The BULLETIN

OF THE

VANCOUVER MEDICAL ASSOCIATION

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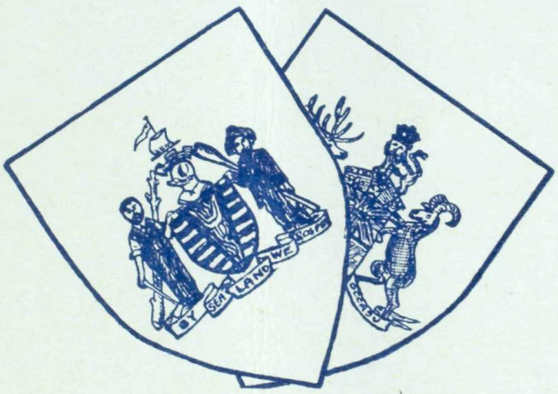

In This Issue:

SECRETORY DISTURBANCES OF THE STOMACH

ANNUAL DINNER

INFECTION: ITS SPREAD AND CONTROL

(Conclusion)

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THE VANCOUVER MEDICAL ASSOCIATION

BULLETIN

Published Monthly under the Auspices of the Vancouver Medical Association in the Interests of the Medical Profession.

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VOL. XI DECEMBER, 1934 No. 3

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STATISTICS—OCTOBER, 1934

Total Population (Estimated)	243,711
Japanese Population (Estimated)	7,866
Chinese Population (Estimated)	8,315
Hindu Population (Estimated)	251

	Number	Rate per 1,000 Population
Total Deaths	175	8.5
Japanese Deaths	4	6.0
Chinese Deaths	5	7.1
Deaths—Residents only	156	7.5
Birth Registrations— Male, 172; Female, 153	325	15.7

INFANTILE MORTALITY—	October, 1934	October, 1933
Deaths under one year of age	11	9
Death rate—per 1,000 births	33.8	35.7
Stillbirths (not included in above)	3	8

CASES OF COMMUNICABLE DISEASES REPORTED IN THE CITY

	September, 1934		October, 1934		November 1st to 15th, 1934	
	Cases	Deaths	Cases	Deaths	Cases	Deaths
Smallpox	0	0	0	0	0	0
Scarlet Fever	31	1	53	0	20	0
Diphtheria	1	0	0	0	0	0
Chicken Pox	8	0	54	0	32	0
Measles	0	0	0	0	0	0
Rubella	0	0	1	0	0	0
Mumps	12	0	38	0	18	0
Whooping-Cough	11	0	20	0	6	0
Typhoid Fever	0	0	2*	0	1	0
Undulant Fever	0	0	0	0	0	0
Poliomyelitis	0	0	0	0	0	0
Tuberculosis	35	7	63	10	29	..
Meningitis (Epidemic)	0	0	0	0	0	0
Erysipelas	2	0	2	0	0	0
Encephalitis Lethargica	0	0	0	0	0	0
Paratyphoid	0	0	0	0	0	0

* Non-Resident.

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VANCOUVER MEDICAL ASSOCIATION

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Programme of the 37th Annual Session

GENERAL MEETINGS will be held on the first Tuesday of the month at 8 p.m.

CLINICAL MEETINGS will be held on the third Tuesday of the month at 8 p.m.

Place of meeting will appear on Agenda.

General meetings will conform to the following order:

8:00 p.m.—Business as per Agenda.

9:00 p.m.—Paper of the evening.

1934.

October 2nd—GENERAL MEETING.

DR. G. F. AMYOT: "Infection, Its Spread and Control."

Discussion: DR. E. D. CARDER
DR. H. A. SPOHN.

October 16th—CLINICAL MEETING.

November 6th—GENERAL MEETING.

DR. C. E. BROWN: "Some Secretory Disturbances of the Stomach."

Discussion: DR. H. A. DESBRISAY.
DR. A. Y. MCNAIR.

November 20th—CLINICAL MEETING.

December 4th—GENERAL MEETING.

DR. A. B. SCHINBEIN: "Tumours of the Breast."

Discussion: DR. J. J. MASON
DR. B. J. HARRISON
DR. H. H. PITTS.

December 18th—CLINICAL MEETING.

1935.

January 8th—GENERAL MEETING.

DR. W. E. AINLEY: "The Relation of the Retina to Cardio-Vascular and Renal Disease."

Discussion: DR. W. D. KEITH
DR. WALLACE WILSON.

January 22nd—CLINICAL MEETING.

February 5th—GENERAL MEETING.

DR. MURRAY BLAIR: "Physiological Observations in Obstetrics."

Discussion: DR. W. S. BAIRD.

February 19th—CLINICAL MEETING.

March 5th—GENERAL MEETING.

THE OSLER LECTURE—DR. WALLACE WILSON.

March 19th—CLINICAL MEETING.

April 2nd—GENERAL MEETING.

DR. F. W. EMMONS: "The Surgery of the Presacral Nerve."

Discussion: DR. J. J. MASON
DR. F. TURNBULL.

April 16th—CLINICAL MEETING.

April 23rd—ANNUAL MEETING.

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EDITOR'S PAGE

There is a school of thought which holds that history goes round in a circle—"repeats itself" is the phrase. There is much to support this view, especially if one regards such things as fashions; even physical fashions run in cycles, as the immortal Mae West has shewn us.

But some of the more optimistic among us are inclined to disagree with this view, and regard the course of history as an ascending spiral rather than merely the circular and unending route of the ox that one sees in some countries attached to a long pole pivoted on a central post, and, as he travels in an everlasting circle goaded on by a small native boy astride the pole, supplying the motive power for a sugar mill or some such primitive machine. Our eye seems to discern signs of progress, rather than merely a return to a phase of a cycle,—at least, in our more sanguine moments,—even if at times we incline to the cynical or "hard-boiled" attitude of the Preacher, when he declares that there is "nothing new under the sun."

This is, perhaps, a rather lengthy preamble to our subject: which is the return of the general practitioner. We would perhaps not have dared, since that is our own line of work, to broach this topic so boldly—but the attitude of our co-editor, himself a specialist, in the editorial he wrote some three months ago, has greatly encouraged us, and supported us in our frequently-expressed opinion that a great many specialists, after all, are quite decent fellows.

But, jesting apart, one sees clearly a definite swing back to what one might call the general practitioner point of view, in the last few years, and we cannot help saying that we feel that this is all for good. There has been, in the last generation, let us say, an over-emphasis on specialism, and to many of us this has seemed to be tending not towards edification. There is no room for debate, of course, as to the need for specialists, and their value—we simply cannot do without them, and if we have any sense, we use their services more and more—but there is considerable room for debate as to their number and the method by which they evolve. We ourselves have always felt that a specialist *should* evolve—unlike the poet, we think he is made, and not born, a specialist. But it is quite evident that many have disagreed with this view—and full-fledged specialists appear from universities and hospitals who have never done general practice.

Years have taught us to avoid the reactionary point of view. Not that we agree with the mental attitude that resignedly accepts the *status quo,* and says "What is, is right"—but we have come to see that nothing lasts long or has much real staying power unless it contains a real element of value; and it is evident that the present state of things grew out of a need, and was evolved to meet that need. But we think that, as so often happens, the movement went too far, and the general practitioner point of view, that we referred to above, was, temporarily at least, lost to a great degree—and we think this is a pity. But we see it coming back.

