting up two days had an attack of hemianopia to nearly total loss of vision, partial loss of power of speech using wrong words, much distressed in consequence. Numbness of hand, arm and leg and slightly of the right side of the face. Neuralgic pains over the left side of face and hand, well after 24 hours.

In the eighth week, twelfth week and sixteenth week of this pregnancy had uterine hæmorrhages lasting from three days to a month.

In the twenty-third week she had another attack of hemianopia, numbness of right arm and hand, difficulty in getting the right word, condition lasting about half an hour.

On examination the child was lying in breech presentation and her general physical condition was good.

Dr. Howard kindly examined the eyes and found a normal fundus with two degrees of myopia and a good deal of myopic astigmatism and was of opinion that the eye symptoms were due to migraine.

Dr. Woods examined the patient from the neurological side and came to the same conclusion as regards the nerve symptoms.

Attempts at external version failed and so I allowed the case to proceed as a breech. She delivered herself of a living child, breech with extended legs, and there is no sign of this extension in an X-ray photo taken a few days before labor. Presentation was a right sacro posterior, the right buttock rotating to the front.

Since delivery in the end of June, she has had one slight attack without eye symptoms but attended by headache and numbness, the attack supervening as many of the attacks have done, on fatigue and worry.

Turning to the actual obstetric work.

Cæsarian section has been performed eight times during the year, six times in the hospital, and twice in the Presbyterian Women's Hospital.

Of these, one was a case of central placenta prævia and to anyone who has had the experience of dealing with this complication by the older methods, the relief from the strain of a case where one is certain to lose the child, and possibly the mother; and the satisfaction of a case, where a fine child is obtained, and the mother has an uncomplicated convalescence, make Cæsarian section for this trouble an operation of election.

The remaining seven were all performed for contracted pelvis, four were for general contraction involving either an early induction with corresponding risk to the child, or Cæsarian section.

In one of these four a Cæsarian section had already been performed in America and this was the second pregnancy. In a second case, the first child had been lost after a difficult forceps delivery in which the head was crushed, possibly this was a craniotomy.

In the third and fourth cases the patients were primiparæ, came into the hands of the Department early in pregnancy, and the operation was definitely planned, and carried out as the measure of election.

The other three cases were ones of funnel pelvis. In each case attempts had been made to deliver with forceps. In one case the condition had been overlooked by myself, the upper measurements of the pelvis being oversize and the impossibility of getting a living child through the pelvis was not discovered till the reason for delay was investigated under an anæsthetic. The other two were patients who had been some time in labor, and both operations were performed in the Douw Hospital by invitation of Dr. Hinkhouse. One, a primipara had been examined outside by more than one person,

the waters were broken but fortunately she consented to a Cæsarian, and both mother and child were saved.

The other had been seen before labor came on, and had been warned, and entreated to consent to a Cæsarian section. Three children had already died during labor or immediately after delivery and this was the fourth. She steadily refused till after forceps having been tried it was clear that no delivery could be accomplished without the destruction of the child, and then consented. The child only gasped a few times. The mother however made a good recovery.

One feature of the operation in the last two cases was the way in which the intestines had become distended, coming in front of the uterus when the abdomen was opened, and welling out of the wound, and they could not be replaced until after the removal of the child and turning out of the uterus, in fact in the last case the reduction of the intestines gave considerable trouble during the closing of the abdominal wall.

With the exception of the last named child all the mothers and children did well.

Sterilization was only performed in one case, that of the patient who already had had a Cæsarian section. In this case the tubes were cut and tied and the ends buried.

One case of uterine contraction ring has come under our care. The patient, a secundipara, went out in a rickshaw as labor was coming on and was conscious of jolting. Whether this had anything to do with the malpresentation is doubtful.

When first seen the head was rising over the brim, the cervix was $\frac{3}{4}$ dilated with a large bag of waters and there was no presentation to be felt. Dilatation was allowed to proceed and when the membranes broke the os was fully dilated. A foot could then be felt high up coming through a tight contraction ring. The patient was moved to hospital and anæsthetized. Pains had ceased completely from the time of the breaking of the waters. Probably this was due to the altered polarity of the uterus as the first stage had been easy and the patient was not exhausted.

On examination the condition was as follows: There was a tight contraction ring in the lower uterine segment, with an aperture about $4\frac{1}{2}$ cm. in diameter. Through this protruded a foot and ankle, the toes of another foot, the fingers of a hand and a piece of cord, and on passing one's fingers through the ring, a part of the head was also felt. The child was alive.

Circumstances made it impossible to perform Cæsarian section, and so the next best procedure was adopted. Manual dilatation

of the contraction ring was carried out as fully as possible and a leg brought down. The arms gave a little difficulty and the head still more and it took about seven minutes to extract the head without tearing the parts. The child was resuscitated after a lot of work, but only lived some seven hours, and at the postmortem the principal feature was marked hæmorrhage into and around the adrenals, a not infrequent occurrence in infants who have died in labor, or after they have been resuscitated with difficulty. Apparently the major number of these contraction rings are due to the cause which acted in this case.

The foetal parts being prevented coming down into the pelvis, the waters drain off into the lower uterine segment and a contraction ring forms behind the bulk of the waters.

They are very difficult cases to treat well.

Only one case has given any trouble with postpartum hæmorrhage.

The patient was a five para with tuberculosis of the lungs and kalazar.

She was an in-patient in the Presbyterian Hospital when five months pregnant, and at that time I seriously considered doing a rapid hysterectomy. But she was too ill for the operation. She then improved and went home. About the end of the eighth month she went into labor, and was confined about 3 a.m. of a living female child, no excessive bleeding. I was at the hospital operating about 10 a.m. when she suddenly began to bleed without any apparent cause and bled so profusely that the only thing was to have her up to the theatre and pack the uterus. There was no further bleeding but she had a stormy convalescence.

After leaving hospital she was better for a time, then the spleen again enlarged, ascites developed and she died of asthenia. Several cases of occipito posterior presentation have been under observation. As is usual, the majority of these finally rectified themselves.

Two of the cases, both primiparæ, call for special notice.

In both for the last three months the presentation was persistently occipito posterior.

One of these finally rectified itself but the child was stillborn owing to a malformation which was only found out at autopsy. The left leaf of the diaphragm was absent, and the left lobe of the liver, the cæcum, appendix, all the small intestine, spleen and part of the stomach were on the left side of the chest, the left lung being a mere rudiment. The placenta in this case was very adherent and had to be removed manually but microscopically was normal.

In the second case the malpresentation persisted and the cervix dilated badly. When the mother began to show signs of exhaustion, dilatation was completed manually and rotation of the head attempted.

This could be partially accomplished but the shoulders persistently refused to follow, apparently due to the position of the placenta, and finally I did internal version and delivered, the only trouble being with one of the arms which had become extended.

Convalescence was a febrile in both of these cases.

On the gynecological side the following cases may be of interest. Two cases of severe dysmenorrhœa which was rendering life difficult owing to the monthly pain and invaliding were treated.

One had a thorough dilatation performed, and has been practically relieved of her pain. There was also a prolapsed left ovary but this has given no trouble since the dilatation.

The other case had also some retroposition and had to spend two to three days every month in bed. Thorough dilatation was performed and then the abdomen was opened and a modified Gilliam operation used to bring the uterus into good position. The ovaries were very large and one showed a small follicular cyst. Half of this ovary was removed and both ovaries were drawn well up out of Douglas' pouch by a fine stitch passing through the broad ligament just below the tube. The result has been very satisfactory, menstruation having been regular and practically painless since that time.

Two cases of abdominal tuberculosis have been treated.

In the one there was a history of an attack of peritonitis some eight years previously and the patient was sterile. A tuberculous pyosalpinx was found on the right side, and the tube on the left side was sealed. The pyosalpinx on the right was removed and a plastic operation done on the left tube but the probability is that as far as the sterility is concerned the operation will be unsuccessful.

In the other case the provisional diagnosis before operation was tuberculous pyosalpinx. A appendix operation had previously been performed and her father had died of intestinal tuberculosis. At the operation a large tuberculous mass was found involving the cæcum and base of the appendix and adherent to the back of the uterus. This tuberculous mass consisting partly of bowel and glands extended down to and involved the tissues of the posterior abdominal wall. It was freed from the uterus, a portion of omentum interposed, and otherwise left alone. The patient made a good recovery, and put on fifteen pounds weight in the next two months. The pain in the iliac region which had been very bad, disappeared after the operation. Of course the

final outlook for such a case is not good but even with a resection of the cæcum one would not have got clear of the disease.

A letter just received from this patient, who was sent home to America, states that she is in good health, acting as a librarian, and that the mass was smaller and harder and the consultant quite satisfied with her progress.

Several cases of fibroid of the uterus have been treated during the year amongst them the following interesting cases. A lady aged forty-eight came with a tumour up to the umbilicus which was causing dysuria and difficulty in defecation. This urinary trouble had existed a full year and there had been a period of chronic indigestion of which she complained more than of the tumour. It proved to be a large cervical fibroid and was removed by panhysterectomy. (Fig. 1) She made a very rapid recovery, spent the twenty-second day of convalescence at a Presidential reception and the twenty-third day at the Summer Palace. But on microscopical examination, the tumour in one part was very cellular with many mitoses, and I predicted an early return of trouble. She remained well for about six months and then began suddenly to complain again of dysuria and difficulty with defecation. These difficulties rapidly increased, she was brought to Peking and found to have a large recurrent tumor in the pelvis, reaching well up towards the umbilicus. An exploratory operation was undertaken as obstruction was becoming serious, and a large irremovable malignant growth was found and it was clear that an inguinal colotomy would be liable to be soon blocked by the spread of the disease. A transversotomy was done and was a great success relieving the obstruction and giving very little trouble. But a few days later first one leg became blue and swollen then the other one followed suit. They became about twice normal size and greatly inconvenienced the patient who suffered a good deal from pelvic pain for which morphia was freely given.

After about a month she sat up on the bed pan one morning, lay back and became unconscious, and died in about fifteen minutes from pulmonary embolism.

At the autopsy the clot was found to have been detached from one of the veins in the right groin; the growth which was frankly sarcomatous was invading a piece of the small bowel, and the ureters passed right through it.

In this connection it may be of interest to note that we had one other case of pulmonary embolism.

The woman had had a baby six weeks before, and had a slight mastitis but nothing of serious consequence.



Fig. 1. Fibroid of cervix undergoing malignant change.



Fig. 2. Fibroid polypus which expanded anterior cervical wall.

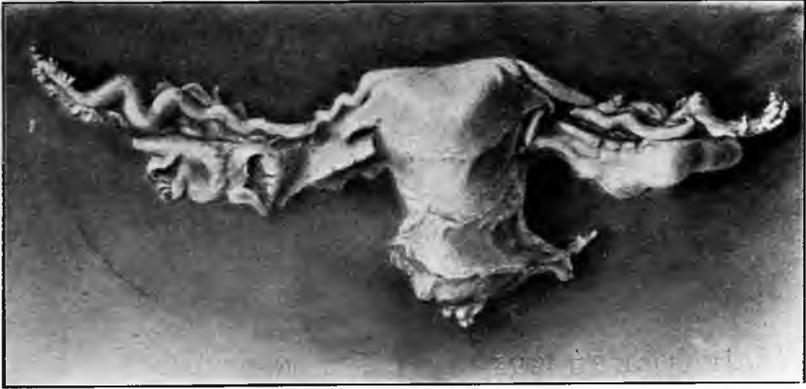


Fig. 3. Uterus and ovaries of newborn foetus ($\times 2$). The ovaries show a marked cystic change.

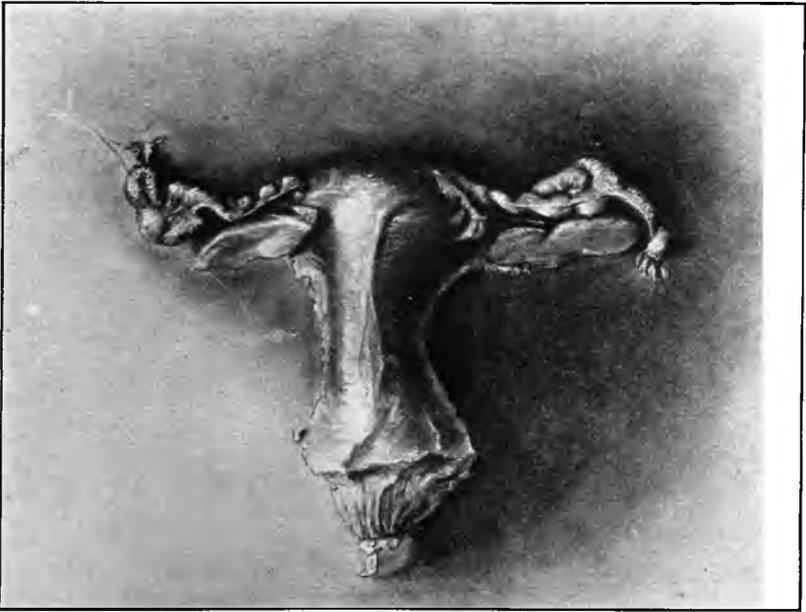


Fig. 4. Uterus and ovaries of newborn foetus ($\times 2$), normal, for comparison with Fig. 3.

She went out into the yard and stooped to get some clothes, was seized with pain and difficulty of breathing, got into the house, became unconscious with very rapid respiration and died before I could get to her.

A case of a small fibroid of the ovary which was causing much pain and in which the uterus also contained fibroids, was dealt with by panhysterectomy and did well.

One very interesting case of fibroid polypus, Fig. 2, was seen in consultation at the Presbyterian Women's Hospital and operated upon there. There was a swelling filling the pelvis in a woman of fifth-two years of age, causing some dysuria and difficulty in defecation. The os externum could be felt undilated high up behind and the feel of the mass in front was almost like a pregnancy. At the operation I intended to do a panhysterectomy but finally discovered that I was dealing with a fibroid polypus which had expanded the cervix the anterior wall stretching much more than the posterior wall and the os externum remaining undilated.

She did well.

Three cases were explored for sterility. In the one tuberculosis of one tube was found with signs of old peritonitis. In another there was retroversion but in this case the left tube, ovary and round ligament were completely absent, the right ovary double normal size and burrowing into the broad ligament and a part of this ovary was resected. In the third case a persistent retroversion was corrected by means of a modified Gilliam operation and the uterus thoroughly dilated and curetted.

Two most interesting cases of malformation were seen in consultation at the Presbyterian Women's Hospital. In one there was complete absence of the vagina with a uterus a little under normal size and a blood cyst in the right ovary, the tube not being distended and there being no sign of a hæmatometra.

The other case was that of a girl in a girls' school. Doubts had arisen about her sex and on putting her under an anæsthetic the following condition was found. There was a well marked penis with hypospadias. Beneath the urethral opening there was a small vagina containing a fruit stone. At the end of the vagina was a small lump evidently the rudiment of a uterus. Two glands could be felt near the internal abdominal rings almost certainly testes. The case was one of male pseudohermaphroditism, and the advice was given that the girl should change her sex and become a boy, or rather a young man, for she was seventeen years of age. The breasts were of male

ypæ in this case, the voice husky and the thyroid cartilage was prominent.

Pathological material from a good many interesting cases has been received by the Department during the past year.

Amongst other specimens a fibroid tumour of the ovary of unusual size and weight was received from Dr. Wylie of Paotingfu. It weighed 27 lbs., was easily removed and on microscopical section shows no signs of malignancy.

Dr. Ford of Taiyuanfu sent us a portion of a tumour of the cervix and scrapings from the same uterus. The cervical tumour proved to be an adenoma but the endometrial scrapings were typical adeno carcinoma. One case of our own deserves special mention.

During the year four babies were lost at, or shortly after birth. I have already mentioned the cases of three of them, i.e., one stillborn with malformation of the diaphragm, one which died seven hours after a very difficult breech delivery due to a uterine contraction ring, and one in a case of Cæsarian section, attempts having been made to deliver with forceps and the case having been in labor for some time. The fourth was perhaps the most interesting of them all.

The mother was an Austrian, a secundipara in the thirties. Her first child was born after a long labor, a 10 lb male child, but healthy, and it is still alive. During this pregnancy the mother, who had become very stout, suffered a great deal, much vomiting and wretchedness being present especially from the third to the fifth months. The latter part of the pregnancy was not specially marked by illness but she was not well. Labor came on to the day and was not specially prolonged or difficult. She delivered herself of an 11½ lb. female child, which came out blue but cried fairly well.

Breathing was shallow but the lungs seemed to expand all over and oxygen and artificial respiration restored it to a fair color.

But only for a short time. Then it became blue again and after an hour or two it was clear that we were losing ground, the intervals of good color becoming shorter and shorter.

Dr. Douglas Gray was called in consultation and suggested bleeding, which was done without relief. The child died after 4½ hours and a postmortem was obtained. The liver appeared large but was smooth and did not really weigh much over the normal. There were no spirochætes to be found on microscopical examination. The spleen was about normal size, there was a small infarct and it was adherent to the diaphragm. There was a little free fluid in the abdominal cavity. All the organs with the exception of the ovaries appear

normal on microscopical examination and the foramen ovale and ductus arteriosus show no abnormality. But the ovaries are hyperplastic to a remarkable degree, many cysts being present and the ova have nearly disappeared. I shall be very pleased if any of you can throw light on the cause of this trouble.

In closing, I put forward two cases for discussion as to the best method of treatment, I am sorry that it is impossible for one to show you the patients themselves, but on one Dr. Clark will operate to-morrow.

The first case is that of a lady age 25. She was in good health till she became pregnant. In the last three weeks of pregnancy she began to suffer from toxæmia, slight trace of albumen, restlessness and anæmia. Pelvis a little general contraction. Nothing was noticed abnormal in examination before labor. The head came down fairly well but there was a certain amount of primary uterine inertia and the labor was terminated by forceps, but as the head came down there appeared a swelling at the vulva about the size of a small hen's egg which as labor progressed protruded outside and had to be very carefully protected and returned when forceps were applied and the child delivered.

She had a long rest in bed owing to trouble with the breasts but on rising, immediately began to suffer from this swelling which appears at the vulva on straining. The uterus is retroposed and there is slight descent. Dr. Clark who has kindly seen the patient with me diagnoses the swelling as a vaginal cyst, and will operate on her to-morrow. (Operation revealed a vaginal cyst which was removed.) The second case is that of a lady of 32. She is a Swiss, and of a nervous temperament. She was strong and well till her first confinement which was badly managed and left her with a huge tear of the perineum which was not sewn up. She was six weeks in bed. The child born on this occasion is alive and well aged nine.

In October 1912 she had a second pregnancy. She was in Switzerland, was much worried at the time, had a great deal of vomiting and abortion was induced at four months. In September 1913 she was suffering from backache and probably also from prolapse, was in a weak, nervous condition, and was persuaded to have a fixation operation performed.

What exactly was done is not known, save that the tubes were cut, a centimetre of each removed, and the ends buried.

After the operation she was better till a year later, when the pain in the back recurred and in addition there was constant burning pain

n the region of the cervix. This has persisted ever since, she has been treated by local applications and douches many times without any permanent benefit. At present she is a neurotic woman, blood and urine normal, but otherwise in fair physical condition. Feels her inability to have children and deeply regrets having permitted the previous operation.

The cervix is cleft to the left, cedematous and chronically inflamed. The uterus is bent acutely at the cervico uterine angle, anteflexed, about normal size and apparently fixed to the anterior abdominal wall.

She is anxious that I should open the abdomen and try to reconstruct the tubes, and probably if this were successful and she had another child she would have much better health. Alternatively the cervix should be removed, but this of course will not relieve the mental attitude. Perhaps the best method would be to remove the cervix, at least the whole vaginal portion, and then explore from above, and be guided by what one found there as to the possibilities of reconstruction, but I have not fully made up my mind on the subject and shall be glad to hear your opinion on the matter.

(No operation was performed on this last case.)

INTERESTING CASES OF THE YEAR 1921-1922.

BY J. PRESTON MAXWELL.

- Fig. 1.* (page 12 of manuscript, 11th line)
Fibroid of cervix undergoing malignant change.
- Fig. 2.* (page 13 of manuscript, 19th line)
Fibroid polypus which expanded anterior cervical wall.
- Fig. 3.* (page 16 of manuscript, 13th line)
Uterus and ovaries of new-born foetus (x2). The ovaries show a marked cystic change.
- Fig. 4.* (page 16 of manuscript, 13th line)
Uterus and ovaries of new-born foetus (x2) normal for comparison with Figure 3.

THE MODERN TREATMENT OF LEPROSY.

By HENRY FOWLER.