Of course, the cynic may say it took the depression to rediscover the general practitioner, and that when times are good again, he will relapse into his usual state of decent oblivion. But we do not think so. The depression has perhaps restored to him some of what he regards as his lawful property—but the trend back to the general practitioner began long before the depression. Social medicine is built around him, and must always be. The recent developments in health work, and disease prevention, are built round him, and he is being enlisted and used, to the great profit of all con-

cerned, as an integral and important part of the machinery of disease prevention. This is, to us, a proof that progress is upwards rather than in a circle. And even certain specialists are urging their own kind to think, not as specialists, but as all-round internists. (They do not mention surgeons; we wonder why?) And our own feeling is that no specialist is quite safe or efficient unless he thinks in general terms first.

Even in nursing we see this tendency. Dame Janet Campbell, our recent illustrious visitor, was referring to the methods adopted in some centres, where the same nurse does pre-school and school work, general preventive work, and maternity work. A general practitioner, in other words.

And this leads to the powder hidden in the jam. The general practitioner need not preen himself on anything that he has done to bring this about. The great advances are made, not by one side or the other, but by the joint work of the two; and the obligation is on the general practitioner to measure up to this new standard of confidence. It must have been his failure in some respect, or deficiency, not necessarily culpable, that led to the evolution and even the hypertrophy of the specialist—and he must grow himself, all-round if you like, and *fill* his rightful place, not merely *occupy* it. The future holds great promise and opportunity for the general practitioner of medicine—he will undoubtedly be the predominant figure for many years to come—but this means responsibility as well as privilege, and it is for us to meet the former, and not merely claim the latter, of these two.

NEWS AND NOTES

It is with deep regret that we record the death of Dr. F. Stainsby on November 8th. Dr. Stainsby, while at the time of his death he was practising in West Vancouver, was well known to many of the profession on this side of the Inlet, as he once practised here. He was greatly loved by the West Vancouver community, as was shewn by the very large attendance at his funeral.

* * * *

Dr. E. T. W. Nash, lately interne at St. Paul's Hospital, has started practice in Vancouver, his office being located in West Point Grey. We wish him every possible good fortune. He began well, by winning a prize of astronomical proportions in the Vancouver Exhibition this year, as many of us will remember hearing.

* * * *

Almost the entire medical profession of the city visited Shaughnessy Golf Club for a couple of hours or so on November 19th to take a post-graduate course in golf from the eminent professor of that game, Robert Tyre Jones, better known as Bobby Jones. The weather (overhead at least) was all that could be desired and the clinic was a very great success. The fact that our own Davie Black sank the winning putt made the day perfect, and our surgeon-golfer, Dr. J. Bilodeau (*vide* the *Daily Province* of recent date) obtained a great many new wrinkles.

* * * *

Dr. C. W. Prowd has returned from his trip, but, we regret to say, is not yet very well, and is not back at work.

* * * *

Dr. R. G. Wride, late of the Yukon, has moved to Princeton, where he has taken over Dr. J. R. Naden's practice. His brother, Dr. Gordon E. Wride, has joined him there.

Dr. J. R. Naden, we are glad to hear, is returning to Vancouver soon, after some time which he will spend in New York, doing postgraduate work.

* * * *

Dr. W. H. Hatfield has recently returned to Vancouver from a trip of three months through Scotland, England and France, during which he has been studying the latest methods of prevention and control of tuberculosis.

* * * *

We have received the following note from the Provincial Board of Health Laboratories at Kelowna, which explains itself.—ED.

"Re the article "Macro-micro Flocculation Test for Syphilis" in the BULLETIN of October, 1933: I have found that with commercial antigens purchased by us during the past two months it is necessary to make an adjustment in regard to the quantities of antigen and saline in order to get clear readings, without the use of the microscope as detailed.

It was found that, if quantities of antigen and saline to given an opacity equal to 30,000 million staphylococci were used, the test was satisfactory and easily readable.

* * * *

Mead, Johnson & Co., through their local representative, Mr. D. M. Turner, have asked us to notify the profession that they have available for exhibition a large number of films, dealing with a wide range of subjects—obstetrical, surgical, pædiatric and laboratory technique. These may be shewn in offices or elsewhere to small or large groups of medical men, and are of outstanding merit. They are at the disposal of any group of men who may desire to view them, and a telephone message to the Vancouver Medical Association offices, or to Mr. Turner direct, at 3449 West 26th, Bay. 4934L, will secure a time and place of shewing. We recommend these to our members.

ANNUAL DINNER

The Annual Dinner of the Vancouver Medical Association was held in the Spanish Grill of the Hotel Vancouver on Thursday, November 22nd. It was a conspicuous success, and Dr. J. W. Thomson and his committee are to be congratulated on the outcome of their efforts to make it so.

Some hundred and fifty-four men sat down to dinner. Dr. Frost presided at the head table and was flanked on either side by the youth and beauty of the Association, including Dr. R. E. McKechnie, Dr. Boyle, Dr. George Gordon, Dr. W. D. Brydone-Jack and many others. We had many visitors, amongst whom was noticed Dr. Sutherland of Wells, B.C., whose new hospital was mentioned recently in the BULLETIN.

The programme was good and worked without a hitch, except the one that Wally Brewster had to take in his skirt with a couple of safety pins procured for him by the blameless Editor of this publication, who nearly got into a box, as he unwittingly invaded the sanctum where the very charming young ladies who provided us with entertainment were beginning to shed their costumes for one of their acts. It was a close thing. The entertainment referred to was a series of dances, monologues and songs, provided by the Attree dancers. The dances and gymnastic displays were very fascinating to watch, and revealed a very high degree of training.

Nor was there anything mean about the liquid part of the dinner. Adequate refreshment was provided, though of course the term "adequate" is a relative one.

Later in the evening various stunts were put on, including an Apache dance by Herren Doktoren Brewster and J. E. Harrison; and a more elaborate show in which Drs. Bilodeau and Brewster took the stellar parts of Aesculapius and Hippocrates, while Dr. Lavell Leeson took part, complete with head-mirror, along with Dr. Hammy Boucher, who looked as if he had been coaching the Meralomas through a rather sanguinary game with the Regina Roughriders, and Dr. Alec Agnew, whose rendering of his role revealed depths of Thespian ability not suspected hitherto of the placid and even-tempered Alec. They were all very good—but if the language used by Hippocrates on several occasions is what we may expect on arrival in Heaven (if that is where we arrive), one can only say it is not according to the conventional idea of Heaven at all.

Dr. Jack Wright, too, contributed a great deal to the gaiety of the dinner by his very clever telephone conversations. Altogether, it is a matter for congratulation that so much new talent has been unearthed amongst the younger generation.

If one has a criticism of the dinner, it is that no music was provided. For the first time in a great many years, our orchestra was not in evidence, and there was no singing, which we feel to be rather a pity, as it warms things up. Dr. Covernton, whilst he provided some entertainment unwittingly, yet did not sing Alouette, and this is a distinct loss; while Dr. Nelles also remained silent all evening.