As the result of the Conference on Leprosy, held in connection with the opening ceremonies of the Peking Union Medical College in September last, many enquiries have been made both as to the latest reports of treatment and as to where supplies of the ethyl esters of chaulmoogra oil can be obtained.

With regard to the first point, Dr. Heiser will, I hope, pardon me if I quote from a letter of his dated New York, December 27, 1921.

“Recently I was in Washington and had a conference with Doctor George W. McCoy, Director of the Hygienic Laboratory of the United States Public Health Service. You will probably recall that Doctor McCoy was formerly in charge of the United States Leprosy Investigation Station in Hawaii. We tried to make a careful analysis of the outstanding facts in connection with the results that have been obtained in the treatment of leprosy with the chaulmoogra esters. The evidence is certainly conflicting. Doctor McCoy has recently sent Doctor Hasseltine to Hawaii to go over McDonald’s work and make a report. At the present time the “fly in the ointment” is the relapse which apparently takes place. I am enclosing herewith a newspaper clipping giving an official statement made by the United States Public Health Service in Public Health Reports of November 11, 1921. You will note that eight per cent of the patients apparently cured in Hawaii have relapsed. It seems to me that in the future special stress should be laid on having the treatment continued for a very much longer period than has been the case in Hawaii. I should think that the treatment ought to be continued for a full year, and then gradually tapered off during another two year period. At present there is some promising chemical work under way, and it may be possible to develop other esters which will have better therapeutic results. The propyl esters look specially promising. This later information which has developed should not in any way interfere with plans for giving the Dean treatment a very thorough test on a large scale. After all is said and done, this treatment has produced better results than any which has been used up to the present time, and I hope you will be able to have it tried out on a large scale. I have written Governor Wood in the Philippines about this later development, but have strongly recommended that they still go forward with their plans for placing five thousand lepers under treatment.”

The newspaper clipping is taken from "The New York Times," December 15, 1921, and reads as follows:—

"Although the treatment of leprosy with the ethyl esters of chaulmoogra oil at the Leprosy Investigation Station of the Public Health Service at Kalihi, Hawaii, and at the Territorial Leper Colony at Kalaupapa, has given very encouraging results, nevertheless over-optimistic and extravagant statements which have appeared from unauthorized sources in the public press made it necessary at this time to call attention to the therapeutic status of the ethyl esters of chaulmoogra oil in the treatment of leprosy, says a bulletin of the service.

"The ethyl esters of chaulmoogra oil may be regarded as the most valuable therapeutic agent in the treatment of leprosy which has been developed up to the present time," continues the bulletin. "They are superior to chaulmoogra oil in that they may be administered practically to all patients, and their use, when injected subcutaneously, is not accompanied by the pain, discomfort or slow absorption and frequent abscess formations attendant on the use of crude chaulmoogra oil.

"In properly selected cases, especially in the young and in those who are in the early stages of the disease, the clinical improvement is rapid and striking. The results are less favorable in older persons and in cases of long duration. At this time we cannot say that the ethyl esters of chaulmoogra oil are a cure for leprosy. The cases which have been paroled from the Leprosy Investigation Station at Kalihi and from the Territorial Leper Colony at Kalaupapa are cases which no longer exhibit clinical evidence of leprosy and in which the disease has apparently been arrested. Whether these cases of arrested disease constitute permanent cures or not is a question which only the passage of time can answer. As in the case of arrested tuberculosis, one would expect a certain percentage of relapses to occur in lepers paroled with the disease in an arrested condition. A certain percentage of these relapses do occur. Up to the present time, eight per cent of the patients paroled from the two leper institutions in Hawaii mentioned have relapsed and have returned to the institutions for treatment.

"Therefore, in regard to the treatment of leprosy with the ethyl esters of chaulmoogra oil, we may say at present that their use has resulted in the apparent cure of the disease in a considerable number of cases, but whether these 'apparent cures' are permanent or not is a matter which requires time to determine. The results have,



Anaesthetic Leprosy.
Inmates at the Siaokan Leper Azylum, Central China.



Mixed Leprosy inmates at the Siaokan Leper Home,
Central China.



Nodular or Tubercular Leprosy.



**Pronounced Nodular Leprosy with anaesthetic type,
beginning in left hand man.**

however, been so favorable as to lend a hopeful aspect to the treatment of a disease which has long been regarded as hopeless and to lead us to believe that a therapeutic agent has been developed which surpasses in value anything which has been brought forward up to the present time.'"

As regards supplies of the ethyl esters of chaulmoogra oil. It should be stated that the seed of the "*Taraktogenos Kurzii*" from which true chaulmoogra oil is obtained cannot be procured at present in large enough quantities to supply all demands. The consequence is that adulterated samples of the oil have been offered for sale and have given disappointing results. As rapidly as possible, however, the esters for use in India are being produced in Calcutta. The Philippine Government has undertaken their manufacture for use at the Cullion Leper Colony. Here some 5,000 lepers will be segregated and treated. The Government Laboratories at Seoul under the direction of Dr. Shiga have also undertaken to supply free of cost sufficient for all the Leper Institutions in Korea. In Honolulu the preparation is manufactured and is being actively employed among the lepers of the Hawaiian group of islands.

Commercially the ethyl esters of chaulmoogra oil have been produced in the United States of America under the title of "*Chaulmestrol*" by the Winthrop Chemical Co., Inc., of New York. The firm of Burroughs Welcome & Co., whose workers claim to have been the first to manufacture the esters of the oil in their laboratories, have listed it among their products as "*Moogrol*." Both these preparations are excellent in quality but by reason of their cost prohibitive for working on a large scale. So far as China is concerned, Dr. Franklin C. McLean, of the Peking Union Medical College, has placed us all under deep obligation by undertaking to supply the ethyl esters. His letter announcing the offer will be read with interest by those whom so far it has failed to reach:—

"The Chemical Laboratory of the Department of Medicine at the Peking Union Medical College is now producing the ethyl esters of chaulmoogra oil according to the method of Dean. It is hoped that within a short time a sufficient supply of the product will be on hand to fill the requirements of those desiring to use it in China and Korea.

The ethyl esters, to which two per cent of iodine is added, as advised by Dean, will be supplied in bottles of 500 mls each. The price, which will be based on cost of production, has not yet been fixed, but it will probably not exceed Mex. \$30.00 per 1,000 mls

This will bring the average cost of the treatment to within Mex. \$0.10 per week.

It is requested that those wishing to use the product send to Dr. Franklin C. McLean, Peking Medical College, Peking, China.

1. An order for an initial supply, to be filled as soon as possible.
2. An estimate of the monthly requirements, on which we may base our volume of production.

Orders for initial supply will be filled in the order of their receipt and will be accompanied by an invoice. Standing orders for a regular supply will also be accepted. No order for less than 500 mils can be accepted.

For information as to the method of treatment of leprosy with the above preparation please refer to "Treatment of Leprosy with the Dean Derivatives of Chaulmoogra Oil," by J. T. McDonald, Journal of the American Medical Association, November 27, 1921, vol. 76, pp, 1483-1487. We will be glad to send an abstract of this paper to anyone who has not access to it."

A MOST UNUSUAL GYNECOLOGICAL CASE.

The patient was a woman of thirty years of age, married, and had no children.

The History of the case is as follows:

Eighteen months ago, after a long and obstructed labor, she was delivered of a full-term child. The child was dead and delivered in sections. The woman was very sick for three weeks. She remembers of no urinary disturbance during or after her sickness. But she did not menstruate for nine months after her confinement, and then not until the midwife 'made an opening' when a large quantity of old menstrual fluid was passed. Since that time she has menstruated regularly. Her only *complaint*: Constriction of the vaginal orifice making coitus impossible.

Examination: Other than gynecological examination negative. The external urethral meatus normal. Scars of perineum indicating old second degree tear. Vaginal orifice very small and rather sphincterlike admitting the little finger. By slowly dilating, the index finger was with difficulty introduced, but not far enough for a satisfactory examination. On withdrawal of the examining finger urine poured from the vagina. The smallest size speculum was then introduced and urine trickled from it during the entire time it was in place. A dimple on the vesico-vaginal wall was seen indicating the vesico-vaginal opening. On introducing the catheter into the urethra it was found to enter the vagina just above the constriction. This showed that a large portion of the urethra was missing. No urine escaped from the vagina while the catheter was in place, but trickled from the catheter at intervals. Moreover, the patient was watched during spontaneous urination and all the urine was found to pass from the vaginal opening. The patient was carefully watched for several days and found to be perfectly continent as she claimed to be.

LOIS PENDLETON, M.D.

THE HOSPITAL ADMINISTRATION COUNCIL.

By HENRY FOWLER.

Owing to the postponement of the China Medical Missionary Association Conference till 1923, the Hospital Administration Council appointed at the last Conference deems it necessary in the interests of the Association to acquaint members of its work and plans for the coming year. In this and subsequent issues of the Journal, it is hoped that some phases of its activities will be dealt with. Criticisms and suggestions are cordially invited.

The Council has for its officers, Dr. F. Auld as Secretary, Dr. John A. Snell as Vice-Chairman, and Dr. Henry Fowler as Chairman.

Hospital Administration on careful examination was found to be far-reaching and wide embracing. Consequently, in order to deal thoroughly with outstanding problems, the following Sub-Committees and their Chairmen were appointed:—

Hospital Construction, Dr. Manget. Hospital Management, Dr. Tucker. X-ray, Dr. Snell. Records and Statistics, Dr. Crawford. Medical Ethics, Dr. Fowler. Evangelism, Dr. Auld. Training Hospital Assistants, Dr. James. Purchasing Agency, Dr. Fowler.

Most of these Sub-Committees are made up of several members of the Council and in addition other members of the Association, having some contribution to make to the particular subject under review, have been co-opted.

The object of the Council from the beginning has been to promote in every way possible the study of Mission Hospital problems, and to encourage and assist hospitals in attaining the highest possible standard of efficiency.

The main theme of the Peking Conference of 1920 was "Hospital Problems." Several of the matters resulting from the discussion and deliberations of these were referred to this new Council, and for the past two years have engaged its earnest attention.

In regard to *Hospital Construction*. The object of the Council has been to study construction from every angle; to make available to all hospitals the experience of places where successful construction has been carried out; to be prepared to advise hospital administrators on all construction problems from the smallest part of the hospital to the hospital as a whole; to criticize plans of proposed buildings; to be prepared to make definite recommendations for the best design and construction of a kitchen, latrine, bathroom, septic tank, ward or any unit of a hospital or out-patient building.

At present these problems are being, or have been, worked out by many in different places and their experience in time it is hoped will be placed at the disposal of all. It has been suggested that this Department of Work could well be developed later into a *Hospital Construction Bureau*. Perhaps in a subsequent number of the Journal the Convener of the Committee will deal with the subject from this point of view.

The X-ray Committee has been actively at work. It set out to secure lists of standard apparatus and supplies and methods of securing the same. It has been advising as to suitable outfits for different parts of China. Fortunately, the Committee was able to secure as its Honorary Secretary such a keen worker as Dr. Hodges, of the Peking Union Medical College. During the past year, as in the year previously, he visited several hospitals and has rendered assistance with their X-ray installations. In November 1921, he made a trip to the Yangtze Valley to assist in arranging for the exchange and purchase of apparatus at the University Hospital, Nanking, the Red Cross Hospital, Shanghai, and the Shantung Road Hospital, Shanghai. Part of the expenses of this trip was carried by the hospitals concerned, and part by the China Medical Board. Other important work has been done with manufacturers in America and England. These have been convinced of the necessity of making the demand for X-ray and dark room apparatus particularly suitable to conditions in China.

The actual construction of apparatus in China itself for certain Mission Hospitals has been carried along steadily as the available material has allowed. Recent shipments, already in China, but not actually in Peking, assure us that this work can go on to completion within the coming year.

Dr. Hodges will always be willing, by advice and otherwise, to help members of the C.M.M.A. interested in X-ray work.

Later communications will deal with other departments of the Council's labours.

HENRY FOWLER.

23-2-22.

MICRO-METHODS OF URINE AND BLOOD ANALYSIS.

HSIEN WU, Department of Physiological Chemistry, Peking Union Medical College.

The value of chemical analysis of the urine and the blood in clinical diagnosis and prognosis is too well known to need any discussion. The development in recent years of micro-methods has placed in the busy practitioner simple and easy ways of chemical analysis which are fast becoming routine tests in well-equipped modern hospitals.

The simplicity of modern micro-methods is readily appreciated when one compares the time required for the analysis of some urinary constituents by modern methods and that required by the older methods. The determination of ammonia by aëration and subsequent titration, which is still the standard macro-method, requires at least two hours. But by the micro-method, using permittit to absorb the ammonia, ten minutes suffice for a determination of this constituent. It used to take Salkowski three to four days to make a uric acid determination by his well known method, involving dilution of the urine to a sp. gr. of 1.020, removal of the phosphates with magnesia mixture, precipitation of the uric acid and other purines with ammoniacal silver nitrate, decomposition of the precipitate with hydrogen sulphide to remove the silver, evaporation of the silver-free filtrate to a small volume, acidification of the concentrated solution, and finally after standing 24 hours, filtering, drying and weighing the uric acid crystals obtained. This volumetric method of Folin and Schäffer, which is already much of an improvement, requires 24 hours, whereas the micro-method of Folin and Wu requires only 10-15 minutes. Blood analysis came into being only within the last decade, and substances, whose qualitative detection in blood used to require a long time, are now readily determined by the micro-methods.

Nevertheless many institutions have not yet availed themselves of the advantage which chemical analysis of the blood and the urine would afford; and when such chemical work is done, the methods used are often antiquated, laborious and unreliable. This is true even in some hospitals in Europe, to say nothing of those in China.

There are probably several reasons for this conservatism. But the chief reason is, no doubt, the expense of equipping and maintaining a chemical laboratory.

A well-equipped biochemical laboratory with a competent biochemist in charge, a laboratory prepared not only to handle routine

work but to undertake original investigation, certainly involves considerable expense and cannot soon be expected to become an integral part of hospitals in China. But it should be within the reach of all institutions with moderate financial resources to carry on such chemical work as is of practical, clinical value. It is with some work of this kind that the writer wishes to deal in this paper.

Probably the most important chemical determinations from the clinical point of view are those of total nitrogen, urea, uric acid, creatinine and sugar in blood and in urine, and of ammonia in urine. The methods generally used for the determination of these constituents are those developed by Folin and collaborators (Table I) and published in the *Journal of Biological Chemistry*. Most of these methods are given in Mathew's *Textbook of Physiological Chemistry*, 3rd Ed., 1920, and all can be found in Hawk's *Practical Physiological Chemistry*, 7th Ed., 1921, and in Folin's *Laboratory Manual of Biological Chemistry*, 2nd Ed., 1919, stocked by all the leading book dealers in Shanghai.

These methods require no rare chemicals and no expensive apparatus besides a colorimeter, a balance and centrifuge. A colorimeter of the Duboscq type is required for accurate work, but the less expensive Bock-Benedict colorimeter or even Hellige's or Myers' colorimeter used in phenolsulphonphthalein test can give results good enough for clinical purposes. A centrifuge run by hand will serve the need as well as one run by electricity.

TABLE I. Micro-methods for the determination of the more important constituents in blood and urine.

Constituent	Blood	Urine
Total nitrogen	Folin-Wu	Folin-Denis
	M.P.C. pp. 1007-1014	H.P.P.C. p.p. 513-514
	H.P.P.C. pp. 276-278	F.L.M. pp. 103-105
	F.L.M. pp. 179-183	
Urea	Folin-Wu	Folin-Youngberg
	M.P.C. pp. 1014-1016	H.P.P.C. pp. 517-518
	H.P.P.C. pp. 278-279	F.L.M. pp. 107-111
	F.L.M. pp. 183-187	
Ammonia		Folin-Bell
		H.P.P.C. pp. 522-523
		F.L.M. pp. 97-103
Uric Acid	Folin-Wu	Folin-Wu
	M.P.C. pp. 1019-1021	M.P.C. pp. 1098-1100
	H.P.P.C. pp. 221-283	H.P.P.C. pp. 530-532
	F.L.M. pp. 193-197	F.L.M. pp. 113-115

Creatinine	Folin-Wu M.P.C. pp. 1017-1018 H.P.P.C. pp. 280-281 F.L.M. pp. 189-191	Folin M.P.C. pp. 1095-1096 H.P.P.C. pp. 528 F.L.M. pp. 117
Sugar	Folin-Wu H.B.C. pp. 1021-1023 H.P.P.C. pp. 283-285 F.L.M. pp. 197-201	

M. P. C.=Mathew's Physiological Chemistry.
H. P. P. C.=Hawk's Practical Physiological Chemistry.
F. L. M.=Folin's Laboratory Manual.

But there are two problems which the clinicians in Chinese have to solve in introducing chemical methods into their laboratory. First, where can the needed apparatus and chemicals be procured? Secondly, how should the method be modified when gas and running water are not available as is the case in most places in China? It is the purpose of this paper to assist the clinician in solving these problems.

WHERE TO OBTAIN APPARATUS AND CHEMICALS.

All the apparatus needed in biochemical work can be procured through Arthur H. Thomas Company, West Washington Square, Philadelphia, U.S.A., or the Will Corporation, Rochester, N.Y., U.S.A. Chemicals of sufficient purity for ordinary reagents can be obtained also from these firms or from Merck & Co., N.Y., U.S.A. Permutit can be obtained from the Permutit Company, 440 4th Ave., N.Y., U.S.A.

But for the preparation of standard solutions it is often necessary that one either prepares the substance himself or purifies the commercial product. The ammonium sulphate required as standard in the determination of ammonia, urea and total nitrogen, should be recrystallized at least twice from water and dried over sulphuric acid. Pure creatinine zinc chloride is not readily procurable in the market and the preparation of these substances is too laborious to be a profitable undertaking for the clinicians. When the color developed by the creatinine is strong as in the determination of this substance in urine, a solution of potassium bichromate can be used for the color comparison. But this solution cannot be used for the determination of creatinine in blood where the color developed by creatinine is very weak. Fortunately, a standard solution of creatinine suitable for use in urine and (when diluted) in blood analysis can be prepared from *normal* urine as described below.

Preparation of Standard Creatinine Solution.—To 500 mls normal urine add 10% sodium hydroxide solution until it is distinctly alkaline to litmus and then add 5 mls more. Allow to stand for 5-10 minutes and filter off the phosphates. Add to the filtrate 10% hydrochloric acid until it is distinctly acid. Determine the creatinine content of this solution as follows :

Weigh accurately 2.4550 grams of pure potassium bichromate and dissolve it with 60-70 mls distilled water in a small beaker. Transfer the solution to a 100 ml volumetric flask, rinse the beaker three times with a few mls water and pour the rinsings into the flask. Fill the flask to the mark with distilled water, stopper and mix.

Transfer by means of an Ostwald pipette 2 mls of the treated urine to a 100 volumetric flask. Add 3 mls of saturated picric acid solution, mix, and then add 1 ml of 10% sodium hydroxide. At once mix well, note the time, and allow to stand at room temperature (20° C.) for exactly five minutes. In the meantime fill the cups of the Duboscq colorimeter half full with the bichromate solution. Set the left cup at 8 mm. and adjust the right cup till the two halves of the field are matched. The right cup should of course read exactly 8 mm. if the instrument and the illumination are correct. This preliminary reading is to accustom the eyes to the instrument and also to discover any error of the same. Take at least four readings, two from above and two from below, and average the results (S).

At the end of five minutes dilute the urine in the flask to the 100 ml mark, stopper and mix. Pour off the bichromate solution from the right cup, rinse it and the plunger twice with the unknown color solution and fill it half full. Now match the color of the unknown solution with the bichromate solution and take at least four readings and average the results (R). With the standard bichromate solution at 8 mm. the unknown should read between 6-10 mm. If this is not the case, the determination should be repeated using more or less of the urine according as the color is too weak or too strong. It is not advisable to use a urine so dilute that it requires more than 2.5 mls or one so concentrated that it requires less than 1.5 mls to give a color equal to that of the bichromate solution. In the latter case, it is better to so dilute the urine that it contains a little more than 1 mg. of creatinine per ml. As the night urine is usually more concentrated than the day urine, the former should be preferred in this work.

The creatinine content of the treated urine may be calculated from the formula—

$$X = \left(\frac{S-r}{8-l} \right) \frac{2}{n} \frac{8.1}{R-r} \text{ mgs. creatinine per mil.}$$

Where S=Reading of the bichromate solution on the right against the same solution set at 8 mm. on the left.

R=Reading of the unknown creatinine solution on the right against bichromate solution set at 8 mm. on the left.

r=zero error on the right scale.

l=zero error on the left scale.

n=number of mils of the treated urine used.