But the highlight of the dinner was the presentation to Dr. W. Y. Corry of the Prince of Good Fellows (P.G.F.) degree. He was, we feel, rather taken by surprise when his name was disclosed to the audience—but there could be no doubt at all of the immense popularity of the choice made by the Executive, as the loud and prolonged applause, repeated again and again, shewed. It was felt everywhere that no man could have been chosen more fitly, and that the recipient of the degree embodies all the qualities which the degree is intended to recognise.

Dr. Corry responded briefly, in a witty little speech which yet shewed how deeply he was moved by the recognition of his fellows.

Altogether, it was a very good dinner, and everyone had a very good time.

REVIEW

THE BRITISH PHARMACEUTICAL CODEX, 1934.

In these days of propaganda concerning pharmaceuticals coming daily by mail and personal representative, it is a comfort to turn to a volume of straight-forward description of drugs, etc., and their uses.

"To furnish information concerning the newer *materia medica,* consisting of substances and preparations which had not yet attained the status of approved and established remedies included in the pharmacopœia, as well as giving particulars of medicinal articles, which, although in constant demand, had ceased to receive pharmacopœial recognition," is given as the basic reason for the publication of the British Pharmaceutical Codex of 1907 and its three subsequent editions, including the present volume. This 1934 edition is intended to provide not only a book of reference for pharmacists and medical practitioners, but also to prove a book of standards for drugs and preparations, the fact of British Pharmacopœial recognition being indicated when such is the case.

There are four parts.

Part I consists of monographs on chemical substances and drugs, in

alphabetical order, giving preparations, doses, actions and uses in the manner made familiar in our early study of *materia medica.*

Part II contains monographs on surgical dressings and the basic vegetable and animal fibres used in their manufacture.

Part III is the formulary, and well repays one for its perusal.

Part IV is composed of appendices containing tables, general tests, reagents, methods of sterilisation, a pharmacological index, trade names and proprietary substances.

The complete volume, which has a voluminous index, forms a valuable addition to the books of reference of the library.

INFECTION: ITS SPREAD AND CONTROL

By Dr. G. F. Amyot

Read before Vancouver Medical Association, October 2, 1934

(Concluded from last month)

Before the case is even reported it should be placed under advisory isolation by the physician. That is, the sick should be separated from the well completely. As the infection is spread in most cases by contact, if this isolation is simply but carefully carried out, those not already infected will escape. All articles that are soiled by the vehicle carrying the infection should be treated in a manner to destroy the organism. Those attending the patient, including the physician, should rigidly wash their hands immediately after contact in hot running water with soap. Not the often noticed dip in so-called antiseptic solution for a moment and then a dry on a towel. A surgeon, assuming the possibility of there being some pathogenic organism present, goes through a thorough and elaborate technique of surgical asepsis. The physician, knowing that he is actually dealing in most of his practice with infection, forgets in his rush from place to place that there is greater danger that he may carry to others infection that could be eliminated by a thorough but simple medical asepsis. Our hospitals and offices are not properly supplied with suitable washing facilities to assist in this procedure, but in spite of this drawback medical asepsis can in most cases be carried out.

The health department takes the final responsibility of quarantine and isolation, and if this is passed to them they can relieve the physician of a great deal of trouble. Most people, if the facts are explained to them, are quite willing to co-operate if things are not made too rigid.

Public health has taken charge of the next method of transmission by placing barriers in the way through regulations governing the production and sale of milk and milk products. Pasteurization destroys the pathogenic germs that may have gained access to the milk supply from the time it left the cow until it reaches the dairy for distribution. This process, if properly carried out, will make any milk safe. It does not destroy in any amount the nutritive value of the milk.

A safe supply of water is obtained by filtration, chlorination, or other methods. In Vancouver our supply is rather unique, as it comes from a guarded watershed and receives no other treatment.

Sewerage systems have been provided to prevent the contamination of water and ice supplies by sewage.

Meat and food inspection assures us of a safe food supply.

The destruction of insects, the elimination of their breeding places and screening protect us from this method of spread of infection.

We have seen the methods devised to protect us from infection by public health and these give good results. Unfortunately they do not by any means solve the whole question. If all cases were typical from the onset and isolated immediately, the battle would be won, but they are not, and we have coming into the picture the atypical case, and there are many more of these than we are led by the text books to believe. The mild cases are often never seen by a physician, and run at large. Patients often think that because the case is mild it is not infectious. I have even heard medical men say, "Oh, that is only mild; a case of scarlatina and not scarlet fever," and do nothing more about it. Scarlatina and scarlet fever are one and the same thing. The case that is entirely missed by everybody also is a deadly source of infection. Finally, the carrier, an apparently healthy person harbouring the organisms of disease, is a definite source of infection. These cases all miss isolation and pass all the barriers placed to stop them, and continue to spread infection throughout a community.

How are we to stop the spread by this last group of sources? Nature has shown the way, by demonstrating that it is in many cases possible to develop in the body once attacked by a disease, some substance that builds up an immunity to any further attack of that disease. Realizing this, the immunologist has tried to get the same result without the person going through the dangers and inconveniences of an attack of the disease. We were given the first of these great discoveries by Edward Jenner. In this century we have available toxoid to protect against diphtheria. Typhoid vaccine demonstrated its value during the last war in a better manner than I could tell you. There are others, not quite on a par with the three mentioned, but still very valuable. There are two ways, then, that people can receive immunity of an active type against infection. First, to have the disease in a very mild, unrecognised type, all the way through to the severe type. Second, to receive some agent without the actual disease from which they will develop an active immunity.

The use of these substances has been built up by public health and great results have been obtained, but there is still a great deal to be accomplished. The profession has left this work to its specialized branch of public health. Clinics have had to be established to give this service to a public that have shown their support all over the world. This had to be done in this manner to establish it, but the time has come when others should be interested in this work. I refer to the medical profession as a whole. Those of you who had the opportunity of hearing Doctor Vaughan describe the medical participation programme he established in Detroit and in the rural areas of Michigan will realize what can be done along public health lines by the profession co-operating with the health departments.

Babies given toxoid or vaccinated during the last six months of the first year are given, with practically no reaction, a protection against two diseases that have in the past destroyed large numbers. What better person to give this protection than the man who brought the child into the world? He is rightly, and should be, the family advisor in everything pertaining to illness. But would it not be better to go one step farther and be the complete advisor to the family in everything pertaining to illness and health? In other words, who is better suited to advise how to avoid illness and retain health than the family physician?

Immunization is only a small part of preventive medicine, and will do

for an example that should be expanded to include, in time, every phase of prevention. The knowledge we have is far ahead of that now being applied. The profession is interested, and always has been, in attempting to relieve suffering; they are also interested in going one step further and preventing suffering in every way possible. Periodic health examinations are certainly approved and accepted by medicine as a great factor in finding defects and chronic illnesses early and affording an opportunity of preventing more serious trouble later on. They offer a means of instructing a patient along the lines of moderation in his life so that he may reap the most fullness, happiness and joy from his short stay on this world. Food is an important thing in everybody's life today, and yet either receives very little attention from practicing physicians or becomes a fad, as with a few. Commercial firms are doing everything possible to keep diet a fad for their own selfish gain. People want advice on these matters, and should come to their physician. The medical profession has had to carry the load of care for the indigent ever since its foundation, but the time is coming when the physician will be adequately paid for his service. Whether these services are for the curing of the sick or the practicing of prevention, they should be paid for.