If there is no instrumental error or personal error, then $r=l=0$, $S=8$ and the formula becomes simply,

$$X = \frac{16.2}{nR} \text{ mgs. creatinine per mil.}$$

On the basis of this determination prepare a solution containing exactly 1 mg. creatinine per mil or, if the urine is too dilute, 0.5 mg. creatinine per mil. Before making up the standard solution to the volume, add for every 100 mils of the final solution 1 mil or 0.5 mil of concentrated hydrochloric acid according as the final solution is to contain 1 mg. or 0.5 mg. creatinine per mil. Colored crystals of uric acid may be deposited in the course of a few days, but they do no harm and may be filtered off if desired.

From this standard solution (for urine analysis) a weaker solution (for blood analysis) containing 6 mg. creatinine per liter can be easily prepared by diluting with $\frac{N}{100}$ hydrochloric acid or simply diluting with water and adding 1 mil of the concentrated acid for every liter of the final solution. The hydrochloric acid in these solutions functions as a preservative.

Glucose marked C. P. obtained from most dealers can not be depended upon. A solution of invert sugar suitable for use in blood analysis can be easily prepared from pure cane sugar as recommended (Folin-Wu). Uric acid obtained from most chemical dealers is pure enough for use as standards. If desired, it can be easily purified by dissolving in lithium carbonate solution and precipitating with hydrochloric acid. Indeed, uric acid of sufficient purity can be prepared from urine by acidifying with hydrochloric acid, redissolving the crystals in lithium carbonate and repeating the precipitation three to four times, although one does not have to resort to this means of obtaining uric acid.

MODIFICATION OF METHODS TO SUIT LOCAL CONDITION.

Regarding such methods as require no gas or running water, nothing need be said here besides referring them to the books given in

Table I. But the methods for the determination of total nitrogen and urea, which require gas and running water, must be modified when these facilities are not available as is the case in most places in China.

Determination of total nitrogen in urine and in blood. It is very difficult to make a nitrogen determination by the macro-kjeldahl method without gas. But good results can be obtained with the micro-kjeldahl method using an alcohol lamp.* As the success of this method depends on the complete decomposition of the nitrogenous substances without much etching of the best tube or pebble, it is essential that the size and shape of the flame be carefully regulated. Since alcohol lamps can not be adjusted without extinguishing the flame, the writer has found it convenient to use two alcohol lamps for each digestion. One with large wick giving a long and wide flame is used for the preliminary evaporation (of blood filtrate). When the water is all driven off, this lamp is replaced by another one with small wick giving a short and pointed flame. One good way of obtaining a flame of this kind is to place a perforated conical cap on the wick which projects only a little above it. The cap is conveniently made by heating a glass tubing to red hot, drawing slightly and cut out a suitable section after cooling. The cap can be made, of course, out of metal.

The time required for the digestion with an alcohol lamp, especially with blood filtrates, is considerably longer than that with the micro-burner. But care must be taken not to heat the mixture too long or too briskly. The distance between the bottom of the test tube and the tip of the flame should be so adjusted that the liquid is kept just boiling. Failure to observe these points will often result in the etching of the test tube or extensive disintegration of the pebble used to prevent bumping, and the final Nesslerized solution will not be clear and may have to be discarded. A few trial experiments will show one the exact technique to follow.

Determination of urea in urine. The method of Folin and Youngberg based on the action of urease and direct Nesslerization leaves nothing to be desired in the matter of simplicity. The essential requirement in this method is that the urease solution should contain very little protein. Such a solution is easily prepared from the American Jack bean by extracting with 15% alcohol. With the native soy bean which contains a high percentage of protein, it is necessary to use stronger alcohol. The writer has found that 40% alcohol gives a

* Alcohol lamps, 4 oz. size, obtainable from Peking, Chen Kuang Glass Factory, are suitable for this purpose.

suitable solution, as this solution is not as active as the Jack bean solution, it is necessary to allow a longer time for the action of the urease on the urea.

Urease solution. Wash 3-5 grams of permutit in a flask once with 2% acetic acid, then twice with water. Add 5 grams of fine soy bean meal, 40 mils of alcohol and 60 mils of water. Shake gently but continuously for 5-10 minutes, allow to stand for 30 minutes with occasional shaking. Filter through a high grade filter paper and cover with a watch glass.

Transfer with an Ostwald pipette 1 mil of diluted urine, containing about 1 mg. urea-N, to a clean test tube. Test tubes of smaller diameter than those used for the determination of total nitrogen are preferable, as they are then not likely to be confused with each other and the danger of poisoning the urease by traces of mercury compounds is eliminated. Add 1 drop of buffer mixture and 1 mil of the urease solution. Place the tube in a beaker of warm water (40°-55° C.) for at least twenty minutes. At the end of the digestion period rinse the contents of the test tube into a 200 mil volumetric flask and dilute to a volume of about 150 mils.

Transfer 1 mil (=1 mg. N) of standard ammonium sulphate solution (containing 4.716 g. per liter) to another 200 mil volumetric flask, add 1 mil of the urease solution and dilute to about 150 mils. Add 20 mils of Nessler solution to each, make up to volume, and mix, etc.

Determination of urea in blood. In the absence of gas and running water the only convenient way of determining urea in blood is by the method based on urease action and distillation. The same urease solution recommended for urine can be used. One important essential in this method is that the liquid should boil gently while the ammonia is being distilled. To insure this the test tube should be rinsed with alcohol and dried before using, and the wick of the alcohol lamp should be trimmed to give a pointed tip close to the metal tube so as to produce a short and steady flame. In the first part of the distillation, it is important not to heat the liquid too strongly, for otherwise foam will rise to the top and the sudden condensation of a large volume of vapor on the cold glass connecting tube may cause the liquid in the receiving tube to be sucked into the distilling tube. The distillation should be carried out in a place free from draught.

Technicians. Before concluding this paper, a few words may be said about technicians. The time of the clinician is so valuable that he often cannot himself carry out required chemical analysis, which

are therefore left to technicians or laboratory assistants to perform. Judicious employment of well-trained technicians doubtless saves one considerable time. But one must have familiarized himself with the technique of the methods, knowing exactly where and how errors may creep in and where there is room for slight variations of manipulation without affecting the results. Having acquired the experience by doing the analysis himself, the clinician can then impart his knowledge to a technician. And the latter, after a period of apprenticeship, may be allowed to work independently. Only in this way one can trust the results which a technician obtains, and one will not be astonished by unusual, but real, findings. No technician should be allowed to try out a method with which the clinician is not himself familiar, or which the clinician finds difficulty in successfully performing.

A CASE OF VESICO-VAGINAL FISTULA OPERATED ON BY KELLY'S METHOD.

DAVID LANDBOROUGH, M.B.C.M., Shoka, Formosa.

Tan Khoan-si, a Chinese woman, aged 34, was admitted to Shoka Mission Hospital on 21st October, 1921, suffering from vesico-vaginal fistula. She gave the following history. Ten years previously she gave birth to her first child. Labor was difficult and prolonged. It was followed by a month or so in bed with constant leakage of urine which has continued ever since. Her husband turned her off and since then she has been supporting herself by hulling or pounding rice.

On examination a vesico-vaginal fistula was found on the anterior vaginal wall extending to half an inch from the cervix. It admitted the tip of the finger and its long diameter was oblique to the axis of the vagina. It was surrounded by cicatricial tissue and the cervix was also bound down by adhesions.

On 22nd October, 1921, she was operated on under chloroform. A knife was first passed into the vagina and made to cut outwards and backwards towards the left ischio-rectal fossa so as to give better access.

The vaginal mucous membrane was dissected off all round the fistula for a short distance and removed and the opposing raw surfaces approximated in the usual way with silkworm gut. The tension, however, seemed to be too great and the operation was a complete failure. About seven weeks later, i.e., on 8th December, 1921, another attempt was made. This time, however, we adopted Kelly's method

of dissecting the bladder off the cervix up to near the peritoneal reflexion. This mobilized the bladder and allowed of its being drawn down easily without tension. The edges of the fistula were then denuded and approximated with silkworm gut sutures as before but this time there was no tension as the bladder wall, separated from its connection with the cervix, readily came down. A glass self-retaining catheter was passed into the bladder and left there. The result was perfect union.

I have used Kelly's method in four or five cases of vesico-vaginal fistula (some of them very large and not capable of being closed by the ordinary method) and I have never failed to get union, though in some cases the union was not perfect, a communication being left between the bladder and the vagina. Some of these communications were small admitting only a probe and readily closed after being touched with a hot wire. Others were larger and required a subsequent operation. In one or two of the cases requiring subsequent operations, I did not succeed in getting union till I repeated Kelly's method by dissecting the bladder off its new attachment to the cervix and pulling it down.

I have always found the raw surface left in the vagina by Kelly's method to heal over easily.

Kelly's method is very clearly described and well illustrated in his *Operative Surgery*, a most excellent book from which I have derived much benefit in operating on gynecological cases, especially vesico-vaginal fistula and fibroids of the uterus.

Practical points in operating on vesico-vaginal fistula:—

1. Better access can be got, if necessary, by making an incision from the margin of the vagina outwards and backwards towards the left ischio-rectal fossa. This incision is of course closed by sutures at the end of the operation.

2. When one comes to making the raw surface all round the fistula, I find that half a dozen or more temporary silk sutures about a foot long passed through the vaginal mucous membrane (but not tied) all round the fistula at about half an inch from it and left long are a great help, as by pulling on them the vaginal mucous membrane is made taut and easily incised. They also keep the surrounding parts out of the way and give a good exposure of the fistula. They are of course removed at the end of the operation.

3. It is important that the silkworm gut sutures should pass through the raw surfaces to be approximated as near the vesical mucous membrane as possible without piercing it. This can be

effected by always passing the needle from within outwards—never in the reverse direction. The needle is threaded first on one end of the silkworm gut suture and made to *enter* the raw surface as near as possible to the vesical mucous membrane. Its point of emergence is of less importance but it should take a good deep hold of the tissues. It is then unthreaded from that end of the suture and threaded on the other end and passed in exactly the same way with regard to the opposite raw surface. As the space in which one is working is limited, I use the smallest fistula needles I can get curved to half a circle and I hold them with a Spencer Wells needle holder.

CONCERNING THE QUESTION OF A NEW ERUPTIVE FEVER IN INFANCY.

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Peking.

The purpose of this paper is to call attention to two articles in a recent issue of the *Journal of the American Medical Association* raising the question of a new clinical entity and to report from the Peking Union Medical College Hospital three cases which appear to be more or less in point.

Levy¹ submitted to the *Journal of the American Medical Association* in November 1919, a paper on his observations of "An Eruptive Fever of Unusual Characteristics in Infancy and Early Childhood." But this paper did not make its appearance until December 3, 1921, when the *Journal* published in the same issue another contribution by Veeder and Hempelmann² apparently concerning the same question.

Levy's syndrome is marked by a period of continuous fever lasting three or four days which, a short time prior to its termination by crisis, is followed by the appearance of a macular or maculo-papular eruption. The disease is further characterized by its non-contagiousness, its lack of physical signs, its incidence in infancy and early childhood, its low white blood count, and its uniformly favorable prognosis. His observations covered about thirty cases.

Veeder and Hempelmann described the essential features of their syndrome, of which they have seen more than twenty cases in the course of one winter and spring, as follows:—

Onset.—This is abrupt. Careful questioning has failed to elicit any prodromal symptoms.....

Symptoms.—There are no symptoms except for the fever and the lassitude or depression produced by the high temperature. There is no vomiting, cough, diarrhea or pain, and the most careful physical examination in our cases has failed to discover any abnormal physical signs, such as congested eardrums, inflamed tonsils, swollen gums, lymphoid enlargement, chest or abdominal signs, or symptoms relating to the central nervous system. The posterior cervical glands are not enlarged. The urine has as routine been negative. There is, as a rule, an absence of toxic symptoms and only moderate prostration.....

Course.—There is a striking uniformity in the course of the disease. The fever, mounting abruptly to from 102 to 104 or more, remains high, with perhaps slight morning remissions until the fourth day, when, coincident with the appearance of the rash, it falls to normal by crisis and the child acts as if quite well again. Rarely the temperature falls on the third or fifth day instead of the fourth.....

Blood.—.....There is ordinarily a leukopenia present which may be quite striking, falling as low as 3,200 cells in two cases.....

Age.—Most of the cases occur between the sixth and eighteenth month.....

Communicability.—In none of the reported eight cases, nor in any of the other cases observed but not reported, have we seen a second case in the same family.....

Rash.—The eruption—the only characteristic lesion—is quite typical. It appears as the temperature falls, develops rapidly, reaching its height in about twelve hours, and then fades in another twenty-four to forty-eight hours. The eruption is morbilliform, and consists of small, pale-red macules or maculo-papules, from one-sixteenth to three-sixteenths inch (1.5 to 5 mm.) in diameter. The lesions are usually profuse and fairly well distributed over the body, the lower part of the face, the neck and the extremities.....”

Veeder and Hempelmann claimed that such a condition as above described would constitute a new specific entity for which they proposed the name “*Exanthem Subitum*,” emphasizing thereby the most striking symptom of their syndrome which is the sudden, unexpected appearance of the rash on the fourth day of the fever. They pointed out further that what was described by Zahorsky³ in 1910 and again in 1913 as “*Roseola infantum*” was the same condition.

Levy was more conservative in his conclusions, as the following paragraph of his will show.

“Unless the foregoing can be demonstrated to be an ordinary exanthem existing in atypical form due to variation of the local strain of the virus, we are here dealing with an entity actually constituting a new disease. Until proof to this effect can be demonstrated beyond peradventure, however, it would be well to consider it an anomalous form of rubella, which of all previously described diseases it most closely approaches.”

The cases from the Peking Union Medical College Hospital compare well with those of either Levy or Veeder and Hempelmann.

Case 1, Hospital No. 644. Baby H. was the third child of healthy Chinese parents. He was born September 6, 1921, in the P. U. M. C. Hospital at full term, after a normal labor, was normal at birth, and weighed 3,520 grams. His mother's blood Wassermann was negative. He was breast fed for a month and then his feedings were supplemented by cow's milk. On November 11, 1921, the child was seen in the Out-patient Department for eczema on the face for two weeks. On November 16, he reported again to the Out-patient Department, this time for greenish stools in the last few days and fever since the day before. There was no vomiting or diarrhea, cough or other symptoms. Physical examination showed that the facial eczema was markedly improved and the temperature was 39 C. There was nothing further abnormal by examination. The child was admitted to the ward for observation.

On November 18, the third day in Hospital, the child was discovered to have an eruption of maculo-papules all over the body and to a less extent on the face and the extremities. The rash was rose-red and presented as a whole quite a morbilliform appearance. The buccal mucous membrane was strikingly pale and there was no conjunctivitis. White blood count done in the morning of November 18 was 7,300 cells per c.mm. (which would constitute a leukopenia if we take the normal white count of a three month old child to be between 12,000 and 14,000).⁴ Examination of the stool was essentially negative. The only medicine the child had was a dose of castor oil on admission and the feedings consisted of the mother's milk. The temperature chart as will be seen from Figure 1, showed continuous fever until the appearance of the rash.

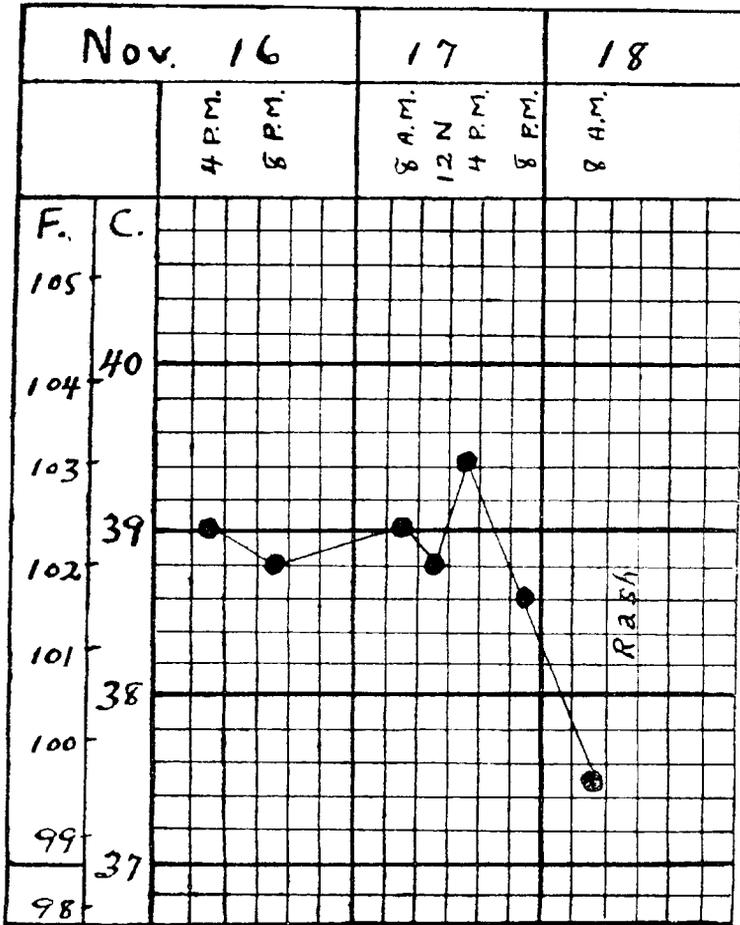


Figure 1—Case 1

The child was sent home soon after the discovery of the rash. Several weeks later he reported again to the Out-patient Department for recurrence of the facial eczema. Otherwise he was well. There was no second case either in the patient's home where he was in close contact with two other children or in the hospital ward where during his stay there were three other children probably exposed.

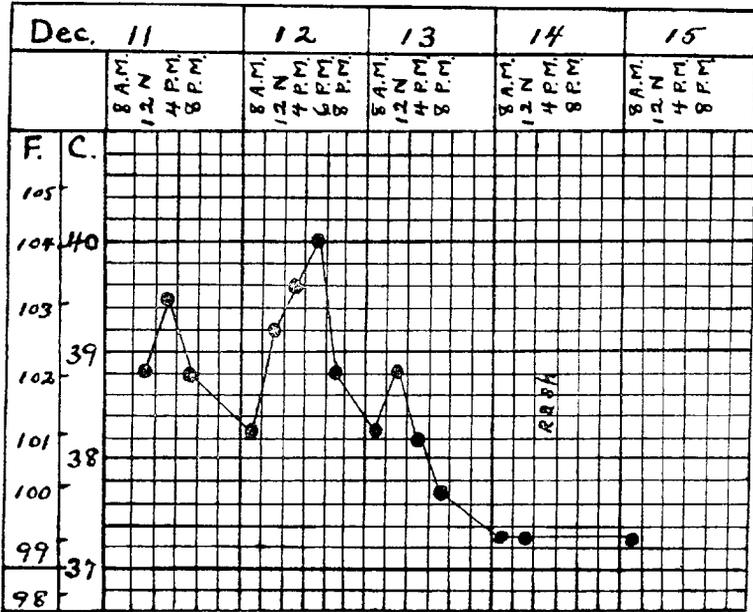


Figure 2—Case 2

Cases 2 and 3 (figures 2 and 3) presented the same remarkable feature, namely, the unexpected appearance of a discrete, pale-red, macular or maculo-papular rash all over the body at a time when the temperature chart, showing high and continuous fever for three days, was registering normal curves. Both cases were American babies—one was ten months and the other eleven months old. Case 3 had greenish stools probably for several days before the onset of fever. The other baby was somewhat fretful when he was having the high temperature. There was no second case in the two families though one of these had several older children.

STUDIES IN THE DIET OF THE KOREAN PEOPLE.*

J. D. VANBUSKIRK, M.D.

Great progress has been made in the study of dietetics and nutrition in the homelands, and this has proven of great practical value. The diet of the Oriental peoples is so different, that we who are here ought to supplement the work of those in the West. A great diet experiment is being carried on by the millions of the Orient, whole races are affected by the results; and we ought to learn many things from careful studies in these diets and their effects upon the people, effects upon their physical and mental efficiency. And we ought to be able to help them in very vital ways after our studies.

This paper is only a report of preliminary investigations as to the amounts and kinds of food eaten by the Koreans, and an attempt to estimate its nutritional value. It is, frankly, only a beginning; further studies are necessary to find its effects upon their physiological processes, the physical and psychical efficiency of the race.

The author has been especially dependent upon Oshima's "Digest of Japanese Investigations on the Nutrition of Man"; Atwater and Bryant's "American Food Materials"; Gephart and Lusk's "Analysis and Cost of Ready-to-serve Food"; McCay's "The Protein Element in Nutrition" and other memoirs from the Government of India; and McCollum's "Newer Knowledge of Nutrition." He has also made use of the ordinary textbooks and the current magazines as available.