To have a satisfactory medical participation programme established, certain things are necessary:

First, the medical profession as a whole must be willing to co-operate with the health departments.

Second, the practitioner must have a proper knowledge of immunization and certain phases of preventive medicine.

Third, if he has the first two he should be able to collect for the preventive services rendered.

We must realize that no part of the public health programme now carried can be dropped until there is some other person ready, equipped and willing to take it up and continue the work. The health department does still have the responsibility placed on it by law to protect the public, and can only relinquish certain phases of the work that can be successfully carried out by others.

In Detroit there are 1,100 physicians co-operating in the medical participation public health programme. The disciplining of the medical men is done by a committee of the medical society and not by the health department. All the health department is interested in is the proper carrying out of the programme.

Unfortunately, in Vancouver it would not be possible to pay the medical men for any services, but there is a large part of the population which can and would pay their doctor if they were shown that he was interested in prevention measures to the fullest extent.

I would suggest that this society appoint a committee large enough and representative enough to draw up a programme of medical participation in public health, to study the matter fully and to co-ordinate the available services with the local and provincial health departments. The only plan that will succeed is one sponsored by the vast majority of the profession. It must have concentrated action and a complete understanding of the whole question and it must come from the profession. They will be met more than half way.

SOME SECRETORY DISTURBANCES OF THE STOMACH*

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Before discussing the question of the secretory disturbances of the stomach it may be well to review a few of the salient points of the normal secretory physiology of this organ. The publications of Pawlow, Carlson, Starling, Alvarez and others have been utilized to a great extent for this purpose.

According to Starling, histological investigations show four types of cells in the gastric mucosa.

(1) Surface cells cover the inner surface of the mucosa and line the ducts of the tubular gastric glands; they secrete mucus.
(2) Mucoid cells form the secreting cells of those pyloric and cardiac glands which are placed near the two sphincters; they are also mingled with the peptic cells lining the cardiac glands.
(3) The peptic or chief cells secrete pepsin.
(4) The oxyntic or parietal cells secrete the hydrochloric acid. The cytoplasm of the latter shews acid reaction during active secretion.

Much animal experimentation has been done on dogs with the Pawlow pouch. An elongated piece is separated from the stomach of the animal and formed into a cylinder, the orifice of which is sewed into the opening in the abdominal wall, the other end remains connected with the stomach. The cavity of the pouch is separated from that of the stomach by a septum formed only of mucous membrane. [The speaker showed slides taken from the work of Dr. Chigin showing the method of obtaining this pouch.]

An animal with a divided œsophagus and a gastric fistula eats greedily, and although the food does not reach the stomach, within five to ten minutes there is a free flow of clear juice. This "sham feeding" establishes the idea of a reflex nervous mechanism. This is a non-conditioned reflex. On the other hand, if the animal is merely shown food which he desires, or hears the preparation of food, or smells food, that is if there is any stimulation of the desire for food through any of the nerves of special sense, the gastric juice begins to flow. This is a conditioned reflex.

Pawlow has shown that this physical secretion is entirely abolished by the division of both vagi, thus demonstrating the nervous mechanism of gastric secretion.

Just as gastric secretion can be induced by pleasurable emotions, so also can it be stopped by unpleasant or painful ones, such as fear, anger, annoyance, disgust or pain.

The juice as it is poured out by the glands always possesses the same degree of acidity. Owing to the fact that after it is secreted it flows down over the alkaline mucous membrane, it inevitably becomes neutralized, that is, it has its acidity reduced. The more rapidly it is secreted the more acid will it be. In no gastric juice does the acidity exceed the normal. Even in animals suffering with pathological conditions, in no sample does the acidity prove higher than normal.

The varying necessity for acid during the course of digestion is supplied by variations in the quantity of juice and not by changes in its acidity. Fluctuations in the acidity of the juice after it leaves the glands which

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secrete it must be looked upon as desirable and in a normal stomach a perfectly pure juice may have its acidity reduced 25 per cent by neutralization with mucus.

The first secreted portions of the gastric juice are distinguished from the others by a stronger digestive power, that is, the strongest juice is poured out when it is most needed. Every individual kind of food calls forth a particular activity of the digestive glands with special properties of the digestive juices. The properties of the juice, the rate and duration of secretion and also its quantity vary with the work to be done. The point of the maximum outflow, as well as the whole curve of secretion, is always characteristic with each diet. The work of the digestive glands is elastic to a high degree, also characteristic, precise and purposive.

Comparisons are made between "bread juice," "flesh juice" and "milk juice," etc. "Bread juice" contains four times as much ferment as "milk juice." Not alone the digestive power, but likewise the total acidity, varied according to the nature of the diet. The latter is, however, greatest with flesh (0.56 per cent) and lowest with bread (0.46 per cent). The quantity of juice poured out and the duration of its secretion are dependent upon the kind of food. Flesh requires the most, and milk the least, gastric juice. The hourly intensity of gland work is almost equal in the case of milk and flesh diets, but far less with bread. The last exceeds all the others in the time required for its digestion. The most active juice occurs with flesh in the first hour, with bread in the second and third hour, and with milk in the last hour of secretion. On protein in the form of bread, five times more pepsin is poured out than on the same quantity of proteid in the form of milk.

The second phase of gastric secretion is determined by a chemical mechanism. This may be described as the "gastrin theory." Through a fistula in the large stomach, without attracting the dog's attention, food is inserted into the stomach. Certain foods, such as bread and coagulated white of egg, do not yield any juice during the first hour or more afterwards. Flesh is able to excite a secretion, but the juice appears from fifteen to forty-five minutes after the feeding, instead of from six to ten minutes as under normal circumstances. The amount of juice secreted as compared to the normal feeding is much less. The quantities obtained by direct introduction of the flesh added to those of sham feeding give almost identical results as with the normal.

Water was found to have an exciting effect on the gastric juice. Meat broth, meat juice and solutions of meat extract proved to be constant and active excitors of the secretory process in the stomach. Other foods, such as starch and fat, proved to have no exciting effect. Starch in water solution had no greater effect, but rather less, than water alone. When quantities of finely divided raw flesh are introduced into the stomach of dogs the secretion begins at the very earliest from fifteen to thirty minutes afterwards. If one obtains the fluid digestive products from the stomach of a dog who has eaten egg albumen and injects them into the main stomach of a dog, a more constant and larger flow of gastric juice is obtained than from the introduction of a like quantity of water or egg albumen.

When bread and egg albumen are eaten without appetite, or introduced into the stomach unobserved, they lie there for a long time, just as stones would lie, without the least appearance of digestion. When such foods are eaten in the normal way the appetite juice is the sole initiator of the secretory process. The psychic juice here plays the role of the igniting material

which sets the stove ablaze, and for this reason it has been called "igniting juice" by Dr. Chigin.