KOREAN METHODS OF PREPARING FOODS.

Cereals.

Rice (*pap*) is cooked in a kettle with enough water to cover it, over a quick fire of brush or straw; it is allowed to stand covered for a time after boiling, so the process is mainly one of steaming. It absorbs about twice its weight of water, so that cooked rice is considered equal to about $\frac{1}{3}$ its weight of dry rice. Millet is often mixed with rice and cooked as above.

Barley (*pori-pap*) is cooked in the same way, but takes so much more fuel that the Koreans say it is no cheaper than pure rice.

Millet (*cho-pap*) is cooked the same way. The whole grain is used, so it contains more "fat-soluble vitamines" (this may in part account for the larger size of the northern Koreans).

* Severance Union Medical College, Research Dept., Art. No. 14.

Rice and Peas or Beans (*pat-pap* or *kong-pap*) are often mixed, usually not more than $\frac{1}{3}$ peas or beans; it takes longer cooking and in the ordinary Korean home the peas and beans are not well-cooked. The mixture is not so easily digested as pure rice, but it is quite a satisfactory food if well-cooked. Soy beans are sometimes used in this mixture, though none of the samples analyzed contained them.

Gruels (*chook* or *mi-um*) are often made of rice and barley. 'Mi-um' is thinner and is a common food for the sick and is given to infants.

Steamed Bread (*dawk*) is made by taking hulled glutinous rice tied up in a bag and soaked in water for a time, then steamed over boiling water—or rice flour may be made into a dough and steamed, this is easier but not quite so good—it takes from $\frac{1}{2}$ to 1 hour steaming and is generally allowed to stand over the hot water for another half hour or so. After this, it is taken out and kneaded on a flat stone or heavy slab of wood and beaten with a heavy mallet; it is then made into cakes—dumplings—and eaten; it is quite tough and very apt to cause indigestion; it is not ordinarily eaten at regular meals but is prominent at feasts.

Dumplings (*wul-pyung*) are made of wheat flour, often rolled out and chopped meat then folded into the dumplings; they are then cooked in a soup. They are eaten at feasts.

Vermicelli (*kook-soo*) is made from buckwheat generally, though a poorer quality is made from wheat flour. The dough is forced through holes in the bottom of a press and the strings are allowed to fall into boiling water; after cooking they are scooped out of the water; the vermicelli is generally served in a soup, either meat or vegetable.

Bean and Pea Foods.

Bean Curd (*tu-bu*) is the equivalent of the Japanese 'tofu.' It is made by grinding soy beans after they have been soaked and cooked, a large amount of water is used to grind them; the liquid is then strained through a cloth and to the liquid is added 'concentrated mother liquid' from sea-water to precipitate the proteins, the liquid part is decanted off and the curd is pressed into cakes, very tender and soft—this is the 'tu-bu.' The bean residue is also sometimes eaten, it is called 'pi-chi.' The bean curd is not generally eaten without further preparation: it is commonly added to soups and stews, and often made into omelets with eggs; another palatable food is made by cooking the bean curd for a short time in bean sauce (*chang*) and serving this with sesame oil, pepper and onions, it is called 'tu-bu-

cho-rim'; bean curd may be eaten without further cooking, served in sauce.

Pea Curd (*mook*) is similar in composition but quite different in preparation. Peas are soaked in water till the hulls can easily be removed, they are then ground in a mill with water to keep all wet and liquid, the suspension is strained through a coarse sieve, the liquid then stands to allow the fine particles to settle, the supernatant liquid is decanted off and thrown away, the sediment is collected and boiled for a time, this coagulates the protein, and when cool it is a jellylike mass. It is generally cut up and served with bean sauce and red pepper sesame seed. The pea residue is also eaten and is called '*pi-chi*,' like the bean residue.

Bean Sauce (*kan-chang*) is somewhat like the Japanese '*sho-yu*' but is much more salt and not sweetened. Soy beans are thoroughly boiled, then mashed and made into cakes and partially dried, the cakes are stored for months and allowed to mold and slowly ferment; when ripe they are broken up and soaked in salt water for a long time, then strained (the solid part left is dried and is also used as a condiment), the liquid is boiled and the coagulated scum is removed frequently; when sufficiently concentrated, the liquid sauce is cooled and stored. This is the indispensable condiment for Koreans.

Another bean sauce (*ko-cho-chang*) is made by taking about equal parts of the bean cakes, after fermenting, and rice and salt, with a large amount of red pepper; this is soaked in a small amount of water till ripe. This too is very important as a condiment.

'*Kong-cha-ban*' is made by boiling beans in the bean sauce; they do not swell, but are hard, brittle and very salt. Sugar and sesame oil may be added when serving them.

Sprouted Beans (*kong-na-mul*) are very common; the beans are soaked in water and allowed to sprout; when the sprouts are quite long, both beans and sprouts are boiled and served—sauce is generally added.

Pea Pancakes (*nok-tu-chun-pyun*) are made by soaking the peas in water for 12 to 24 hours to soften and remove the hulls, they are then ground up while wet, and the pasty mass is the batter; salt is added and often thin slices of vegetables are put in; it is fried like pancakes. Flour may be added to the pea batter.

Soups and Stews (*kook* or *chi-jim*), a variety of vegetables are boiled and flavored to suit, with bean sauce and red pepper, a small piece of meat or fish is commonly added for flavor. Turnips, carrots, cabbage and onions are the common vegetables used. Bean curd is

often added to these soups. The amount of meat in these soups is generally quite small. Meat soups are common though fish, beef, pork and poultry are used. Vegetables are added to the meat soups too. '*Chi-jim*' corresponds more to a stew, more food and less water.

'*Kim-chi*' is somewhat similar to "sauerkraut." Cabbage is washed and cut up and put into jars with salt and allowed to ferment. Red pepper is always added in large amounts, and often ginger, shrimp and fish for flavor. Bean sauce is sometimes added when served. '*Kim-chi*' or one of its substitutes is the essential relish at all Korean meals. Turnips are often salted down in the same way as cabbage; this is called "*ka-ktu-ki*."

'*Chang-et-chi*' is made by soaking turnips, onions, cucumbers, cabbage, etc., in bean sauce until ripe; it is a '*kim-chi*' substitute.

'*Tong-chim*' is made by soaking turnips in water until they began to ferment; add red pepper and onions; when ripe take out the turnips and slice them, and serve in the water in which they were fermented.

Greens are quite common foods. Many kinds of leaves are used so.

Potatoes are used in place of rice in some mountainous districts, but are not ordinarily of much importance in the diet of Koreans.

Sweet Potatoes are coming into use, boiled and baked.

CHESTNUTS and NUTS are eaten as such, the chestnuts commonly roasted.

DATES are often added to other foods, e.g., mixed with dough and made into bread.

Animal Foods.

EGGS are eaten raw and boiled, generally hard-boiled. But OMELETS (*Chi-kai*) are more common. Vegetable slices, or minced meat, or small pieces of bean curd are mixed with the eggs; this is then cooked in a small dish over the rice. Red pepper is sprinkled over the top when served.

BEEF is often served in soups or stews, but there are common methods besides these. '*Chang-cho-rim*' is made by boiling beef in water for a time, then boiling it in bean sauce—the bean sauce may be added to the water. Sesame oil is generally sprinkled over the meat when served. '*Naw-bui-an-i*' is small pieces of beef broiled over a charcoal fire, and sprinkled with sugar, red pepper and sesame seeds when served. '*Koi-ki-san-suck*' is made by taking small slices of beef and piercing each slice with a spit, alternating pieces of meat with onions or other vegetable, then when the spit is full, it is broiled

over a charcoal fire; sprinkle with salt, red pepper and sesame seeds, and serve with bean sauce.

FISH are cooked in several ways; one of the most common is to boil it in water to which bean sauce has been added, and serve sprinkled with red pepper and sesame seeds (*cho-rim*). "*Am-chi*" is salt fish soaked in water, then torn to pieces and broiled over charcoal fire; sesame oil is added when serving. "*Mut-chim*" is dried fish soaked in water, then shredded, and then soaked in bean sauce; sesame oil and pepper are added, this is let stand for a short time. Fish roe (*Ran-chut*) are soaked in salt water, or preserved in brine, then boiled in clear water; add red pepper when serving.

Series 2.

This includes the reports of twenty-three young men, vigorous and healthy, getting some exercise but not laboring. They weighed the food served and the dishes after eating, as stated above, each report covers at least one month. Most of them lived in boarding houses, and a few at home, but there was little difference in the reports. There was some difference in the quality of the rice and in the variety of food served in the more expensive boarding places, but it was not enough to warrant an attempt to separate the lists according to the cost of the board.

About half of what is listed as rice in the table, was a mixture, commonly of rice and peas; some beans and millet and barley are also reported and included in the column. Our analyses of these showed such small differences in them, that no attempt was made to report them separately. Also under the head of "*kim-chi*," turnip and radish pickles have been included, as well as the cabbage "*kim-chi*." With vermicelli is included "bread soup"—a soup made with steamed bread, like dumplings; the two are as similar as American "noodles" and "dumplings."

All foods listed in these reports were "ready-to-eat." This necessitated investigation as to the methods of preparation, and analyses of the ready-to-eat foods. Our analyses were not of the foods served, but similar foods from the same or like places. The number of analyses is too few, and no calorimetric determinations were made, so the food values could only be approximated. The table shows the amount per day per person.

The rice and rice mixture averaged 1,572 grams a day, equal to about 520 grams of dry rice, peas, etc., this has a value of about 1,885 Calories, i.e., about 79% of the whole. The total caloric value

of the diets averaged 2,366, ranging from 1,774 to 3,359 Calories. Protein furnished about 15% of the caloric value of the diets; an average of 89 grams a day being reported, the range being from 67 to 130. There was more animal protein than in the dormitory diets, the average being 16 grams a day, fish furnishing most of it. There was more lipin, but 14.7 grams a day is a very small amount.

Number.	Sex.	Occupation.	Season.	Rice, etc.	Kim-chi, etc.	Veg. Soup and Stew.	Meat Soup and Stew.	Omelet.	Bean Curd.	Bean Sauce	Beans, etc.	Greens	Vermicelli, etc.	Bread.	Pancakes.
8	M	Stud.	Win.	1430	482	551	202	58		1		16	8		
9	M	"	"	1303	271	230	323	19	2	9		130			
10	M	"	"	1110	250	106	167	27	12	9	88	15		22	
11	M	"	"	1843	333	255	205		54			284			
12	M	"	"	1302	130	28	630	110		2	40		66	7	
13	M	"	"	1432		316	317	12		1		32	22		
14	M	"	"	1722	615	428	17	167	20		39	43		7	
15	M	Serv.	"	2480	808	106	30	88			4	48	25		
16	M	"	"	1634	330	622		222	11		40	74		3	
17	M	"	"	1672	164	469	115				24	29			
18	M	"	"	1717	378	585	24			44	69	19			
19	M	"	"	1154	228	71	57		54	19	18	5		10	
20	M	"	Spr.	1881	468	141	77	64	65		33	172	43	15	
21	M	"	"	1991	640	310	89	68	101		21	15	31	13	
22	M	Phys.	"	1469	821	349	200		43		2	3	23	8	22
23	M	Stud.	"	1401	309	105	325		31		48	35	38		12
24	M	"	"	1832	252	213	143	20	12	13	30			20	
25	M	"	"	1343	334	240	240		33	4	17	38	30	2	25
26	M	"	"	1368	213	442	90	54	145	3	81	30	116	4	
27	M	"	"	1443	468	93		100	53		59		38		
28	M	"	"	1450	333	83	21	38	30		62		114		
29	M	"	"	1452	445	120	8	248	60	2	38		41		
30	M	"	"	1752	160	207		84		62	132	82		1	

Average.

	Fish, Fresh.	Fish, Dry and Salt.	Beef and Pork.	Eggs.	Fruits.	Miscellaneous.	Total Bulk of Foods.	Water.	Animal Protein.	Total Protein.	Lipins.	Carbohydrates.	Total Calories.	Fat-sol. vitamine.	Number.
11	1			2		32	2914	723	11	91	20	412	2253	AA	8
43	14	17					2372	926	26	87	14	376	2030	AA	9
9				89		47	1852	913	14	76	10	360	1846	AA	10
173							3240	491	35	130	25	508	2856	AA	11
4		32				185	2503	480	34	99	19	402	2338	AA	12
42		13				5	2192	910	21	86	15	377	2066	A	13
64	6	27					3158	863	28	103	23	537	2837	AA	14
	3					63	3511	1523	6	99	11	697	3359	AA	15
39	18						2996	955	23	103	18	470	2515	AAA	16
1	2	8					2486	540	6	74	10	453	2256	A	17
6	18					10	2970	982	7	91	16	476	2473	A	18
66	3	5					1695	848	17	71	6	348	1774	A	19
1		2	8			3	2956	519	6	89	11	554	2740	AA	20
8		9				4	3241	562	10	95	13	568	2839	A	21
47	7	26				22	3022	1157	20	91	21	432	2343	A	22
34	10			9		29	2366	985	18	85	13	403	2162	A	23
21	16	14				12	2600	454	18	85	12	515	2610	A	24
30	40	3		11		47	2437	818	24	69	15	412	2211	A	25
	11	17		5		16	2607		13	94	19	406	2227	AA	26
20	15		2			11	2355	403	13	81	12	434	2223	AA	27
12	25	5				73	2248	565	13	78	9	444	2226	A	28
16	20	1				71	2522	601	21	88	18	434	2299	AA	29
12	8					28	2529	758	8	93	9	522	2608	AA	30
									16	89	15	454	2366		

Fat soluble vitamine, A=poor, AA=questionable, AAA=probably good.

As for inorganic salts, no analyses have been made, but it would seem probable that there is no marked deficiency, the vegetable and leafy foods forming a good part of the diet. It is important that determinations be made to see as to the sufficiency of these substances. The presumption is that there is no deficiency in the "water-soluble vitamine," no cases of beriberi occurring among those reporting, or others eating the same diets. An inspection of the lists leads one to infer that, at best, the amount of the "fat-soluble vitamine" is questionable as to its sufficiency, and in many cases is clearly deficient. Basing the estimates upon the reports of McCollum, and Osborne and Mendel, and others, as to the foods that contain "fat-soluble vitamine," the table shows an attempt to estimate the probable content of the diet in this important substance.

Nitrogen of Urine and Protein of Diet.

It has not been possible so far in these investigations to get urinalyses and diet reports at exactly the same times, but the analyses reported

here were all of the men on their ordinary diet, the same as that reported by them. So, while there is considerable variation in the amount of N in the urine and it often differs from that reported in the diet of the individual, the averages seem to be fairly comparable. The Nitrogen of the urine accounts for about seventy-five per cent of that of the diet, when the averages are taken. Taking account of the amounts of animal protein and the bulk of the diets, the amount of probable Nitrogen absorption was estimated; this was done independently and compared with the urinary nitrogen afterward. If we follow McCay in estimating 1 gram of absorbed N eliminated in the feces, the agreement is nearly exact—11.86 and 12 grams.

Nitrogen of Urine and Protein of Diet.

Diet No.	Total Cal.	Total Protein	Animal Protein	Estimated N Absorption	N of Urine	Protein Equivalent
9	2,080	86.9	33.4	12.1	8.346	52.1
10	1,846	66.9	8.6	8.8	12.368	77.3
11	2,856	130.6	58.5	17.6	8.243	51.5
12	2,338	99.3	42.9	14.0	10.931	68.3
13	2,066	86.4	15.6	12.0	8.650	54.6
15	3,359	99.5	8.2	13.3	12.663	79.1
16	2,514	102.8	28.1	14.5	11.631	72.6
17	2,256	73.9	7.0	9.0	6.361	39.7
23	2,162	85.0	22.7	12.0	14.881	93.2
24	2,610	89.6	19.1	11.8	13.582	84.8
25	2,211	69.7	17.0	10.0	10.584	66.1
28	2,226	78.4	13.1	10.8	12.080	75.5
Ave.	2,377	89.0	22.8	12.0	10.860	67.9

Average Nitrogen of Urine=76% of Average Nitrogen of Diet.

Discussion.

The young men furnishing these diet lists were all in good health apparently, their body weights averaged about 55 kilograms. Their diets furnished about 43 Calories per kilo of body weight, this agrees very closely with the standard estimates of food requirements for men at their age and occupations, and would seem to be sufficient, in spite of the loss due to bulk and poor absorption.

Their diets furnished about 90 grams of protein a day (14.4 N). This is about 1.6 grams of protein per kilo of body weight. But the N equivalent of only 1.2 grams is found in the urine. However, even the latter amount would be the equivalent of over 80 grams protein a day for a man of 70 kilos. This is more than is considered necessary by advocates of a low-protein diet, for such occupations and body weight, but it is less than the older accepted standards. It would be easy to say that the reduction in available protein is the

cause of the low efficiency of the Korean people—it may be a factor but it appears more probable that if a deficiency of protein is a factor at all, it is rather a poor quality of protein than an inadequate amount. Tests as to the relative efficiency of Koreans and Westerners have never been made, but there can be little doubt as to the fact of their being less efficient. Climate, religions, social and political conditions have undoubtedly been factors in this low efficiency. It is clear that the “high-protein-diet” Occidentals are more vigorous than the “low-protein-diet” Orientals. The ‘specific dynamic action’ of protein is well known, and we can reason that lowering the available amount of protein results in a slower rate of metabolism and less vigor and lower efficiency. But improving the quality of the protein and reducing the bulk of the food might correct this without any increase in the amount of protein. McCollum especially emphasizes the value of milk and the ill-effects of its limited use. This is not only due to the “fat-soluble A” but to the superior quality of milk proteins. There is clearly a deficiency in the amount of “fat-soluble vitamine” in the Korean diet, and this must have a great effect upon the people. Huntington and others have shown quite conclusively the great effects of climate upon races, and applying such findings to Korea indicates a marked reduction in the efficiency of the Korean people on this account, as the author has shown in another paper. It seems clear to the author that dietetic deficiencies are important factors in the low efficiency of the Korean people, but he is not ready to attribute it to the low protein content of the diet. Fuller and more careful investigations are necessary before any attempt can be made to assess the effects of the various factors.

Only two of the dormitories reporting were under the observation of our staff, those furnishing lists 5, 6 and 7. The girls in one of the dormitories were not in the best physical condition, and there was an appalling amount of tuberculosis developing among them; overcrowding and poor heating are causative factors, but it seems that diet deficiencies were also important causes. The other dormitory had been on a similar diet but better housed; here, too, tuberculosis was frequently developing. The diet was improved along lines suggested, and this is given in list seven. This too was further improved afterward. No case of tuberculosis has developed in this dormitory in four years, so far as we can find out. In nurses dormitory—not included in these reports—there was a great deal of sickness and many breakdowns. The diet as reported showed a deficiency in fuel value and in all elements. The addition of meat, fish and bean pro-

ducts to the diet resulted in such improved health that the saving in the care of the sick and in the increased service of the student nurses more than paid the extra cost of the additional food.

The small number of cases of beriberi in Korea is easily explained by the amount of vegetables and leafy foods eaten; and the crude methods of hulling rice in common use, as well as by the use of millet and barley as whole grains. Scurvy is prevented in the same way. But the small stature of the people lends support to the view already expressed that there is a deficiency of "fat-soluble-vitamine." The diet lists reported include few things that have been shown to have an abundance of this essential. Eggs seem to furnish more than any other food in most of the lists; some have good amounts of leafy foods; but it seems improbable that these would furnish an ample supply.

Summary.

Thirty diet lists of at least a month each are here reported.

The Koreans are mainly vegetarians in diet; rice is the great staple, supplemented by millet, barley, peas and beans. These food-stuffs furnish about 80% of the caloric value. Roots, tubers and leaves are important items in the diet.

Fish is the most common animal food; beef, pork, poultry and eggs are eaten according to financial ability, but never in great amounts—except along the seaboard where sea food is eaten.

Milk and butter are not used to any considerable extent.

The caloric value of the diets reported averages about 2,400 Calories. This is probably sufficient for people of the occupation and physique reporting, practically all being students. But the bulk of the diet interferes with digestion and absorption, and apparently results in great frequency of gastric dilatation.

The diets reported about 90 grams of protein a day, but only about 75% seems to be utilized; the urines analyzed contained an average of about 11 grams total Nitrogen.

The diets reported contained about 15 grams of lipins a day.

The anti-beriberi and anti-scorbutic vitamins seem to be supplied in sufficient amounts. But there seems to be a deficiency of the "fat-soluble-vitamine" resulting in underdevelopment and lowered efficiency.