Carlson (1923) states that the "gastrin theory" postulates that substances, either in the native foods or developed in the gastric digestion of foods, act on the pyloric mucosa in such ways that a gastric secretion is produced, this in turn is absorbed into the blood and acts on the fundic glands via the blood. It seems highly probable, however, that the gastrins are artefacts developed in the decomposition of the foods or in the extraction of the mucosa and do not represent physiological mechanisms. Gastrins belong to the pharmacology, rather than to the physiology, of gastric function.

Histamine is a general secretagogue. However, Luckhardt and others were able to separate histamine and gastrin by chemical means, which seems to show that they are different substances.

In man, most of our experimental work in gastric secretion has been done in cases of gastrotomy or by means of a stomach tube.

The resting stomach usually contains from 30 to 50 c.c. of fluid, consisting of gastric juice, mucus, saliva and regurgitated duodenal contents. The hourly rate of secretion is usually 30 to 60 c.c. After a good meal 500 c.c., or more, of this juice may be secreted. Usually the range of HCl in this juice is between 0.2-0.4 per cent. As Pawlow and others have shown, even in man, before dilution, neutralization or regurgitation is effected, the pure gastric juice shows a persistent HCl content up to 0.5 per cent. The whole contents rarely, if ever, reach such a high level.

The chief digestive function of the gastric juice is dependent on the action of the enzyme, pepsin, which is accumulated as pepsinogen. The activation of the latter is accomplished through the HCl of the juice. The main effect of the gastric juice is on the proteins of the food with the division of the complex molecules. Proceeding from primary through secondary albumoses to peptones, the breakdown never passes beyond this stage. Fat is set free by the action of the gastric juice on the protoplasmic envelopes and undergoes conversion into fatty acid.

There are three methods by which the acidity of the gastric juice is altered.

(1) As we have seen in the experimental work, the gastric juice as it is secreted flows down over the mucous membrane of the stomach and mixes with the mucus, reducing the acidity to a considerable amount. We know also that the pyloric glands secrete an alkaline mucus which acts as a neutralizer.

(2) It is maintained that when the acidity reaches a certain height, the stomach glands release a neutral sodium chloride at the expense of the HCl and this secretion acts as a diluting fluid to the HCl of the gastric contents.

(3) The regurgitation of the alkaline pancreatic and duodenal secretion into the stomach is a factor in the control of acidity.

Much work has been done to prove or disprove one or all of the above three methods of the control of acidity. It is reasonable to believe that they all may and do take part in the process.

Whether the acid of the gastric juice is, as Cannon maintained, the factor which controls pyloric mechanism is questionable. Others maintain the pylorus controls the acid of the stomach.

Alvarez (1928) says that we must be careful how we speak of the retarding action on the duodenal side as an "acid" reflex. The acid is

effective, but so, also, is fat. It seems clear that if the acid is left unneutralized in the duodenum, it will keep the pylorus closed for long periods of time.

Consistency of food should have much to do with the rate in which it leaves the stomach; and, theoretically, if the carbohydrates were as difficult to liquefy as meats they should go out as slowly as meats. Raw white of egg, which is semi-liquid, leaves the stomach promptly like water, and not slowly like other proteins. The main work of the stomach is to liquefy the contents or turn them into pap, and when that is done, the material can go into the duodenum no matter what its acidity. It appears that strong acidification, with hydrochloric acid, of liquids or foods, will delay their passage through the pylorus until the acid has been diluted or neutralized to a point where it will not be so stimulating on the duodenal side. Weak solutions of alkalies will hasten emptying. The osmotic pressure also affects the emptying of the stomach. Isotonic solutions run out rapidly, hypertonic ones slowly.

It is doubtful whether any chemical stimulus is needed on the gastric side to open the pylorus. It relaxes at intervals, and if the gastric contents are then under any pressure the liquid part is squirted out and the more solid parts are retained. Hydrochloric acid is one of the substances which, in strong concentration on the duodenal side, closes the pylorus. We probably have no more right to speak of an acid reflex than of a fat, a food, or an osmotic pressure reflex. Solubility of food largely influences the rapidity at which it leaves the stomach.

Functions of Hydrochloric Acid in Gastric Juice

(1) Activating pepsin.

(2) Slowing up the emptying time of the stomach and so leading to better gastric digestion.

(3) Antiseptic action on the swallowed food, preventing implantation in the lower digestive tract of infection from sinuses, teeth, tonsils and the lungs.

(4) Pawlow has shown that in a dog with a permanent pancreatic fistula, after 150 c.c. of one-half per cent solution of hydrochloric acid is introduced into the stomach, within two to three minutes the pancreatic juice begins to secrete. This is one of the most securely established proofs that acids have a powerful influence upon the pancreas. One can excite the activity of the gland more by acid than by any other means. One is justified in stating that acid is a specific excitor of the pancreatic gland.

Bayliss and Starling have shown that the acid acting on the mucous membrane of the duodenum and the upper jejunum converts "prosecretin" into "secretin." This substance is absorbed into the blood stream and results in stimulation of the pancreatic secretion.

Methods of Investigating Gastric Secretions Clinically

The fractional method of gastric analysis is a noted advance as regards the study of gastric secretion in man, both in health and disease. The main shortcoming of the fractional method is due to the variation in degree of acidity of the gastric content in different regions of the stomach. (Carlson, 1923.)

Dimethyl-amino-azo-benzol, as an indicator, is sufficiently accurate for all clinical and most research purposes.

The type of meal varies with different workers. I have used two glasses of plain water; on occasions, a dilute alcohol meal; but as a routine, strained

oatmeal gruel has been the meal of choice. I have not used histamine routinely. The reactions after its injection lead to caution in its routine use in private practice. It may be used in cases where the ordinary test meal shows anacidity in order to determine the persistence of the latter. I have resorted to a recheck at a later date with the ordinary gruel meal rather than resorting to histamine.

One wonders at the difference of opinion which exists as to the indications of a fractional gastric analysis. One author goes so far as to suggest its use in all routine physical examinations, whereas others, including a prominent gastro-enterologist, would have us believe that it has very little place in our diagnostic equipment. I would refer you, however, to the statistics of a large American clinic which show that 16,000 fractional gastric analyses were done in the years 1928-1931. When one considers that varying statistics show that achlorhydria occurs in 10 to 25 per cent of cases with gastro-intestinal disturbance, this factor alone should indicate its use much more generally than is the case today. The fractional meal not only gives an indication as to the acid secreting function of the stomach, but as well its fasting contents, its emptying time, the state of the pylorus as indicated by the regurgitation of bile, and the presence of blood and mucus.

Technique.—One hesitates to discuss the question of the technique of fractional gastric analysis, but none the less, poor technique may lead to erroneous results. Fear and discomfort should be avoided so far as possible.

It is, therefore, advisable in preparing the patient for a gastric analysis and the swallowing of the tube, to obtain his confidence and relieve his apprehension. The swallowing of a small Rehfuss tube is not such a difficult process and may be likened to the swallowing of a piece of meat or other pieces of food that have not been well masticated. As a rule it is advisable not to have the patient see the tube. It is warmed to body temperature and the tip smeared with a drop of glycerine. The patient is asked to relax and to breathe deeply in order to relax the chest and pharyngeal muscles. He is advised to open his mouth widely and say "aah." The bulb of the tube is passed under vision into the pharynx, avoiding the base of the tongue, and the patient is then asked to swallow as if eating a mouthful of food. Frequently one swallow is all that is necessary, as the tube is immediately grasped by the pharynx and passed into the œsophagus. If the patient then keeps the mouth open and breathes deeply, the tube will usually be grasped by the œsophagus and taken rapidly into the stomach. Muscular spasm, at the upper or lower end of the œsophagus, may grasp the tube. A swallow of water will usually relax such a spasm and the tube rapidly passes into the stomach. If care is taken to observe these few details the patient has no future dread of repeating the procedure. Patients learn to pass the tube on themselves where repeated aspirations are necessary.

In very young patients the use of a nasal tube is preferable to the ordinary Rehfuss tube. A syringe of 50 c.c. or more capacity, with good suction and a large calibre opening in the tip, is essential.

Very few illnesses contraindicate the passage of a tube; possibly advanced cardiac disease or aneurysm of the aorta are contraindications.

There is little choice between the different test meals in use. Water, as shown by Pawlow, is a definite stimulant to gastric secretion, and two glasses of water are probably as effective in stimulating the secretion of the gastric juice as oatmeal gruel, or dilutions of alcohol, or biscuits and water, etc. Its disadvantage, I have found, after using it for a limited number of

tests, is that it leaves the stomach a little too rapidly; and there is the possibility of the stomach emptying before a representative secretion of the gastric juice takes place. The oatmeal gruel, which I have used almost entirely, is somewhat slower leaving the stomach, the average emptying time being 1¼ hours. The specimens filter in a reasonable time and one gathers some idea as to the rate at which the starch leaves the stomach.

Occult blood is not examined for, as slight bleeding may be caused by injury from swallowing the tube. The amount of the fasting contents is measured, the gross blood content and bile and mucus content are observed. The practice of washing the stomach before giving the test meal has not been considered necessary if the contents are well evacuated. The patient swallows the test meal and specimens are extracted at fifteen-minute intervals until the stomach is emptied. The specimens are examined, after filtering, for free HCl and total acidity, dimethyl-amino-azo-benzol and phenophthalein being used as indicators. The regurgitation of bile, the disappearance of the starch and the presence of gross blood are noted.

In obstructive conditions of the pylorus from œdema and spasm, or from organic scarring, or from cancerous growth, the emptying time may be delayed unduly. If, at the end of two hours, a residue remains, it is withdrawn and measured.

On completion of the test the tube is gradually withdrawn and usually comes to the pharyno-œsophageal junction without any difficulty. Frequently a spasm is met with at this point, but by asking the patient to swallow, or gag, and keeping a firm, even tug on the tube, it invariably is released without distress or difficulty.

I would suggest that the same advice be offered to the budding gastroenterologist as is usually given to the genito-urinary neophyte, that is, to pass the tube on himself. In this way a gentleness of technique and a respect for the feelings of the patients undergoing the procedure, will be developed.

Normal Gastric Acidity Range from Birth to Old Age

Vanzant and associates of the Mayo Clinic, in a study of over 3,000 gastric analyses done on patients with no serious diseases in the digestive tract, attempted to arrive at a normal range. They find a steady increase in the incidence of achlorhydria from youth to old age. At the age of 60 years 28 women in 100 failed to show free acid on repeated fractional analysis, and similarly, 23 men in 100 were achlorhydric.

Free gastric acidity appears to increase rapidly from childhood up to the age of 20 years when adult values are reached. About the age of puberty, the average value for boys begins to rise considerably above that for girls. Typical free acidity for men ranges between 45 and 50 units in the years from 20 to 40. After this it falls off rapidly to a level of from 30 to 35 units in the aged. In women the mode is approximately 35 units throughout adult life. It appears to fall off slightly after the age of 60 years. The normal range of free acidity in both men and women is about 90 units. In both sexes the combined acidity appears to vary but little from youth to old age. Ninety per cent of the data lay between limits of 12 and 22 units with a mode at 17 units.

As previously stated, probably there is no such condition as hyperacidity. The pathological change in acidity is always in the direction toward anacidity. In pylorospasm we have a hypersecretion but never a hyperacidity.

Hurst maintains that the acidity curve of the gastric secretion depends on the type of individual. He classifies them into the *hypersthenic* gastric constitution, which comprises those who have a tendency toward hypersecretion, the normal, and the *hyposthenic* gastric constitution.

Achlorhydria.—Hurst believes that without gastritis there is no achlorhydria, but gastritis does not cause achlorhydria unless there is a predisposition to the hyposthenic gastric constitution. He gives no report on any microscopic findings in the gastric mucous membrane which would confirm this persistent presence of gastritis in achlorhydria.

Faber of Copenhagen, for the past thirty years, has given gastritis as the cause of achlorhydria.

On the other hand, in regard to gastritis, Edwin F. Hirsch (1916), from the Rush Medical College, after microscopic examination of the stomachs of men dying in delirium tremens, noticed that the absence of changes indicating acute or chronic inflammatory processes is striking. Except for the presence of hæmorrhage, the appearance of the stomach is unaltered in any extent. These hæmorrhages probably are anatomic manifestations of acute toxæmia. Chronic alcoholism alone is of doubtful etiologic importance in causing chronic gastritis. We know, however, that achlorhydria is a fairly common condition in chronic alcoholism.

Complete atrophy of the glands of the mucosa rarely obtains, achlorhydria occurring long before such serious injury results. Familial tendency towards the development of achlorhydria is noted. I have three such cases in my series in which both brother and sister were achlorhydric.

Baird, Campbell and Hern (1924) refer to three possible causes of achlorhydria, namely:

(1) Normal secretion and excessive neutralization;
(2) Diminished secretion and some neutralization;
(3) Absence of secretion or true achylia.

They are of the impression that the first two may occur in healthy subjects, but are doubtful if the third ever occurs in subjects who can really be called normal.

Carlson believes that the possibility of achylia being congenital, and probably hereditary, seems speculative. Permanent injury to the gastric glands during the life of the individual through toxic agents as bacterial toxins, alcohol, irritating food, nose and throat infections, etc., may be the cause. He considers the most important factor in this depression of gastric secretion is probably the cachexia of the gastric glands.

Oliver and Wilkinson seem to favour chronic gastritis as the etiological factor, but believe the theory of constitutional origin of achlorhydria is supported by a tendency to occur in many members of a family. The possibility of a neurogenic origin of achlorhydria is also suggested.

In the majority of cases of pernicious anæmia the achlorhydria is a permanent condition. Achlorhydria was present in 56 per cent of pellagra cases and also in 50 per cent of sprue cases. In subacute combined degeneration of the spinal cord, without anæmia, 100 per cent of the cases showed gastric anacidity. Chronic pancreatitis, chronic biliary tract disease, diabetes mellitus, allergic conditions, certain skin conditions, arthritis, hyperthyroidism and numerous other conditions are associated with a varying percentage of achlorhydria.