**Minutes of a Meeting of the Executive Committee held March
25th, 1922, at 4 Quinsan Gardens, Shanghai.**

The meeting was called to order at 9.30 a.m. by the President, Dr. C. F. Johnson, and was opened with prayer by him.

The following members were present, Drs. Johnson, Beebe, Fowler, Houghton, Lincoln, McCracken, Pell, Thomson and Morris.

The minutes of the last meeting of May 25th, 1921, were read, approved and signed.

The minutes of the meeting of the Shanghai members of November 3rd, 1921, were read.

Dr. Fowler was appointed to fill Dr. Davenport's place on the Executive Committee during his absence.

Business arising from minutes of November 3rd :

Institute for Training of Hospital Technicians.

A motion was offered that a decision on the permanent location of the above be deferred. This was carried.

Biennial Conference :

The arrangements for this were in the hands of the Shanghai Branch, who were taking the matter in hand. It was suggested that it be held as usual near the Chinese New Year, the exact date to be fixed by the sub-committee.

Dr. Houghton proposed that invitations be extended to the members of the National Medical Association to attend the Conference. This was carried.

National Christian Conference :

On motion of Dr. Beebe, Dr. Morris, the secretary, was appointed as a delegate from the C.M.M.A. to this Conference.

Dr. Houghton moved that the Executive Secretary be appointed to draw up a report on the activities of the C.M.M.A. to be incorporated in the report of the China Continuation Committee which is to be presented to the National Christian Conference. This was carried.

Dr. Fowler moved that the final report of Commission II, Dr. Patton, chairman, should be laid before the local members of this Executive Committee as soon as possible for consideration and criticism invited, and that it then be circulated to the remaining members of the Executive. This was carried.

Council on Medical Education :

Dr. McCracken, the chairman, reported that there were a number of vacancies on the Council, and requested that these places be filled in order that the Council might carry on its work. The following were accordingly appointed by the Executive to act until the return of the regular members.

Dr. J. O. Thomson to take Dr. Kirk's place
Dr. E. H. Hume ,, ,, Dr. Yen's place
Dr. S. Cochran ,, ,, Dr. Shield's place

Dr. McCracken reported that the Council had been circularized in regard to the amalgamation of the Union Medical School for Women in Peking with the Shantung Christian University Medical School and that the members of the Council had signified their approval. This action was approved by the Executive Committee.

Office of Executive Secretary :

The name of Dr. John Kirk was considered in regard to carrying on the work in connection with this office, the scope of which has increased a great deal. The question had been presented to him informally and it was learned that there was a possibility of obtaining him. A letter from Dr. E. W. Kirk in regard to this was read, intimating that such a step might be possible.

Dr. R. C. Beebe had already intimated his desire to be relieved of the burden of the work, and stated that he was prepared to carry on until his successor should be able to take over the full duties.

The Executive Committee upon receiving this information felt that they should express their very deep appreciation of the services Dr. Beebe has rendered to the Association in his work as Executive Secretary. His willing self-sacrifice in giving up his own work for the wider service to the Association was felt to be a high example to the members. Under his guidance and judgment the office has been firmly established as a very necessary part of the Association and the Association itself has developed greatly and has attained to a position of authority.

It was estimated that a budget of about G. \$8,000 per annum would be required for the complete expenses of this office. It was moved that such a budget should be adopted and raised, and this was carried.

It was then moved that Dr. John Kirk be asked to take the office of Executive Secretary. This was carried.

Qualifications for membership in the C. M. M. A.:

A committee of three, consisting of Drs. McCracken, Fowler and Beebe, was appointed to consider the question of any changes which might be made in the Constitution in regard to this.

It being then 12.15, the meeting adjourned until 1.45 p. m.

The meeting convened at 2.00 p. m. and was opened with prayer by Dr. Fowler.

Objections to the names of two Chinese physicians appearing in the C. M. J. applicants for membership in the C. M. M. A. were presented, on the ground that the colleges from which they had graduated had not been officially recognized by the Association. The objections were sustained for the time being, until action could be taken in regard to these colleges, and it was decided to write to the proposers of these two candidates, explaining to them that the matter was under consideration.

Council on Health Education:

Dr. W. W. Peter then came into the meeting to report on the work of this Council. He outlined briefly the work the Council had been carrying on, and stated that their total expenses for the past year had amounted to over \$26,000 and that they had had to draw heavily on a reserve balance in the bank for this expense. The outlook for the future was very poor, as there was no prospect of raising enough money from the present time.

After some discussion the following resolution was passed:

Inasmuch as the Council on Health Education has been of great service to the members of the C. M. M. A. in the work which they are doing, as well as to many Chinese communities and other bodies, and furthermore has been of great value in stimulating the Chinese to take up themselves the work of Public Health.

Be it Resolved:

That this Executive Committee places on record its great interest in the work of this Council and its very strong endorsement of that work, and should commend its activities most heartily to the earnest consideration of the various Mission Boards which are carrying on work in China (especially in view of the fact that with the establishment of a similar enterprise by the Chinese, the present Council intends to devote its efforts more particularly to the Christian bodies in China), appealing most urgently to those Boards for support for the Council,

without which support its activities and its usefulness will be greatly curtailed.

Dr. Morris announced that he would be leaving on furlough in June, and would not be returning in time for the Conference, and asked that someone be appointed to take his place until the Conference. Dr. A. W. Tucker was accordingly appointed to act as Secretary and Treasurer.

China Medical Journal :

The Acting Editor, Dr. Lincoln, reported that there was great delay and difficulty in getting the publishers to print the Journal on time. The last issue had been two months late, and there did not seem to be any remedy. It was felt that some drastic steps should be taken to remedy this.

Budget for Office of Executive Secretary :

Referring to this question, it was decided to work this out exactly and a proposal was made and carried that after this had been done we request the China Medical Board to make an annual grant at about Mex. \$15,000 per annum for the next five years to cover this. This was carried unanimously.

Resolution re death of Dr. Elizabeth Reifsnyder.

The following minute was adopted.

This Committee desires to place on record its deep regret upon hearing of Dr. Elizabeth Reifsnyder, for many years a member of this Association, who coming to China in 1883 founded the first hospital for women and children in China and was a devoted and beautiful example of a Christian physician in every aspect of her life and work.

And be it further Resolved :

That a copy of this resolution be forwarded to the Secretary of the Woman's Union Mission.

The meeting then adjourned at 3.15 p.m.

DEPARTMENT OF PARASITOLOGY.

CONDUCTED by E. C. FAUST.

ON THE LONGEVITY OF HUMAN INTESTINAL PROTOZOAN CYSTS.

Boeck, W. C., *Am. Jour. Hyg.*, 1 (Sept.-Nov. 1921).

The investigator shows that cysts of the human dysenteric amoeba remained viable in distilled water at the end of 153 days; cysts of *Entamoeba coli*, at the end of 244 days; cysts of *Chilomastix mesnili*, at the end of 187 days, and cysts of *Giardia intestinalis*, at the end of 32 days. In the absence of more definite information on the infectivity of these organisms the period of viability can be tentatively taken as a criterion of the infective period.—F. C. F.

ON THE FREE, ENCYSTED AND BUDDING STAGES OF COUNCILMANIA

LAFLEURI, a Parasitic Amoeba of the Human Intestine. Kofoid, C. A., and Swezy, O. *Univ. Calif. Pub. Zool.*, 20 (June 23, 1921).

The writers describe this new species of pathogenic amoeba from cases in the University Infirmary, Berkeley, California. It resembles *Entamoeba coli* in many respects but is much more active. It usually has only one pseudopodium which it projects very rapidly. It forms an 8-nucleated cyst. The free amoebae range in size from 20 to 35 microns, while the cysts range from 8 to 34 microns in diameter. The free-living forms ingest red blood corpuscles.

The species is unique in the budding off of amoebulae containing single nuclei from the body of the 8-nucleated cysts.

The distinctions between *Councilmania lafleuri* and *Entamoeba dysenteriae* are shown as follows:

*Councilmania lafleuri**Entamoeba coli*

FREE STAGE.

Very active, pseudopodia thrust out suddenly, ectoplasm sharply separated from endoplasm.

Red blood corpuscles ingested readily.

Peripheral chromatin in a thin layer, karyosome large, excentric, with halo, or often seen in premitotic condition with chromatin dispersed in granules in a sphere, ring or skein, without halo and often central.

Sluggish, ectoplasm not sharply separated from endoplasm.

Red blood corpuscles not ingested normally.

Peripheral chromatin in a thicker layer, karyosome small, spherical, with halo, generally excentric.

ENCYSTED STAGE.

Cyst wall very thick.	Cyst wall thin.
Spheroidal, ellipsoidal or asymmetrical, less often spherical.	Generally spherical.
Less readily stained.	More readily stained.
Glycogen body more resistant to iodine.	Glycogen body stains readily in iodine.
Nuclei with little peripheral chromatin and large, generally central or but slightly excentric, dispersed karyosome.	Nuclei with more peripheral chromatin and small, excentric, massed karyosome.
Chromatoidal bodies less acicular in early stages, fasciculate, massed centrally in later stages and contributing to chromophile buds.	Chromatoidal bodies more distinctly acicular, with less central massing and no relation to segregation of chromophile cytoplasm.
Chromophile ridge forms a bud through a pore in the cyst wall, which detaches uninucleate amœbulæ.	Budding unknown.

The writers point out that while this is the first definite description of the new species, its distribution is probably cosmopolitan. In fact, the phenomenon of budding has been described several times for amœbæ, but it has always been attributed to one of the described species, usually *E. coli*. This type of amœba has been found in French Indo-China and may be not an unusual parasite of the large bowel of man in China.—E. C. F.

THE DIFFERENTIAL DIAGNOSIS OF THE COMMON INTESTINAL AMŒBÆ OF MAN. Craig, C. F., Military Surgeon, 49 (1921).

The important points of this paper are summarized in the following tables :

Diagnostic Points in the Differentiation of *Endamœba histolytica*,
Endamœba coli and *Endamœba nana*.

Vegetative stage of development, living specimens.

	<i>Endamœba histolytica</i>	<i>Endamœba coli</i>	<i>Endamœba nana</i>
Size... ..	13 to 30 microns. Average 20 to 35 microns.	15 to 50 microns. 20 to 30 microns.	6 to 12 microns. 8 microns.
Motility	Very active and progressive.	Sluggish. Rarely progressive.	Sluggish. Not progressive.
Cytoplasm	Ectoplasm and endoplasm well differentiated in active organisms.	Ectoplasm and endoplasm very poorly differentiated.	Ectoplasm and endoplasm poorly differentiated.
Pseudopodia	Large, finger-shaped, clear and glasslike in appearance.	Shorter and blunt. Not glasslike in appearance.	Broad and blunt. Not glasslike.
Vacuoles	Not present in most fresh living specimens.	Endoplasm filled with vacuoles.	Endoplasm filled with vacuoles.
Inclusions	Red blood corpuscles. No bacteria crystals or other material.	Numerous bacteria crystals and other material. No red blood cells.	Numerous bacteria. No red blood cells.
Nucleus	Generally invisible.	Visible.	Generally invisible.

Vegetative stage of development, stained specimens.

Structure of nucleus	Endamœba histolytica	Endamœba coli	Endamœba nana
Nuclear membrane	Delicate. Inner surface lined with single layer of minute chromatin grains.	Thicker. Inner surface lined with coarser chromatin grains.	Intermediate in thickness. Chromatin grains rarely observed on inner surface.
Karyosome	Very minute. Situated in center of nucleus.	About twice as large as in <i>histolytica</i> , situated eccentrically.	Large and usually divided into one large and one or more small portions connected by a delicate thread.
Intranuclear chromatin ...	No chromatin between karyosome and nuclear membrane.	Chromatin grains between karyosome and nuclear membrane.	No chromatin between karyosome and nuclear membrane.
Cytoplasm	Not vacuolated.	Much vacuolated.	Many vacuoles.
Inclusions	Red blood corpuscles. No bacteria or crystals.	No red blood corpuscles. Bacteria, crystals and other material.	Many bacteria.

Cystic stage of development, unstained specimens.

Size	6 to 20 microns. Average 7 to 15 microns.	10 to 22 microns. Average 12 to 18 microns.	8 to 12 microns long by 7 to 10 microns broad.
Shape	Generally spherical. Rarely irregular or oval.	Spherical. Rarely irregular or oval.	Oval or ellipsoidal. Sometimes spherical.

Cystic stage of development, stained specimens.

Nuclei, number	1 to 4.	1 to 8. Sometimes more, up to 24.	1 to 4.
Nuclei, structure	Like vegetative form but smaller. Delicate membrane, minute central karyosome, no chromatin between membrane and karyosome except the minute grains on membrane.	Like vegetative form but smaller. Thicker membrane with larger grains of chromatin, larger karyosome eccentrically placed and chromatin grains between karyosome and membrane.	Like vegetative form but smaller. Thick nuclear membrane, large divided karyosome and no chromatin between the karyosome and membrane.
Chromidial bodies	Bar-oval or rodlike masses with rounded ends. Present in about 50 per cent of cysts.	Filamentous or spicular with square or pointed ends. Present in less than 10 per cent of the cysts.	None present comparable with those of <i>histolytica</i> or <i>coli</i> . Small granular or rodlike masses are rarely observed.

THE EXPEDITION TO TRINIDAD FOR THE STUDY OF HOOKWORM DISEASE. Cort, W. W., Science, 54 (Dec. 16, 1921).

This expedition, conducted by the International Health Board with the direct co-operation of the Department of Medical Zoology of the School of Hygiene and Public Health of the Johns Hopkins University during the summer of 1921, is summed up in this preliminary communication.

1. Sources of infection were almost exclusively human sumps in the cane brakes and cacao groves.
2. Introduction of latrines reduced soil pollution.
3. In heavy clay loom soil pollution did not produce soil infestation.
4. Chickens in the infected area tended to limit soil infestation.

5. The pig was found to be a disseminator of the larvæ.
6. Hookworm eggs hatch as readily in ashes as in soil.
7. Many larvæ complete their second larval moult and continue to live in the unsheathed condition.
8. A vertical migration of $5\frac{1}{2}$ inches was observed for certain larvæ but under these conditions the larvæ use up most all of their reserve food material and become inactive on reaching the surface.
9. Hookworm larvæ do not migrate far from their place of development.
10. In Trinidad the length of life of infective hookworm larvæ in the soil is not more than 6 to 7 weeks.—E. C. F.

HEMOTOXINS FROM PARASITIC WORMS. Schwartz, B., Jour. Agr. Research, 22 (Nov. 19, 1921).

This is the most modern exposition of the experimental work on hemotoxins and hemolysins of parasitic worms and their relations to the pathogenicity of the various helminths.—E. C. F.

RINDERPEST AND ITS PREVENTION

EDWARD L. BLISS, M.D., Shaowu, Fukien.

This subject is of interest to us as missionaries because we are looking forward to the time of self-support of the various departments of missions; the evangelistic and educational as well as the medical. Self-support in all these departments, conducted on any adequate scale, must await the economic development of the country. This being an agricultural country, the development of its agriculture is of prime importance, and the constant loss of its cattle through rinderpest is the greatest economic drain on the agriculture of China as a whole. Certain parts of China suffer severely from occasional floods or droughts, but rinderpest is a scourge in all parts of China.

The subject should have added interest to us as medical missionaries, because rinderpest is the greatest difficulty in the way of creating a milk supply adequate for the proper treatment of our patients. The attempt to build up a correct medical practice in China, while ignoring the problem of the milk supply, is like erecting an elaborate superstructure without first laying a suitable foundation. For of all the departments of medicine, preventative medicine is surely the most

important, and in this dietetics and especially the proper feeding in infancy and early childhood is fundamental, because resistance to disease is dependent mainly upon nutrition and is determined largely in the early years of life. For the proper nutrition of the young there is no substitute for fresh, clean unboiled milk and dairy products. Experience has long shown this, and now science has confirmed it by the demonstration of the peculiar nutritional value of the fat-soluble vitamine present in milk:

That the value of milk is in part appreciated in China is shown by the increasing importation of condensed milk. But condensed milk can never meet the need. It is far too expensive for general use, is deficient in important nutritional qualities, and its taste is objectionable.

Physicians in various parts of China have felt the need of fresh milk in their practice, and have started dairies themselves or have encouraged Chinese to do so, but sooner or later the cows have fallen victims to rinderpest. This was our experience at Shaowu. Our first cows nearly all died from this cause before we had had them two years. This led the writer to make a study of rinderpest and its prevention. This study has included the reading of the available literature, observation of the disease occurring naturally and from inoculation, and experimental investigation. The literature proved to be scanty, difficult of access for one in China, contradictory in some important points and silent upon others. It has therefore seemed advisable to collect in this article the more important facts regarding rinderpest that have been confirmed by experience.

DEFINITION. Rinderpest is an acute infectious disease chiefly affecting ruminants, both wild and domestic, and especially destructive to cattle. It is unknown in America, but epidemics are common in Asia and Africa, less frequent in Russia, and rarely invade Western Europe. In the region of Shaowu epidemics occur every two years and sometimes on successive years, an epidemic lasting from six to nine months. It is attended with high fever and is sometimes called "typhoid in cattle," but while resembling typhoid in some respects, it also adds symptoms of influenza, cholera and dysentery, and often pneumonia. Its virulence varies somewhat in different epidemics and in different breeds of cattle, but at best it is very destructive, terminating fatally in most cases.

ETIOLOGY. The causative agent is undoubtedly a micro-organism, though it has so far escaped identification. It has, however, been propagated for several generations on a culture of blood serum and

glucose. It does not pass through the dense bacterial filters but passes through more porous ones. It enters the system by ingestion and apparently by inhalation; and is spread by direct contact with a diseased animal or by conveyance in feed or on the clothes of attendants, especially on their feet. It may also be conveyed by other animals, such as dogs, cats, rats and mice, and also by flies, and possibly by cattle ticks, as the disease has been produced by the injection of blood expressed from cattle ticks taken from cattle sick with the disease. It is present in the fæces, urine, the discharges from mucous membranes and in other secretions of the diseased animals.

It has been stated that barns where the disease has occurred may remain infective for a long period, but this is doubtful as there is strong evidence that the causative agent rapidly loses its infectiousness outside of a susceptible animal. Those who have practised inoculation and have wished to keep barns infected, so as to furnish infective material when needed, have uniformly failed in their efforts. Moreover, repeated careful experiments conducted by the U. S. veterinarians in the Philippines to determine the duration of the viability of rinderpest virus outside the body showed that cattle-pens, water-troughs, and grass-plots purposely infected with fæces and urine of the highest infectivity produced the disease in susceptible cattle if exposed within thirty-six hours but not after a longer period. (Bull. P.I. Bur. Agr. 1914, No. 30.)

The predisposing factors in producing the disease include everything that lowers the vitality of the animal and so lessens its natural resistance to bacterial action, which in robust animals is considerable. They include extreme heat and cold, unsanitary conditions, improper or insufficient food. At Shaowu epidemics begin in July and August or in winter when the cold rains come, seasons when the cattle are in poorest condition.

Since the virus is very short-lived outside the body of the host, it is highly probable that the epidemics are started by carriers, that have received the infection in a former epidemic and have failed to throw it off. Of this there is up to the present time no direct proof, but it has been observed that there are individuals which do not show symptoms within the usual period after infection, but later when exposure to severe chill lowers their vitality, they develop the disease. Such animals possess a certain degree of immunity. Numerous observers have noted that the degree of susceptibility, or, in other words, the degree of resistance or immunity, varies greatly in the different breeds

of cattle, and in individuals of the same breed, and in the same individuals under different conditions.

Moreover, contrary to the general belief, recovery from one attack of rinderpest does not in all cases confer absolute immunity. The writer has observed undoubted second attacks of the disease at intervals of one and a half to three years after the first attack. In the first case the first attack was contracted naturally. All the typical symptoms were present with marked severity. This cow infected two herds with typical rinderpest resulting fatally in all cases except one that was protected with anti-rinderpest serum. One of those infected was examined post-mortem and proved to be rinderpest. Only this first cow and the one that had received anti-rinderpest serum recovered. Three years later this first cow was injected with 5 mils rinderpest blood and again developed rinderpest with all the typical symptoms, but milder than the first attack. There could be no doubt regarding the identity of the second attack, because it was one of a long series of inoculations producing typical rinderpest.

The second case, a heifer of about seven months, contracted the disease from the first case, and it ran a fairly severe course with high fever but recovery after eleven days. A year and a half later she was injected with rinderpest blood and developed fever, inappetence and weakness, but recovered before the diarrhoea stage was reached. The same rinderpest blood was injected into controls and proved to be rinderpest.

Other cases have come within the attention of the writer, which he regards as second attacks, but which cannot be so definitely proved to be such as these two were. In the two cases reported the second attack was milder than the first, but some of the suspected cases of second attacks terminated fatally.

On the other hand, cows that have recovered from rinderpest, both occurring naturally and by inoculation, have years afterwards been injected with 5 mils rinderpest blood without producing any reaction. All that can be affirmed at present is that some cattle can have rinderpest more than once; but the proportion thus susceptible to repeated attacks, or the intervals or other conditions required to exhaust the immunity are as yet undetermined. Probably the susceptibility depends largely upon "vitality"; that a cow normally immune loses its resistance whenever for any reason its vitality is lowered.

The proportion of cattle recovering from rinderpest occurring naturally is so very small, that the number of supposed immunes has been too few for sufficient observation. As the practice of inoculation

furnishes a larger number of recoveries, there will be a better opportunity to determine the percentage of those recovered that are susceptible to a second attack.

Many observers agree that the immunity varies in degree. A degree of immunity too weak to destroy the micro-organism, but sufficiently strong to hold it in check until conditions favorable to its development occur, would produce a carrier. At Shaowu the number of cases of rinderpest closely follows the variations in weather. An epidemic with a large number of cases and few recoveries begins during the extreme heat of July or August. The number of cases and the mortality decrease markedly during the mild October only to increase during the chilly rains of November. There is another decrease when the atmosphere clears with the frosts of December, followed by a large increase during the season of cold rains in February and March, and finally the epidemic dies out completely with the coming of mild weather in late April or early May. It is difficult to suppose that these recrudescences are due to the importation of fresh infection. It is much more reasonable to suppose that they are due to climatic conditions, acting through a lowering of the natural resistance of the individuals harboring the infection, and that the epidemic ends naturally when the mild weather and good pasturage of spring put the cattle in their best condition. If this is true we may infer that some of the last individuals to be infected in the spring can harbor the infection for a considerable period, until conditions unfavorable to their vitality permit the development of virulence and thus start a new epidemic.

Often a weakling in a herd starts an epidemic. It apparently takes a weak strain of the micro-organism, which the stronger cattle can resist, and converts it into a virulent strain, too strong for even the robust cattle.

It was formerly supposed that only ruminants were susceptible to rinderpest, but recently certain other animals, notably hogs, have been proved to be susceptible, though to a less degree than ruminants. Such animals may also act as carriers of the infection.

PATHOLOGY. The most marked lesions are in the digestive organs. The mucous membrane of the entire alimentary tract is inflamed and shows numerous red spots. In severe or prolonged cases these spots become necrosed and form ulcerated depressions. These ulcerations are most constant in the fourth stomach near the pylorus, but are also common in the large and small intestines, and more rarely in the cæcum. The third stomach, manyplies, is enlarged and distended with impacted, dried, partially digested food. The blood vessels of

the serous coat of the intestines are injected, and in severe cases the color of the whole surface may be a purplish red indicating intense congestion. The texture of the bowels is often softened so that they are easily torn.

The respiratory tract also shows severe catarrhal inflammation and often the reddish spots and ulcerations. The lungs are congested and in some cases show lobular pneumonia of varying extent, sometimes involving nearly all of the lung tissue.

The liver may be paler than normal or may be congested and sometimes shows hemorrhages. The gall-bladder is enlarged and distended with a large quantity of dark green bile (500 mils to 1,000 mils). This enlargement has led the Chinese to name rinderpest 壞膽. Exceptionally the gall-bladder is not noticeably enlarged and the color of the contained bile may be yellow or brown or reddish. The consistency of the bile is usually fluid, but may sometimes be so thick with mucus that it will not flow.

The kidneys are inflamed and may be hemorrhagic. The uterus, vagina and often the vulva are inflamed and sometimes ulcerated.

The heart muscle is softened and pale and its living membranes may show hemorrhages. The lymphatic glands are sometimes swollen, congested or hemorrhagic. The synovial lining of the large joints is inflamed and sometimes the cavities contain fluid resembling pus.

SYMPTOMS. The first symptom is a rise in temperature to 103 or 104 degrees (normal in cattle 102 degrees F.), often by the fourth day but sometimes delayed. The further rise in temperature may be gradual or sudden, but by the tenth day it has usually reached 106 degrees to 108 degrees. As a rule, it shows morning and evening variations. A high temperature does not always indicate a fatal termination, and cases where the temperature does not exceed 105 degrees may terminate in death. Frequently, on the eleventh or twelfth day the temperature becomes normal. This usually indicates that death is near, though animals may remain in this condition one or two days. Exceptionally they recover.

Decrease in appetite and loss of rumination are usually the first symptoms noticed. By the seventh day after infection, grass is refused but liquid food may still be taken, perhaps on account of thirst. The faeces become firmer than normal during the first week, and then become softer. Marked diarrhoea appears between the ninth and eleventh day. This becomes profuse, watery and foetid, later mucous and finally bloody.

A slight cough is often one of the early symptoms, but in some cases is absent. At about the time of the appearance of diarrhœa there is a thick discharge of mucus from the nostrils. In the pneumonic cases there is dyspnœa, which is sometimes very acute.

The urine is highly colored, and later becomes scanty and is finally suppressed. It is often bloody.

There is sometimes a momentary twitching of the muscles of the body, resembling a quick shiver. Chinese consider this diagnostic, but it is absent in many cases. Individuals vary much in general appearance and behavior. Some lie down much after the disease is established, others stand listless with drooping ears, and still others, especially in the later stages, seem nervously excited and continually pace their stalls until they drop for death.

TREATMENT. There is no satisfactory treatment for rinderpest after the disease is established. Medicines administered by the mouth are useless because the motility of the stomachs is early lost, the mass of the food in the first three stomachs at the beginning of the disease remaining undigested and stationary throughout its course. Anti-rinderpest serum also fails to appreciably modify the disease if administered after the symptoms appear; and can be relied upon only within the first twenty-four hours after exposure to the infection. Only preventative measures are of any avail. The most rigid isolation practicable has proved ineffectual. The only safeguard is immunity, active or passive.

Koch discovered in 1897 that passive immunity may be conferred by the hypodermic injection of the blood serum of cattle which have recovered from rinderpest, or by the injection of bile from cattle sick with rinderpest. The injection of from 25 mils to 500 mils of anti-rinderpest serum, the quantity of serum required depending upon its strength, will immediately produce a passive immunity. The serum from cattle which have been given the disease by inoculation is apparently as potent as that from cattle which have contracted the disease naturally. It was claimed by the early experimenters, that serum afforded complete protection lasting two to four months, but it has since been found that even the strongest hyperimmune serum at no time confers absolute immunity. The protection is greatest immediately after injection, but diminishes daily and after ten to fourteen days becomes negligible. (R. C. Ward, *The Preparation and Use of Anti-rinderpest Serum.*)

The preparation of anti-rinderpest serum requires laboratory equipment and careful technique by a specially trained biologist, so freshly

made serum is at present practically out of the question for most physicians in China. Anti-rinderpest serum can be purchased, but it is very expensive, forty dollars or more a liter. One cannot afford to keep a fresh supply always on hand, and as it deteriorates rapidly it is apt to fail to afford protection. At best one injection will protect only temporarily, and must be repeated every two weeks as long as the danger of exposure lasts. Both on account of expense and uncertainty this method does not recommend itself.

Bile taken from an animal during the height of an attack of rinderpest as a rule contains the virus, and when injected into a susceptible animal has, in many instances, produced the disease. If the bile is drawn from the gall-bladder with due regard for surgical cleanliness, it may be preserved by mixing with one-half the quantity of pure glycerine. The glycerinated bile gradually loses its virulence so that at the end of nine days it may safely be injected into a susceptible animal. The writer has injected glycerinated bile five days after collection and thereby produced fatal rinderpest. He has in many instances injected it ten days after collection into susceptible animals without producing active symptoms. A period of ten days after injection is required to produce the full immunizing effect. After ten days the animals injected have proved to be partially immune to rinderpest; i.e., the subsequent injection of an amount of rinderpest blood sufficient to produce fatal rinderpest in unprotected cattle caused in those that had received the bile only mild rinderpest or no apparent reaction.

This partial protection lasts usually only two to four months but it may in some cases produce permanent active immunity, as in the following instance. In 1918 three heifers after being injected with glycerinated bile ripened ten days showed a slight dysentery, according to the report of the herdsman. As no reaction had been expected the temperatures were not taken, but two years later they failed to react to rinderpest blood, one only showing a slight rise in temperature of one degree. As these heifers were raised in our own herd and there was no other known way by which they could have acquired immunity, we must conclude that the glycerinated bile was sufficiently potent ten days after collection to produce mild rinderpest conferring active immunity. This, however, is exceptional and glycerinated bile cannot be relied upon to confer more than a temporary immunity.

The bile contained in the gall-bladders of animals slaughtered during an attack of rinderpest varies considerably in quantity, fluidity and color. It has been found by experience that the clear dark-green

bile, neither too thick nor too watery, taken from the eighth to twelfth day of the disease is the most reliable. If the date of the infection is unknown, the beginning of diarrhoea or the appearance of nasal discharge are safe guides, as these are usually marked by the ninth or tenth day. The gall-bladder should be tied off before removal from the liver, its exterior washed with an antiseptic, and the bile drawn through a sterile trocar into a sterile glass jar of at least 500 mils capacity. When nearly two-thirds full, the glycerine should be added, the jar sealed and shaken to ensure thorough mixing. After nine days it is ready for injection. As the biles of different individuals vary greatly in activity a mixture of the biles of at least three animals is more reliable.

Of the glycerinated bile 20 mils is injected into the loose subcutaneous tissue in the dewlap of a full grown animal, or a smaller quantity for calves in proportion to age. This produces a hard swelling which gradually disappears without suppuration if the skin and syringe have been properly sterilized.

During the epidemic at Shaowu of 1918, we gained the experience necessary for selecting suitable biles, and used the method successfully in protecting our herd through an epidemic lasting eight months by making a second injection three months after the first injection.

The glycerinated bile method of producing passive immunity is much more practicable than the serum method for general use, as it does not require elaborate equipment or special training for either its preparation or use. It requires only good judgment in the selection of the biles and careful attention to asepsis. It has also the advantage of cheapness, especially in regions where frequent epidemics furnish an abundance of bile.

A practical objection to this method is that the necessary bile usually cannot be procured until the epidemic is in full swing and then nine days are required for ripening the bile and still another ten days are necessary after injection for the establishment of immunity, so that there is apt to be a month after the beginning of the epidemic during which there is opportunity for exposure to infection without protection. The work involved in the injections repeated year after year is considerable, and the danger of infection during the first month of the epidemic greatly lessens the practical value of this method.

The injection of either anti-rinderpest serum or of glycerinated bile does not afford absolute protection. They protect from ordinary accidental infection, where the number of bacteria actually finding entrance into the system would be relatively few, but dose not as

a rule protect from the hypodermic injection of a sufficient quantity of rinderpest blood. The virulence of the blood, even in the acute stage of rinderpest, varies in different individuals. So the quantity necessary to produce the disease depends both upon the virulence of the blood used, and even more upon the susceptibility or, in other words, the natural resistance of the animal injected.

This partial protection can be taken advantage of to make cattle permanently immune by following the injection of serum or glycerinated bile by the injection of a sufficient quantity of defibrinated rinderpest blood to produce a mild reaction. As the virulence of the blood and the susceptibility of the individual animal cannot be predetermined, it is safest to make a series of injections of blood, beginning with .2 mils. This will produce a mild attack in some individuals but no appreciable reaction in those less susceptible. The latter should receive at intervals of from eight to ten days a series of injections of 1 mil, 5 mils and 10 mils until they react. If there is no appreciable reaction even after the largest dose, it is probable that they are safely immune. Reaction is not necessary to the development of an active immunity. Some inoculators have made the initial injection sufficiently large to produce a violent reaction, with the idea that the immunity thus produced would be more complete and permanent. Experience has shown that this supposition is incorrect, and the practice should be discouraged, as it causes unnecessary deaths or often permanent lesions which impair the strength of the cattle. When we consider the complicated nature of the digestive organs of cattle, it is evident that the severe inflammation which rinderpest causes in them is to be avoided if possible.

In employing the serum and blood method of inoculation, the injection of blood is best made immediately after the injection of serum, certainly within twenty-four hours, as the protection afforded by the serum diminishes rapidly. The injections are usually made into the loose subcutaneous tissue behind the shoulder.

In employing the glycerinated bile and blood method, the injection of blood should not be given until at least ten days have elapsed after the injection of the bile, as that period is required for the development of the maximum protection. It was formerly thought that the protection afforded by the bile became absolute ten days after its injection, and remained so for a period of two to four months, and that it was impossible to give the protected animal rinderpest except at the beginning or end of the immune period. Consequently, at the beginning of our experiments in 1918, we planned the injection of blood for

the tenth day and used a considerable dose, 5 mils, to make sure that it would produce the desired effect. It did produce it and considerable to spare, for all those injected developed rinderpest, modified, to be sure, but still severe, and fatal in fully 50%. We found that in the case of the Shaowu cattle at least, the protection is at no time absolute and that the desired reaction can be produced at any time within the two months in many and probably all of them, if a sufficiently large dose of virulent blood is injected. This greatly simplified the method, as it is very difficult to plan to have blood of the right degree of virulence on exactly the tenth day. Moreover, it is highly probable that some animals develop the immunity more rapidly than others, so that no such rule as to the exact interval could be of practical value.

Later in the epidemic, two yearlings previously injected with glycerinated bile were injected with rinderpest blood in increasing doses beginning with .2 mils without producing active symptoms. This was shortly before the epidemic came to an end and it was necessary to stop the experiments. In the epidemic of 1920 one of them was tested by the injection of rinderpest blood and proved to be still immune.

During the epidemic of 1920 a series of twenty-five, including cows and calves, were injected with glycerinated bile and after an interval of from ten to thirty days were injected with rinderpest blood. Of these twenty-five, two cows developed a very mild rinderpest, with slight temperature, decrease of appetite, and diarrhoea lasting from twenty-four to thirty-six hours. This was followed in both cases by abortion. A third cow died. This was an old cow which we intended to butcher, but was included in the experiment. She developed diarrhoea but no temperature. Her death appeared to be due to exposure to long continued chilly rain in November. She was in poor condition at the time of inoculation. How far her death should be attributed to the failure of the glycerinated bile is a question. Of the twelve calves inoculated in this series, two showed a rise of temperature of two degrees for less than twenty-four hours, and four others showed a rise of temperature and diarrhoea lasting from twenty-four to thirty-six hours. The remaining sixteen of the series gave no evidence of reaction or other disturbance, though all of the cows were pregnant.

The cattle inoculated in this series went out daily to the range where the pasturage was scanty and coarse. This furnished their only food. They were exposed to cold rains during the period and

were not in good condition. All of these conditions are favorable to the development of severe rinderpest, and probably account for the active symptoms in the seven cases. Under more favorable conditions the number showing such symptoms would doubtless have been less. But the favorable result even under such unfavorable circumstances is conclusive evidence of the protective power of glycerinated bile against rinderpest infection. The cows in this series were given .2 mils rinderpest blood at the first injection, followed at intervals of eight days or more with injections of 1 mil, 3 mils and 5 mils. Five months later they were tested by prolonged exposure to acute rinderpest, and all but one proved immune. This one exception, a cow, showed a decrease of appetite and malaise for four days, afterwards becoming normal.

The inoculation with anti-rinderpest serum and virulent blood and the inoculation with glycerinated bile followed after ten days with virulent blood are both reliable and safe methods if the serum or bile is potent and the first injection of blood does not exceed .2 mils. As the two methods are equally reliable, the choice of method will depend upon circumstances, such as the possibility of obtaining reliable serum or glycerinated bile, and their relative cost, and the experience and personal preference of the operator. For inoculation on a large scale, such as would be conducted by governments, where there would be provided the apparatus and the expert veterinarians necessary to produce a constant supply of anti-rinderpest serum of known potency, the serum and blood method would probably be chosen. For the person who is not in a position to produce his own serum, but is in a locality where frequent epidemics furnish a supply of rinderpest bile, as is the case in China, the glycerinated bile followed by blood offers a practicable and cheap method of producing immunity.

The blood obtained from a butcher, though collected from an animal showing the symptoms of rinderpest is not to be relied upon for the purposes of inoculation. It must be proved to be rinderpest, and of the proper stage to insure virulence. So we use blood from the butcher to inject a healthy animal, watch the progress of the disease, and take its blood at the proper time to inject the animal to be immunized. To make doubly sure of its virulence one or more susceptible animals are injected at the same time and with the same blood as controls.

Other experimenters have used cattle, usually calves, to furnish the blood and for controls. This necessitates killing the calves,

making the proceeding too expensive to be continued any considerable length of time. It was found that we could use goats for the purpose. As these withstand the disease better than the Shaowu cattle they could be given a mild attack from which they recovered, as a rule, after furnishing the virulent blood needed. This greatly reduced the expense, enabling us to inoculate a succession of goats extending through a number of months. In this way a series of inoculations might be continued indefinitely, thus making possible the inoculation of calves every year independently of an epidemic.

Probably there are other smaller animals which could be used for the purpose with less expense and trouble than the goats. Experiments were started with rabbits, but were interrupted before enough temperatures had been taken to warrant any positive conclusion, but the observations made seemed to indicate that rabbits are susceptible, though not as susceptible as goats.

During the epidemics of rinderpest visiting Shaowu in 1912 and 1914 and 1915, it was noticed that the nursing calves of immune cows escaped, but if these same calves were exposed in a later epidemic after they were weaned, they died of rinderpest. This suggested the possibility that such calves were protected temporarily by inherited immunity or by an antitoxin in the milk or by both together, and in the epidemic of 1918 calves of immune cows were given rinderpest blood without previous protective treatment. None of these calves were made seriously ill. It was questioned whether they had been made permanently immune. These were tested in 1920 by the injection of rinderpest blood and have proved to be still immune.

In the spring of 1921, twelve calves of immune calves were injected with virulent rinderpest blood without previous preparatory treatment. Their ages varied from five to seventy-five days. The initial injection consisted of .2 mils virulent rinderpest blood, defibrinated, and was followed at intervals of a week with injections of 1 mil and 3 mils. To insure accuracy of the initial dose, the rinderpest blood was diluted with normal saline solution in the proportion of 1 : 5. Only two of the twelve calves showed reaction. These were among the older calves, two months or over. They had moderate fever (104 to 105 degrees F.) and diarrhoea lasting from twenty-four to forty-eight hours, rapidly becoming normal in every respect. At no time were they sick enough to lose their appetite. The other ten calves, including three under one week old, showed no appreciable reaction whatever.

During the period of inoculation these calves were allowed to run with their mothers and the rest of the herd consisting of over forty

head, nearly all immune, except that the two which showed fever were separated from all except their mothers during the period of acute symptoms, because the sick calves needed to be protected from inclement weather.

It is of interest to note that a calf three months old of the same herd, which did not receive injections of rinderpest blood but was exposed to infection from inoculated cattle, contracted fatal rinderpest. This calf in turn infected her mother with mild rinderpest, showing that the cow was only weakly immune, not sufficiently so to protect her calf or even herself entirely.

The inoculation of these calves was conducted at a season very unfavorable to the best results in recoveries. The calves were exposed to hot sunshine alternating with cold rains, conditions very favorable to the development of acute rinderpest. In spite, however, of unfavorable conditions, the result in this series was one hundred per cent successful. The experiment therefore proves conclusively that it is safe to inject the calves of immune cows with virulent rinderpest blood without previously injecting the calves with either anti-rinderpest serum or glycerinated bile. It would also indicate that the younger the calves the greater the resistance, and that this resistance depends upon the degree of immunity of the mother and gradually decreases with the age of the calf.

This method of inoculating the calves of immune cows as soon as possible after birth is, from its simplicity and safety, a great advance upon former methods of inoculation against rinderpest. It is necessary to have only the first generation of cows immunized either from natural causes or by inoculation with rinderpest blood in connection with antitoxic serum or glycerinated bile, but the second and succeeding generations can be made immune without these complicated, dangerous and expensive methods.

As stated before, the writer was led to inoculate calves in this way because he had noticed in several epidemics that the calves of immune cows failed to contract rinderpest when exposed naturally to the infection, while the calves of cows not immune died under similar circumstances. So far as the writer knows no one else has reported similar experiments with the calves of immune cows, or advised the early immunization of such calves by the simple injection of rinderpest blood.

But since the series of inoculations above reported was completed, the writer has learned that as early as 1754 the inoculation of calves with virulent material during epidemics was practiced widely in Europe.