Carcinoma of the stomach, according to Hurst, if superimposed on peptic ulcer, may be associated with hydrochloric acid in the gastric secretion. However, if chronic gastritis occurs in a person with a hyposthenic

gastric constitution it leads to achlorhydria, and the combination of these, with the constitutional predisposition to carcinoma, leads to carcinoma of the stomach. This occurs in 75 per cent of cases of carcinoma of the stomach. He reports 4 patients in whom achlorhydria was known to be present before carcinoma developed and he found reports on at least 19 similar cases. In my series I have had only one known case of achlorhydria which subsequently developed carcinoma of the stomach.

The microcytic type of anæmia with low colour index and associated with achlorhydria was described by Faber in 1909. In this type of anæmia the anti-anæmic factor of the gastric secretion is not entirely absent. Another form of this type of anæmia is that associated with dysphagia and achlorhydria. It is usually relieved by adequate treatment with iron and hydrochloric acid.

Oliver and Wilkinson claim to have found approximately 24 per cent of relatives of patients with pernicious anæmia showing the presence of achlorhydria.

PERCENTAGE OF ACHLORHYDRIA IN GASTRIC ANALYSIS IN VANCOUVER

	Gastric Analyses	*Achlorhydria*	*Percentage Achlorhydria*
Vancouver General Hospital, 1933 and 1934	827	228	27.5
St. Paul's Hospital, 1933	103	21	20.4
Own Series	573	108	18.8

PERCENTAGE OF ACHLORHYDRIA, IN OWN SERIES, ACCORDING TO SEX AND AGE

Decade	*Gastric Analysis: Male*	*Gastric Analysis: Female*	*Total Gastric Analysis*	*Achlorhydria: Male*	*Achlorhydria: Female*	*Total Achlorhydria*	*Percentage Achlorhydria: Male*	*Percentage Achlorhydria: Female*	*Total Percentage Achlorhydria*
70-80	3	2	5	1	1	2	33.3	50	40
60-70	20	28	48	9	7	16	45	25	33.3
50-60	64	41	105	17	15	32	26.5	36.1	30.4
40-50	72	66	138	10	18	28	13.8	27.4	20.3
30-40	65	88	153	3	13	16	4.6	14.7	10.4
20-30	51	52	103	4	6	10	7.1	11.5	9.7
10-20	6	9	15	--	--	--	----	----	----
0-10	2	--	2	--	--	--	----	----	----
Unknown	1	3	4	1	3	4	100	100	100
	284	289	573	45	63	108	15.8	21.8	18.8

Symptomatology of Achlorhydria.—Achlorhydria may be a symptomless condition and there is evidence that it may occur in a small number of individuals who are seemingly in good health. It would seem, however, that these individuals are worthy of close observation over a period of years before one may accept achlorhydria as a normal condition. In my own series of cases, although I have not analysed them fully, I am of the opinion that achlorhydria is usually associated with some abnormal physical condition. One must admit, however, that this work has been done on those who have come complaining of some physical abnormality or symptom.

EGGLESTON'S SUMMARY OF ONE HUNDRED CASES OF ACHYLIA GASTRICA

Men, 28; Women, 72; Average Age, 52.

Diagnosis	*No. of Cases*
Fatigue, chronic	36
Glossitis	9
Gastritis, chronic	7
Anæmia, secondary	16
Anæmia, primary	7
Chronic cholecystitis	13
Combined lateral sclerosis	17

Bowel Condition	*No. of Cases*
Normal	14
Constipation	75
Diarrhœa	8
Alternate constipation and diarrhœa	3

Carlson believes that the explanation for the absence of symptoms associated with achlorhydria is probably to be found in some compensatory mechanism.

As Eggleston (1931) states, diarrhœa as a symptom in cases of achlorhydria occurs far less frequently than constipation. The diarrhœa usually is associated with colicky pains, flatulence, mild secondary anæmia, and possibly sore tongue at intervals. There is undue fatigue and nervousness, chronic fatigue being a prominent symptom. Flatulence, nausea, heartburn, constipation, constipation and diarrhœa alternating, epigastric pains and a feeling of oppression after food are symptoms which are frequently complained of. The tongue is usually coated, the breath heavy. The appetite is usually poor. Mental depression, sleeplessness and migraine are common. There may also be a great intolerance to cold. Dry skin and pallor may be present. The achlorhydric individual frequently is a tired, pale, nervous individual with an offensive breath, a coated tongue, constipated, flatulent and miserable. Diarrhœa may be present at intervals.

Radiologic study of cases of achlorhydria exhibits frequently decided hypermotility, the meal leaving the stomach in so short a time as one hour and reaching the rectum in so short a time as three hours. The pylorus is frequently seen to remain patulous and there is very little peristalsis present in the stomach, the barium simply pouring out through the pylorus as from a jug. After reaching the colon there is usually a stasis in the progress of the meal.

As Eggleston states, under such conditions the digestion must be very imperfect. In the presence of a highly putrefactive intestinal flora, it is not impossible that irritating substances are formed which might tend to produce a diarrhœa as a result of the colon irritation.

Treatment of Achlorhydria.—In the treatment of achlorhydria for the past 15 years we have become accustomed to the exhibition of much larger doses of HCl than formerly, when the dosage given in the pharmacopœia was 5-20 minims. Physiologists have shown that 500 c.c., and upwards, of gastric juice is secreted following each meal and a conservative estimate of 1½ litres during the day is accepted.

Chemically pure HCl contains, by weight, 31.79 per cent of hydrogen chloride and 68.1 per cent, by weight, of water. Diluted hydrochloric acid contains 10 per cent, by weight, of hydrogen chloride, that is, 330 grms. of HCl, and distilled water sufficient to produce one litre. That is, roughly,

one part of HCl, chemically pure, and two parts of distilled water. (In Vancouver ordinary tap water may be used.)

In cases of achlorhydria this dilute HCl is prescribed ordinarily in drachm doses, mixed with 10-12 ounces of water, sweetened as desired with sugar, mixed with fruit juice, and taken as a beverage with each meal. Now this amount of acid in 10 ounces of water is the equivalent of 300 c.c. of 0.13 per cent HCl, or 300 c.c. of approximately 35 units in terms of decinormal sodium hydroxide neutralizing power. Therefore, this amount, if given during the ingestion of a meal and subsequently up to a period of two hours following the meal, would be considerably less than the amount of free HCl secreted in the normal stomach. As much as two drachms in patients with the heavier meals may be given. This dilute acid should be sipped with the meal and the balance may be taken up to one hour or more following the meal. In this way one simulates to a degree the normal secretion of acid in the stomach. Patients carry a small vial of the dilute HCl with them when away from home.

A small percentage of cases of achlorhydria do not tolerate hydrochloric acid. In these cases there seems to be some benefit from the use of the juice of citrus fruits, such as grapefruit, lemons, etc.

The effect of the acid may be slightly harmful to the teeth. In one or two of my cases the dentist has been under the impression that decay of the teeth has been definitely hastened. In order to prevent this effect the fluid may be taken through a straw or glass invalid's tube and, after the acid has been consumed, the mouth may be washed with a neutralizing solution, such as 1 or 2 teaspoons of undiluted milk of magnesia, care being taken not to swallow any of the alkali.