It is reported that results were variable. It is not stated that the practice of infecting calves was limited to the calves of cows known to be immune, so presumably calves of both immune and non-immune cows were infected indiscriminately, which would account for the variable results and the large proportion of fatal cases. Moreover, there is no evidence that the hypodermic injection of minute quantities of diluted rinderpest blood of proved virulency was employed, but in no other way can the quantity or quality of the infection be so accurately gauged. The former method of infection was necessarily crude and uncertain, and deservedly fell into disuse. It had this in its favor that cattle of different breeds and individuals of the same breed and individuals under different physical conditions vary greatly in their resistance to rinderpest, and that young calves appear to be more resistant to the virus than older calves or yearlings or full grown cows, possibly because their food consists so largely of milk with a minimum of roughage. The writer has observed in epidemics that well nourished young calves frequently do not show signs of rinderpest until a week or ten days later than their mothers do, apparently resisting the first infection only to succumb later to the multiplied infection from the mother. Much more rarely does the young calf take the infection first and pass it on to the mother, though an older calf frequently does, especially if it is in poor condition.

To compare the degree of immunity of the young calves of immune mothers with that of the young calves of susceptible mothers, a mixed group of both kinds should be inoculated under identical conditions. Up to the time of writing no such test has been made. But while such information would be of scientific interest, it would have little practical bearing upon the procedure for the immunization in China, or in other countries where rinderpest is met. In these countries the calves are rarely artificially fed and therefore must run with their mothers. A certain proportion of the calves of even immune mothers develop acute rinderpest as a result of the injection of .2 mls of rinderpest blood, and are thus capable of infecting susceptible cattle. The calves of non-immune cows would be at least as likely to develop the disease from inoculation, and infect their susceptible mothers fatally. Thus deprived of their natural nourishment they would themselves die. So the inoculation of calves unprotected by immune mothers must in a large proportion of cases result disastrously.

As the degree of immunity of cows which have recovered from rinderpest, either contracted naturally or by inoculation, varies greatly, the protection afforded by them to their calves would likewise vary.

The degree of immunity of the cow can be tested by the injection of .2 mils rinderpest blood, followed at intervals of a week by injection of 5 mils and 10 mils. Such cautious tests within two years after immunization have proved to be safe, even for a pregnant cow, while fatal rinderpest may develop if the quantity of virus injected at first is excessive. In view of the fact that one attack of rinderpest does not necessarily protect from a second attack, such tests repeated periodically are of great value in making the protection of the herd absolute. Such definite assurance of the active immunity of the cow insures against the loss of both cow and calf when the latter is inoculated. We have adopted the practice of injecting every individual in our herd with rinderpest blood at the outbreak of every epidemic, which at Shaowu is as often as every two years. The injection of a small quantity of blood is a very simple operation. A large number of cows can be injected in an hour. But this practice, coupled with careful attention to the general hygiene of the herd, is the only way to protect it from loss by rinderpest in regions where this cattle plague is endemic.

In the inoculation of either calves or mature cattle, where the active virus is employed, there are certain precautions which must be observed to insure the best results.

The cattle must be in good condition. This does not necessarily mean that they should be fat. Indeed it has sometimes seemed that the fatter animals, which usually have not had sufficient exercise, had less stamina than those in only moderately good flesh. But the cattle should be vigorous. Cows giving large quantities of milk are subject to a drain on their vitality which favors the development of rinderpest. There is therefore more risk in inoculating cows than in inoculating heifers, though in many cases the inoculation of cows with a small initial dose of rinderpest blood causes only temporary diminution of the flow of milk.

The food during the period of inoculation and a few days before should contain a considerable proportion of fresh green or succulent material, which puts the digestive tract in a favorable condition to withstand rinderpest. The disease causes inflammation of the whole digestive tract and rumination is lost early, but appetite is not lost entirely until later in the course of the disease. If coarse dry fodder is allowed it remains unchewed and acts as an irritant, increasing the inflammation. Cooked food like soft boiled rice and succulent green food may be allowed as long as the cattle will eat, but after they refuse such food there seems to be a craving for coarse food, which leads

them to eat their straw bedding. They should be muzzled to prevent this, as such food increases the inflammation and the severity of the disease, sometimes converting a mild attack into a fatal one.

Damp cold exerts a most unfavorable influence on the course of the disease. It has been observed that inoculated cattle showing no reaction or only a mild reaction have developed severe sickness upon exposure to rain, especially a cold rain. Chilling is especially to be avoided in the stage of the disease when the temperature begins to decline. It often happens that the diarrhœa subsides and convalescence is apparently begun, but the animal suddenly goes into collapse with subnormal temperature. Post-mortem examination reveals no anatomical lesions which should have produced death. Such animals die of systemic poisoning producing collapse with subnormal temperature. Many of them could be tided over this stage if kept for forty-eight hours in a heated room.

Pregnancy adds to the dangers of inoculation, as cows are apt to abort, even in those cases where the symptoms are otherwise mild. It is therefore preferable to inoculate the heifers before they are bred, but if this has been neglected, they may still be inoculated during pregnancy with good prospect of success so far as the life of the cow is concerned.

Ploughing cattle should have rest for a week before inoculation and for at least a month afterward.

SUMMARY.

Injection of either anti-rinderpest serum or glycerinated bile affords temporary or passive immunity against rinderpest; and is advisable only to afford temporary protection in sections where rinderpest occurs but rarely, or when for any reason inoculation producing active immunity is not practicable.

In sections where epidemics of rinderpest are frequent, all cattle should be inoculated with virulent rinderpest blood in connection with either anti-rinderpest serum or glycerinated bile.

The serum and blood method is preferable in operations on a large scale, with facilities for the production of fresh serum of known potency.

The glycerinated bile and blood method is best adapted for immunization on a limited scale, where a supply of reliable serum is not available. Where epidemics supply the rinderpest bile, its preparation is simpler and cheaper than serum.

In inoculation with either the serum or the bile method, the initial dose of virulent blood should be small (.2 mls), but in cases of non-

reaction should be followed at intervals of week or more by larger dose (2 mils and 10 mils). This is safer than giving a larger initial dose.

A severe reaction is not necessary for producing an active immunity. Some operators have employed the larger doses of virulent blood in order to produce severe reaction with the idea that a stronger immunity would be thereby produced. This is erroneous, as experience has shown that inoculated cattle developing only mild reaction or no apparent reaction are as strongly immune as those which has developed severe reaction.

The direct inoculation of the young calves of strongly immune cows with a small quantity (.2 mils) of virulent rinderpest blood without the previous injection of anti-rinderpest serum or glycerinated rinderpest bile, produces only a mild reaction or, in many cases, no apparent reaction, since such calves possess a temporary hereditary immunity. As this temporary immunity decreases with age or growth, these calves should be inoculated as soon as possible after birth. This is the simplest and safest method of producing active immunity, and should be adopted as the routine practice for the calves of immune cows, whether their immunity has been acquired naturally or by inoculation.

Recovery from one attack of rinderpest whether acquired naturally or by inoculation, does not in all cases protect from a second attack. Therefore it is advisable to reinforce the immunity of supposed immunes every two years by the injection of virulent rinderpest blood. A small quantity of blood (.2 mils) should be injected at first and followed a week or more later by the injection of a larger quantity (10 mils).

THE NORMAL RATE OF THE PULSE IN CANTONESE STUDENTS

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In the course of routine physical examinations of students at the Canton Christian College, we have regularly recorded the pulse rate. For purposes of comparison we have investigated the normal rate determined by other observers.

THE NORMAL PULSE RATE.

The rates for various ages given by Guy (1), (see Table I), are generally considered by most authors as quite reliable for the English race.

TABLE I. The Normal Pulse Rate According to Age.

Age	Guy (1)	Volkman (2)	Katzenberger (3)	Faber and James (7)	Chamberlain White Men (14)	Concepción and Bulatao (16) Filipinos	Fewers (Cantonese) (17)	Tootell (Hunanese, 1st series) (17)	Tootell (Hunanese, 2nd series) (17)	Trimble (Fukienese) (17)	Whyte (Swatow) (17)	Cadbury (Cantonese)
6	95	93	97	92	...	...	...	...	...	...	...	90
7	90	94	95	88.5	...	...	...	...	...	...	...	84
8	92	89	90	86.4	...	...	...	...	...	...	...	90
9	87	90.6	89	86.6	...	...	...	...	...	...	...	90
10	91	87	89	86.3	...	...	...	...	...	...	...	91
11	84	89	87	85.3	...	...	...	...	...	...	...	84
12	94	88	84	85.1	...	...	...	...	...	...	...	85
13	84	87	83	83.7	...	...	...	...	...	...	...	84
14	86	82	82	82.8	...	...	...	79	...	...	...	83
15	84	83	...	81.4	...	...	...	77	...	...	...	83
16	83	79.7	...	81.4	...	...	66	81	...	...	72	83
17	76	76	...	...	...	...	...	83	...	...	80	84
18	74	77	...	...	78	78.2	...	77	80	...	82	82
19	76	74	...	...	...	...	...	79	...	70	76	82
20	72	71	...	...	...	...	...	78	...	...	81	78
21	74	71	...	...	...	...	...	76	84	...	81	82
22	68	70	...	...	82	...	...	78	...	...	85	81
23	74	71	...	...	...	84.9	...	71	...	73	...	78
24	71	72	...	...	...	...	81	75	...	...	88	60
25	73	72	...	...	...	...	...	80	...	...	84	77
25-30	...	72	...	...	81	...	...	...	...	...	...	...
30-35	...	72	...	...	80	80.2	...	...	...	78	...	...
35-40	...	72	...	...	81	...	...	...	...	...	...	...
Over 40	...	...	...	...	79	69	67	...	...	...	...	...

According to Volkman² (see Table I), the influence of age on pulse frequency is not as regular as most physiologists think. The pulse rate does not regularly fall with increased age, but reaches the minimum between 20 and 24 years, after which there is a very gradual rise again.

Gould,³ after a study of the pulse of American soldiers, concludes that there is no relation between stature and rate of pulse. From a large series of normal males, he obtained the following average rates of the pulse per minute :

White soldiers	...	...	...	...	...	74.8
Full black negroes	...	...	...	...	...	74
Mulattoes	...	...	...	...	...	76.9
American Indians	...	...	...	...	...	76.3

Topinard⁴ gives the following rates for:

English	...	...	...	...	...	80
Belgians	...	...	...	...	...	71
Mexicans	...	...	...	...	...	80.2
Chinese	...	...	...	...	...	77

Katzenberger⁵ gives the results of pulse estimations in children. (See Table I.)

According to McKenzie,⁶ the normal pulse rate varies from 50 to 90 beats per minute with an average of 78.9 in the standing position, 70.5 sitting and 66.6 lying.

The pulse of normal school children seated at a table was determined by Faber and James.⁷ (See Table I.)

In the latest edition of Howell's Physiology,⁸ the average normal pulse rate for men is given as 70, and women 78 to 80. Variations are due to sex, size and age of the individual. In tall persons the rate is slower and also in very large men or women. At birth, the average pulse rate is 140; in infancy, 120; in childhood, 100; youth, 90; adult life, 75 and old age, 70. The pulse rate increases with lowering of blood pressure.

THE PULSE RATE IN THE TROPICS.

Galen said, "in hieme pulsus duriores et paulo vehementiores, tardiores fiunt." In cold climates the pulse is slower and of higher tension.

Ratray⁹ studied variations in the pulse rate during a voyage from 51° N. to 10° S. latitude. The pulse was counted in the standing posture and Table II gives the result of his investigation.

TABLE II. To contrast the tropical and temperate zone pulse (Ratray).

<i>Time of Day.</i>	<i>Tropics' Average.</i>	<i>Temperate Zone's Average.</i>
9 a.m.	86.4	91.7
3 p.m.	88.8	88.1
9 p.m.	87.3	90.5
General Average	87.5	90.1

He concludes that the lower pulse rate in the tropics is doubtless related to the diminished respiratory function. The fact that the afternoon pulse is higher in the tropics, he says, is probably because the solar heat is greater at that time.

Parkes¹⁰ states that in experiments on animals moderate heat does not quicken the heart, but great heat does. According to Plehn,¹¹ there was, as a rule, greater frequency of the pulse during his passage to the tropics and during the early part of residence there. After a year or more the pulse fell to its normal rate.

Jousset, Crevaux and Féris¹² declare that there is an increase of about ten beats in passing from the temperate to the tropical zone.

Huggard¹³ believes that "greater frequency of pulse might be expected from the fact that the peripheral vessels of the surface undergo dilatation. The increased volume of the peripheral vessels

naturally diminishes the tension throughout the arterial system and, according to Marey's law, lower tension is accompanied by a quicker pulse."

"Greenlanders are said to have a pulse rate between thirty and forty beats a minute. A higher pulse rate is usually recorded of negroes and other inhabitants of tropical countries than is usual amongst Europeans."

Chamberlain¹⁴ records the average pulse rate from 5,368 counts on 992 healthy white American soldiers in the Philippines, mostly 20 to 40 years of age. (See Table I.) He got a total average of 81 or 5 more beats per minute than the average for the temperate zone. There was no tendency to increase of rate following increased length of service. Age had little effect. There was no effect on pulse rate traced to the complexion, increased height or weight.

Castellani and Chalmers¹⁵ conclude that "in Europeans coming to the tropics the pulse rate is occasionally slightly increased. This disappears after acclimatization and the pulse rate becomes the same as in temperate zones. As regards natives of the tropics, it is stated by some authorities that their pulse is quicker than in the inhabitants of temperate zones, but we are unable to confirm this and find it to be the same as in Europeans."

Chamberlain¹⁴ studied the pulse in Filipinos of various tribes, mostly scouts or members of the constabulary, and most of them under 42 years of age. For the scouts he obtained an average of 75.7 and for the constabulary, of 82.5 beats per minute. Thus the rates for Filipino and white soldiers in the tropics are about the same, but slightly in excess of the white man in the temperate zone.

Concepción and Bulatao¹⁶ examined 536 male Filipinos of an average age of 29.5 years. The average pulse rate of these was 81.5 beats per minute. (See Table I.)

THE PULSE RATE OF CHINESE.

In order to determine the normal pulse rate of Chinese a questionnaire was sent out to physicians working in China. Reports on the pulse rate of normal individuals were received from five persons besides the author.

The tabulated results are to be found in Table I, and some of the data have already been published.¹⁷

All persons suffering with heart or lung disease or showing other signs of illness were excluded.

Doctor H. W. Boyd, of Canton, reported on twenty-five men and women all but one of whom were from the province of Kwangtung,

The other came from Kwangsi. Various occupations were represented. The average age was 28 years, varying from 18 to 54, and the pulse rate averaged 81 beats to the minute.

Doctor E. W. Ewers,¹⁷ of Yeungkong, Kwangtung Province, reported on eleven cases, all Cantonese, of various occupations. The pulse was taken in the sitting posture. (See Table I.)

Doctor George T. Tootell¹⁷ reported on the pulse of 300 Hunanese students, presumably from Central China. In some of these it is not explicitly stated whether they were standing or sitting. Others it is known were sitting. (See Table I.)

Doctor C. G. Trimble reported on thirty-two normal males, twenty-four from Fukien Province (see Table I), and eight from other provinces; the average pulse rate was 79 beats.

Doctor G. Duncan Whyte,¹⁷ of Swatow, in Kwangtung Province, reported the pulse rate of eighty-five male students. Their weights varied from 25.8 to 64.4 kilograms (57 to 142 pounds). (See Table I.)

The figures reported by us a year ago¹⁷ have been amplified so that we now have records of 932 healthy male students of the Canton Christian College. Only boys from the provinces of Kwangtung and Kwangsi were included in the series, most of them coming from the tropical portions of these provinces. (See Tables I and III.)

TABLE III. Pulse of Healthy Cantonese Males, Sitting Posture.

<i>Age</i>	<i>Number of Cases</i>	<i>Average Rate</i>	<i>Maximum</i>	<i>Minimum</i>
6	1	90		
7	6	84	92	68
8	27	90	124	76
9	39	90	120	54
10	37	91	114	64
11	45	84	128	56
12	68	85	120	64
13	60	84	114	64
14	77	83	124	60
15	108	83	114	60
16	107	84	120	52
17	108	82	120	44
18	91	82	120	54
19	68	82	114	60
20	47	78	102	54
21	17	82	116	60
22	12	81	102	72
23	4	78	90	66
24	1	60		
25	2	77	80	74
26	1	72		
27	1	64		
28	0			
29	1	88		
30	1	72		
31	2	81		
36	1	72		

All students in whom any cardiac murmur or other irregularity was found are not included, as well as boys with pulmonary or other disease that might possibly affect the heart rate.

The pulse was counted for from 30 to 60 seconds with the subject seated quietly at a table.

For ages 6 and 23 and above, the numbers were so few that data are unreliable. From ages 7 to 16 inclusive, the rates for Cantonese youth are nearly parallel with those reported by Guy, Volkmann and Katzenberger. They average above the rates for children given by Faber and James.

From the 17th year to the 23rd, the grand average for the various years is 80.6. This is near to Chamberlain's rate for white men in the tropics and the averages for each year are seen to be definitely higher than recorded by Guy and Volkmann. Our figures follow pretty closely those recorded by Ewers and Whyte for Cantonese. They are higher than the rates recorded for Hunanese and Fukienese.

We agree with Plehn, Jousset, Crevaux and F  ris, Huggard and Chamberlain that there is a tendency for elevation of pulse rate in the tropics. Rattray's findings have not been confirmed.

The cause of the increased rate among the Cantonese may be attributed to the small stature, light weight and low blood pressure which we have found to be characteristic of them.

Since reports for Chinese in Central China show a lower pulse rate, we may assume that the tropical climate of Canton may likewise be a contributing factor. The less height and weight of Cantonese, however, must be of some influence.

CONCLUSIONS.

The average pulse rate per minute of the healthy Cantonese male, resting in the sitting posture, is as follows :

For ages 7 to 10 years	...	...	...	...	88.7
" " 11 to 15 "	...	...	...	...	83.8
" " 16 to 20 "	...	...	...	...	81.6
" " 21 to 25 "	...	...	...	...	75.6

These rates are above those recorded for males of the same ages in temperate climates, and approximate the average rates recorded for white and Filipino males living in the Philippine Islands.

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All medical papers and other literary communications intended for the JOURNAL, and all books for review and magazines in exchange, should be addressed to the Editor, St. John's University, Shanghai.

Changes of address of members of the Association, departures and arrivals, and all business communications should be sent to Dr. R. C. Beebe, 5 Quinsan Gardens, Shanghai.

Every member of the China Medical Missionary Association, who has paid his dues for the current year, is entitled to a copy of the CHINA MEDICAL JOURNAL for the year, postage free. To those not members the subscription to the JOURNAL is \$5.00 Mex., per annum. In remitting by cheque, please specify Shanghai Currency. Payment should be made to the Treasurer of the Association, Dr. H. H. Morris, 4B Minghong Road, Shanghai, or to Dr. Beebe 5 Quinsan Gardens, Shanghai.

Editorial.

Medical Missions and the Home Boards

The longer we are in the field the more we are convinced that the co-operation of the Mission Boards in the homelands with the Mission Hospitals in the field is far from satisfactory.

There are various reasons to account for this, but one of the real underlying reasons seems to be that the Boards have never waked up to the greatness of the needs in the case or the actual assistance that the medical work is to the evangelistic.

If the writer is not mistaken, there are only one or two Mission Boards in America and the same number in England on which there is any medical representative whatever; and outside of the Edinburgh Medical Missionary Society no single organization is devoting its time and energy to this branch of missionary service.

It remains to be seen what the National Christian Conference has to say on this subject, if anything, and what suggestions it will make, if any, acting on the report of Commission II.

Welcome to our City

Once in a long time a big meeting like the National Christian Conference is called together, and from far and near the missionaries gather to take counsel and discuss the needs of the field, as well as their likes and dislikes.

So it comes about that, in an assembly of this kind, a fair proportion of medical men are impressed into service as representa-

tives of their missions, thereby introducing a leavening influence which ought to raise as well as improve both the flavor and character of the goodly loaf.

To them and to all visiting missionaries the JOURNAL extends greetings and Godspeed in the work of the Conference.

MUKDEN MEDICAL COLLEGE.

Graduation Ceremony at a Great Institution: Tributes to the Work of the Founders: Handsome Gift from Sir Joseph Maclay

That the Mukden Medical College is a factor to be reckoned with in the life of China was strongly emphasized at the third graduation ceremony held on March 28.

Opened in March 1912, and situated in the East Suburb of Mukden, the handsome college buildings, with all they signify of progressive development in the intellectual life of the nation, speak of a dream long cherished and now in process of realization—a dream which will be fulfilled only when the College, as was the aim of its founders, becomes a truly Chinese institution. Although at present the majority of the staff are foreigners, and the college is managed by representatives of all the Missions at work in Manchuria, it is the aim of this truly Union College (to quote from its constitution) “to have it gradually and ultimately financed, staffed, and controlled by the Chinese themselves, but not in any way which will impair the Christian or scientific character of the college.”

POPULARITY OF THE COLLEGE.

The College is well known throughout north China as one of the popular avenues into the medical profession. Its students are drawn from the best among the Government and Christian middle schools, and there is no lack of entrants. In fact, the number of students is limited only by lack of accommodation.

That the College is able to send out an increasing number of fully qualified medical men is due to the fact that it has a full staff of 12 foreign experts, of whom 10 are medical—and two Chinese—graduates of the College who have recently returned after a course of post-graduate study in Scotland—while three more graduates are taking post-graduate study in Peking with a view to responsible appointments on the staff in the near future. With such a staff, with good equipment

for class work, and with special facilities provided by the Government for dissections, one naturally expects, and gets, the best results. The graduation ceremony spoke eloquently as to these.

THE DAY'S PROGRAMME.

The ceremony was notable for the cosmopolitan character of those who attended. They were fully representative of the official, the scholastic, and the social life of Mukden, a clear indication that the College has not only the most friendly relations with the various Government Departments, but has also won its way into the affection of all classes.

The official programme was as follows:—

Anthem, Student Choir

Prayer, Pastor Wang

Opening Remarks—The Principal, Dr. Christie

Address—H. E. The Governor-General, Mr. Chang Tso-lin

Address—H. B. M. Consul-General, Mr. Wilkinson

Address—The Provincial Governor, Mr. Wang

Address—The Commissioner of Education, Mr. Hsieh

Presentation of Diplomas.

Address to new graduates, Dr Gray, Peking

Address to students, Rev. Dr. Webster

National Anthem, Students.

FORTY YEARS' WORK.

In opening the proceedings Dr. Christie gave a hearty welcome to the visitors. He spoke feelingly of the work of the last 40 years. From the smallest beginnings, and after facing and overcoming obstacles almost insuperable, he showed how a great stage had now been reached in the development of medical work in Mukden. Forty years ago the hospital—which is an integral part of the College, and provides the students with unique facilities for medical and surgical instruction (out-patients last year numbered 43,000)—was established. He reviewed the early days when, with Dr. Webster—now most appropriately visiting China—the first hospital was opened in Mukden. He sketched graphically the gradual breaking down of prejudice: the increasing kindness on the part of the Chinese people, and the growing sympathy and helpfulness of the officials, without which the work could not have prospered as it had done. He touched upon the great need of fully qualified medical men in China to-day—a need which the College was

attempting, and with some measure of success—to supply, and bespoke on the part of his hearers a personal and practical interest in the work.

CHINESE APPRECIATION.

H. E. the Governor-General was unable to be present owing to the political situation, but through his representative sent complimentary greetings.

The Provincial Governor also sent his apologies through his representative, who expressed his good wishes for the continued success of the College.

After addresses by the British and American Consuls-General; the Commissioner of Education; the Chinese doctor in charge of the Chinese Hospital; the Pastor of the Chinese Church, and others, the representative of H. E. the Governor-General presented diplomas to 27 graduates thus bringing the total number of graduates up to 74.

Dr. Webster, who, as indicated, was Dr. Christie's colleague 40 years ago, and who is now one of the Foreign Mission Secretaries of the United Free Church of Scotland, gave an eloquent address reminiscent of the days of small things, and full of hope and inspiration for the days that lie ahead.

THE MOMENTOUS DAY.

The address to the graduates was given by Dr. Gray, of the British Legation, Peking, who had come specially for the ceremony. He pointed out that the obtaining of a diploma was a momentous day in the career of a student, marking, as it did, the termination of a long course of hard study; and that it opened out a career the making or marring of which lay in their own hands. He pointed out the various avenues of service open to the graduates and urged them, whatever work they undertook, to keep up-to-date in medical matters, to cultivate the habit of recording observations, and so to lay a sure foundation for a successful and useful career. It was a memorable address which would serve to send the men forth to their work with high hopes and the earnest desire to deserve well of their country.

Dr. Webster thereafter opened a new out-patient department of the hospital, after which the guests availed themselves of the opportunity of looking over the Hospital and College.

Dr. CHRISTIE'S DEPARTURE.

Dr. Christie returns to the Homeland about the middle of May next for health reasons, but he leaves behind him, in the Hospital

and College, a great memorial of work well done and of work that will go on from strength to strength as the Chinese people themselves, on whose behalf the work was started, and for whom it is being carried on, become qualified to assume the responsibility of taking it over and continuing it on the solid basis of Christian helpfulness for the youth of the nation, for the good of their fellows, and for the benefit of their country

WOMEN STUDENTS.

It may be added that in 1924, thanks to the splendid generosity of Sir Joseph Maclay, late British Shipping Controller, the doors of the College are to be thrown open to women medical students, and already there are quite a number who have expressed their desire to be admitted and who are preparing for the entrance examination.

North China Daily News.

KULING MEDICAL ASSOCIATION PROGRAMME SUMMER 1922.

In July. Dr. R. M. Atwater will start a Sanitary Survey of Kuling.

Come early in the month and help him and have others of your mission help in this work. The work will finish on Good Health Week, July 17th to July 22nd. During this week Dr. Atwater will audit the findings and hold a Conference Course in the Auditorium. This will give you a chance to learn what to do and how to do it. A course of great practical value to your mission and to your community.

A Course for all Educational Workers and Mothers will be Dr. Appleton's course in the Health of the Primary School Child. She will take up School Inspection, Simple Physical Examinations and Corrective Hygiene. Work to be given in conference and by demonstration. Given in Medical Hall. Tell members of your Mission.

Miss Barger will give a course in Physical Training for Girls this same week at Medical Hall and the playgrounds. Miss Barger is the head of the Y. W. C. A. Training School and this will be a most valuable course. It will save your making serious mistakes.

Each evening during Health Week Prof. C. H. Robertson will give a Scientific Lecture in the Auditorium. He will bring his most interesting apparatus with him. This is a rare chance to hear him in

English. He makes the Creator more real yet an infinitely greater Creator than we have known. The great expense of transport compels us to make a moderate charge for these lectures.

Dr. Gray will hold his Physical Training School for Chinese in Lily Valley in August. If you have not received his announcement write Dr. Gray, National Y. M. C. A., Shanghai. See that your Chinese teachers or advanced students attend this Training School.

MEDICAL ASSOCIATION BANQUET, AUGUST 1ST.

Beginning August 8th, and running to August 22nd, there will be two Medical Courses for Doctors. Each will last about ten days. The first by Dr. Farnum of Hunan-Yale will be on Diseases of Children. Clinical material found on the hill will be used and the course will be practical with review of modern methods. The second course will be in epidemic diseases, by Dr. Atwater. He will discuss modern methods of prevention and immunization. We will be prepared to give Toxin-Antitoxin Immunity for Diphtheria if you will notify the Secretary how many in your mission require. There will be a fee, not over \$15 for these two courses. They are intensive in the hope that every doctor may arrange to get at least one of them. Send the Secretary your registration as soon as possible. Nurses will be admitted if there is room for them.

If you wish any special information write the Secretary, Dr. Paul Wakefield, Boone University, Wuchang.

You will see this is a rather ambitious programme. We have found every one with whom we have talked enthusiastic about it. It is going to cost us considerable to carry it out. Already we have had friends give and promise aid in the finance of the work. But much of the success depends on your support and your getting your Mission members to attend these courses. Take this up seriously. Advertise. Teach the importance of these matters. Make Kuling a place of inspiration. A place that will give you ability to do your next year's work easier and better.

ANTUNG MEDICAL REPORT FOR 1921.

L. K. LARSEN, Customs Medical Officer.

The health of the foreign community has been fairly good. No case of death.

A severe case of chronic dyspepsy in a woman on whom laparotomy had been performed thrice before her arrival out here. The same patient got a severe attack of pyelonephritis, but recovered from that.

Typhoid fever, one case, severe, recovery.

Dysentery, two mild cases, recovery.

Malarial fever, one case, recovery.

Influenza, one case, and Icterus catharralis, one case, both recovered.

The Chinese community. In the autumn a severe epidemic of scarlet fever with huge mortality amongst the children. I know of one family, whose four children all died in a few days from this disease.

No case of cholera has been noticed this year. In the beginning of the year a few cases of encephalitis lethargica.

Two cases of what clinically looked like diphtheria, both in the same home; the one patient, a little child, died, the other, an adult, recovered.

Diphtheria is very seldom met with here.

The town has never had an isolation hospital.

This year the local Red Cross Society builded an isolation hospital, but only put up the buildings, which have been closed since the spring, as there were not funds enough to equip the hospital and open it. It is planned to open it as a general hospital and only during epidemics use it as an isolation hospital.

Of public interest is it also, that the first steps have been taken for the building of a quarantine station and it may reasonably be taken for granted that these plans will be realized during 1922. Such a quarantine station may be of great importance as a barrier against the entrance of contagious diseases from abroad into this part of Manchuria.

PUBLICATION COMMITTEE.

P. B. COUSLAND, 4 Quinsan Gardens, Shanghai.

A request came recently from an interne in a large hospital for the loan of some of our most recent books as he could not afford to buy them. May I suggest that every hospital should have a LIBRARY OF OUR BOOKS and have a standing order with the Mission Book Company to send on a copy of each new book or new edition as it is published. And also that every hospital should subscribe for copies of the **TSINAN MEDICAL REVIEW** published by the School of Medicine of the Shantung Christian University, Tsinan, Shantung.

Vol. V, *Rose and Carless Surgery*, will be ready in May. All those wishing Vols. IV and V should order them now as the edition in separate volumes will soon be exhausted. An edition in one volume will be issued this summer.

New editions of *Read's Materia Medica Tables and Notes* and *Leslie's Public Health* are now on sale, also Vol. I *Gray's Anatomy* and *Folin's Laboratory Manual of Physiological Chemistry*.

The Roller Bandage, *McPherson and Henderson's Chemistry*, a *Glossary of Official Chemical Terms*, and Vol. III *Cunningham's Practical Anatomy* are almost ready.

Inspection of our Advertisement pages will show considerable reductions in the prices of a number of books, both new and old.

**AN UNUSUAL CYST CURED BY INJECTION
OF TR. IODIN.**

C. H. HOLLEMAN, M.D., Lungyenchow, Fukien.

Two years ago, a young man of twenty-one came to the Fagg Memorial Hospital with the following history: Three years previously there had gradually appeared a painless, soft swelling in the region of the right temple. This increased in size until about the size of half an egg, when it suddenly disappeared but a new tumor appeared in the cheek; moreover, pressure over the cheek made the previous swelling come back. There is no obtainable history of trauma, redness or pain at any time.

Examination showed the following: General physical examination was negative. Teeth exceptionally well preserved and no sign of

previous disease in the mouth. The right parotid duct has a normal discharge of saliva. The right side of the face is the seat of a swelling which shows a bulging above and below the zygoma. No redness or sign of inflammation. Pressure on either tumor gives an easily demonstrable impulse in the other. The communicating current is underneath the zygoma.

Diagnosis :—Collection of fluid between the temporal and mandibular muscles originating above the zygoma. Cause unknown.

Treatment :—By means of a large hypodermic needle, about two ounces of a clear amber fluid was withdrawn. This fluid at room temperature failed to digest starch, as shown by Fehling's test. An attempt to pass a small copper wire into Stenson's duct was unsuccessful. Patient came back again in one month with recollection of the fluid. Said it was near former amount after ten days. This time an incision was made in the buccal cavity draining the fluid readily, but this wound healed in a few days and condition was the same as before. On his third visit, having in mind an old-time treatment of hydrocoel, I suggested the injection of Tr. Iodin thinking that the accompanying inflammation might obliterate the cyst cavity. This was refused because he feared pain. From this time on the fluid has been withdrawn on an average of about once per month, a total of fifteen times.

Two days before Chinese New Year he came again with the request that the fluid be withdrawn because he wanted to have his picture taken. This time, without consulting him, I withdrew the fluid and injected five mils of a 1% solution of Procaine followed after ten minutes by 5 mils of 7% Tr. Iodin. There was practically no pain after the injection but there was great swelling of the face on the next day. The picture taking date had to be postponed. The swelling gradually subsided and at the end of a week face was normal. It is now fifty days since the injection of Iodin and there is no sign of recurrence.

PUBLIC HEALTH PROPAGANDA, ATTENTION BATTALION!

With the coming of warm weather, hibernating flies will emerge and begin the cycle of laying innumerable eggs. Doctors at work in cities with schools might well stimulate the students to follow the example of Hangchow. Seventy-nine students from ten primary schools killed 770,000 flies. The flies were brought daily to the Young Men's Christian Association where they were measured and destroyed. As a result, people learned to use fly swatters and now the shops order these swatters for sale. At the same time they were taught the importance of eliminating fly breeding places. This was the first large movement of the kind in Hangchow and augurs well for future efforts. A fly killed in time will save several millions.

Book Reviews

"HANDBOOK ON LEPROSY." By Ernest Muir, M.D., F.R.C.S.; Edinburgh. Published at *Cuttack, India*, by R. J. Grundy.

This small handbook as stated by its author was written to be of help to superintendents of Asylums, District Boards, Municipal and Educational Authorities in India. It does not claim to be a treatise on the subject, but for the general practitioner in an endemic area nothing could be more useful.

In five sections Dr. Muir deals clearly and from wide experience, with diagnosis, treatment, isolation and segregation, Leper Asylums, Colonies and Hospitals, and with Research work. The book is profusely illustrated, those dealing with the fruit, seeds and leaves of trees from which Chaulmoogra Oil and its substitutes are obtained, being particularly interesting.

To-day many eyes are rightly focussed on the treatment of the leper subject. The experimental work of Sir Leonard Rogers at Calcutta is here dealt with into other modern methods, and particularly that dealing with the production of the Ethyl Esters of the fatty acids of Chaulmoogra and similar oils, Dr. Muir enters fully and sympathetically.

The book concludes with plans of model wards, settlements, charts for registration of inmates, case-taking forms, etc.

These with suitable modifications could well be employed in the Far East.

In view of the increased attention which must shortly be given to leper problems by Governments, Provincial Authorities and others, this handbook would seem to have arrived at a most opportune time.

With great pleasure and confidence we recommend the book to all those interested in the cure of this old time disease. We have found it both stimulating and instructive.

HENRY FOWLER.

CHINA AND MODERN MEDICINE. By Harold Baime, F.R.C.S., D.P.H. Dean of the School of Medicine, Shantung Christian University, Tsinan. Published by the United Council for Missionary Education, London. 5/- net, post-free 5/3.

China and Modern Medicine is a clear, concise and very interesting account of the history, development and future outlook of medical missions in China, and fills a distinct need in the intelligent study of this important subject, either as a textbook for mission study classes or for the individual reader. The book is well illustrated, convenient in size and attractive in make-up, and should be a great help toward increasing the interest in medical mission work among those at home.

NEWS NOTES.

Arthur H. Thomas Co., dealer in Laboratory apparatus and reagents, whose advertisement appears in this issue of the JOURNAL are very desirous of making an adequate distribution of their new 828-page catalogue Laboratory Apparatus and Reagents to those engaged in organized laboratory work in China institutions, particularly those under control of various Missionary Associations in the U. S. As the catalogue is an elaborate and expensive publication, it is often necessary to exchange correspondence before catalogue can be sent because of inadequate information as to the connection of the individual making the request with institutional work, and they can not afford to send the catalogue to practicing physicians as it contains but little of interest for them.

Practice of Obstetrics, Edgar, 1914 ... 1 ..	6	6
Surgical Treatment, Cleynne and Burg- hard, 1915 ... 5 ..	30	30
Obstetrics, Normal and Operative. Snears, 1916 ... 1 ..	35 shil.	8
Diseases of the Diges- tive Organs, Aaron, 1918 ... 1 ..	7	7
Materia Medica and Therapeutics, Wil- cox, 1917 ... 1 ..	4.75	5
Diseases of the Stomach, Lock- wood, 1913 ... 1 ..	5.50	5
Operative Thera- peutics, John- son, 1915 ... 5 ..	35.00	35

The Library of the Medical Department of the Shantung Christian University at Tsinan has on its shelves certain duplicates which it would be glad to dispose of at greatly reduced prices. One or two of them are the latest editions and unused. The following is the list. In the first column are the advertized prices in Gold, and in the second the price in local currency for which we will sell them, postage prepaid.

Duplicate Copies in Library of Tsinanfu Medical School.

	Adver- tized Price. Gold.	Advertized Price Gold. Price asked Max.
Operative Gyne- cology, Howard Kelly, 1906 ... 2 vols.	\$15	\$15
Infection and Re- sistance, Zinsser. 2 copies offered, 1914 1 ..	5	5
International Medi- cal Annual. 1912- 13-14-15-16-17 5 ..		3.50 each.
Mayo Clinic Col- lected Papers. 1911-1917-1918 3 ..	5	5
Diseases of Heart and Aorta, Hirsch- felder, 1910 ... 1 ..	6	6
Principles of Pathol- ogy, Adami, 1908 2 ..	10	10
Obstetrics, Whitredge Williams. 2 copies, Third Edition, 1916 Fourth (latest), 1917		17

WANTED:--The file of the CHINA MEDICAL JOURNAL in the British Museum Library is complete up to the year 1902 after which year there are no copies on file. It is desirable that a complete file be secured for the British Museum Library. If anyone is willing to contribute copies of a date during 1902 and thereafter will they please send them to the Executive Secretary, 4 Quinsan Gardens, Shanghai.

The complete Report of the Biennial Conference of the Nurses' Association of China, in Chinese and English, is published in the April number of the Quarterly Journal for Chinese Nurses. The price is fifty cents, or \$1 for the Report and for the Quarterly Journal for the remainder of the year.

Address,

Quarterly Journal for Chinese Nurses,
18 Quinsan Gardens, Shanghai.

Editor,
China Medical Journal,
Shanghai.

DEAR SIR:--Dr. and Mrs. Russell F. Maddren who have been at the North China Language School in Peking, have joined the staff of the Hunan-Yale College of Medicine in Changsha.

Dr. E. C. Dudley, Professor Emeritus of Gynecology of Northwestern University, will arrive in Changsha about the middle of March and will spend a month at the Hunan-Yale College of Medicine

and Hospital. He will give a series of clinics and lectures for the students and members of the staff. All visitors who are interested are cordially invited to avail themselves of these clinics.

The exact date of Dr. Dudley's arrival in Changsha, and any other information, will readily be given by the Dean of the College of Medicine.

Very truly yours,

J. R. B. BRANCH, M.D.

Physician in Charge.

A STANDARDIZED SYSTEM OF HOSPITAL ACCOUNTING.

Through the liberal kindness of the China Medical Board, the C.M.M.A. has received from the United States a shipment of loose leaf binders and a large supply of blank sheets. The blank are arranged for entries according to the system devised by Dr. Houghton and approved by the Council on Hospital Administration. These are intended to give a uniform system of hospital accounting and show the expense of hospital administration in a clear and comprehensive way that will be readily available for comparison.

These will be furnished to mission hospitals at first cost of manufacture in the United States without charge for shipping, duty, etc.

There are two styles of binders. The "M" style leather and cloth binding with key, is the larger and more durable book and will be supplied for \$35.50 Mex.

The "O" style, without closed end and with removable posts, has cloth binding. This style is not so strong or complete as the "M" style and does not hold as many sheets. Its price is \$11.00 Mex. The blank sheets are 7 cts Mex. each.

An opportunity is thus afforded hospitals to secure a very superior book for accounting at less than actual cost, and if generally adopted will secure a uniform system of accounts and make possible the solution of many problems in the study of hospital finances.

EVERY MISSION HOSPITAL SHOULD
HAVE ONE OF THESE
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The China Medical Journal

PUBLISHED BY

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EDITOR . . . EDWARD M. MERRINS, M.D.

BUSINESS MANAGER, R. C. BEEBE, M.D.

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ILLUSTRATIONS.—Illustrations should be clear. Of photographs send a good print rather than a negative. Write title or short explanation on back of each picture or table. See that the text references and "figures" correspond.

BIBLIOGRAPHIC REFERENCES.—References to authors in the text should be made in the following way:—"According to Smith¹ (1900) the spleen is enlarged, but Robinson² (1914) says the reverse." Authors quoted should be numbered in the order of citation and the bibliographic reference should be given the same number. Arrange references in a list at the end of the article in the order of the numbers.

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