After one month's treatment the patient is advised to have a recheck of the fractional gastric analysis. In only a small number has the stomach resumed the secretion of the HCl.

Hurst recently advised the washing of the stomach each morning with hydrogen peroxide, 1 drachm to a pint of water. A non-irritating diet is advised, and in 82 per cent of Hurst's cases a return of the secretion of HCl was observed. All nasal, throat and mouth infections are carefully treated. Should the achlorhydria persist, dilute hydrochloric acid in 1-2 drachm doses, well diluted, and a small amount of pepsin, are given with each meal, the first dose taken fasting before breakfast for its antiseptic action, and the others as a beverage with lunch or dinner.

Owing to the rapid emptying of the stomach in many cases of achlorhydria and a deficiency of absorption from the intestinal tract, it has been found advisable in the administration of dye preceding the *x*-ray of the gall-bladder, to give HCl with the evening meal preceding the administration of the dye. Under these conditions we believe that the dye is more likely to be absorbed in the upper intestinal tract and so get into the bile passages and fewer non-functioning gall-bladders will probably be discovered.

Hypersecretion.—As previously noted (Pawlow, Carlson and others), actual hyperacidity in the sense of a gastric juice of greater than normal acidity has not been demonstrated in any disease, and probably does not exist. The pathological deviation in acidity is always in the direction toward anacidity. But actual hypersecretion may exist, although we have no accurate measure of the total gastric secretion in normal persons in the course of a day. It is not less than 1500 c.c. and may be double that quantity.

The notion that gastric content showing 0.2 per cent HCl acidity is the

acidity of normal gastric juice, and that 0.4-0.5 per cent HCl is "hyper-acidity," should no longer be permitted to confuse the issue. The factors definitely known to induce hypersecretion are delayed gastric evacuation from obstruction at the pylorus or gastric stasis due to factors that do not at the same time depress the gastric glands.

According to Hurst, there are certain individuals with a hypersthenic gastric constitution and it is in this group that the so-called hypersecretion and tendency to peptic ulcer occurs.

Sagal (1933) states that high gastric acidity persisting into old age may be considered as an indicator of longevity. Only the hardier individuals reach the eighth and ninth decade and they seem to be the ones who have high gastric acidity.

In an experimental animal with a round ulcer in the gastric pouch, Pawlow observed a continuous and increasing secretion, the flow finally exceeding the normal by three to four times. The secretion was sustained over a much longer period than would normally occur with the type of food placed in the pouch.

Treatment of Hypersecretion.—It was found in this animal with hypersecretion that alkalies produced a marked diminution of secretion. Pawlow claims alkalies are of value for their inhibitory effects on gastric secretion.

Others, however, claim that alkalies have a tendency to promote the flow of juice rather than depress it. Carlson remarks in regard to alkalies: "It would seem that we have been using gastric secretagogues to control and depress gastric secretion. Of course, if enough of the alkalies are given, and if they remain long enough in the stomach, direct neutralization may more than counteract the secretagogue effects." He, however, admits that the mechanism of the salt and alkali action on the gastric gland activity has not been satisfactorily worked out, despite its practical importance.

Alkalies may possibly have their influence through their action on the pylorus. That they have a favorable action in hypersecretion there is no doubt.

At any rate, humanity has learned to relieve so-called "hypersecretion" symptoms by the use of alkalies, such as bicarbonate of soda, calcium carbonate and salts of magnesia. This same relief is frequently accomplished either by emptying the stomach by vomiting, or by the use of the gastric tube. This has frequently been demonstrated in pylorospasm associated with peptic ulcer, relief at night being obtained by aspiration of the stomach contents at bedtime.

Pawlow recommends the use of fatty foods, or fat as an emulsion, where an excessive activity of the gastric glands is manifested. This is suggested by experimental evidence which shows that fat causes depression of the gastric secretion.

Pepsin.—The peptic activity of the stomach secretion usually parallels the acid secretion, being abundant with a high acid curve and absent or in small amounts in anacidity. The measurement of the pepsin is probably of little clinical value. The most satisfactory method for measuring pepsin concentration, according to Carlson, is that of Mett, the pepsin concentration being calculated from the rate of digestion of egg white coagulated in glass tubes.

Alvarez (1932) reports high pepsin values in persons with a nervous temperament, and in cases with so-called "intractable" duodenal ulcer. Patients with "tractable" ulcer, that is, in those who respond to medical treatment, have lower pepsin values in their gastric secretion.

Hurst recently recommended the use of pepsin along with the administration of hydrochloric acid in confirmed cases of achlorhydria.

Mucus in Gastric Juice.—Mucus is secreted in varying amounts during the flow of gastric juice and is most in evidence at the end of the flow. All irritants, such as 5 per cent emulsion of clove oil, absolute alcohol, a 10 per cent solution of nitrate of silver, when introduced into the stomach, produced an enormous secretion of mucus.

Pawlow has shown that the day following this irritation a normal secretion of gastric juice may occur, without leaving a trace behind of the previous irritation. The large quantity of mucus which is poured out dilutes the noxious substance, or forms chemical combinations with it, and drives it away from the stomach wall. At the same time the peptic glands remain absolutely at rest.

Large amounts of mucus are usually found present in the fasting juice aspirated with achlorhydria. The explanation of this is not clear. Chronic gastritis, even if we accept it as the probable cause of the achlorhydria, would not be severe enough to warrant the production of such large amounts of mucus as are often obtained. The patulous pylorus, which is such a common finding in achlorhydria allows free regurgitation of the irritating pancreatic and intestinal secretions into the stomach. The mucus secretion may be a protection against these juices.

Anti-Anæmic Factor.—According to Castle (1933), Addisonian pernicious anæmia is a deficiency disease conditioned by a lack of a specific intrinsic factor, present in normal gastric juice and absent in cases of pernicious anæmia in relapse. In the normal individual the function of this intrinsic factor of the gastric juice is to interact with an extrinsic factor in the food, probably vitamin B_2, to produce specific hematopoietic effects.

More recently Meulengracht has described a somewhat similar intrinsic factor which he terms "neuropoietin," which also may be absent in the gastric juice in pernicious anæmia, leading to development of chronic degeneration of the posterior and lateral columns of the spinal cord. In those cases in which "neuropoietin" alone is absent, the subacute combined degeneration of the cord occurs without the development of Addisonian anæmia.

These intrinsic factors are probably secreted from the pyloric and also probably from the fundic glands.

Crohn has shown that in 600 cases of achylia following gastric subtotal resection, no cases of Addisonian anæmia developed.

The Effect of Operative Procedures on Gastric Secretion.—Portis and Portis (1926), using the Pawlow pouch on animals which had previously had subtotal gastrectomy, report that the secretion from the stomach and pouch showed no free acid from the stomach itself, with a high combined acidity. The pouch, however, still continued to secrete its former acidity. Peptic activity was retained in both the stomach and pouch. Roentgenologic study of the gastric motility revealed that the stomachs emptied in about one-half the normal time. They conclude that the essential factors following subtotal gastrectomy are the neutralization of the gastric acidity by regurgitation and more rapid emptying of the stomach.

Following gastro-enterostomy there is a tendency to a lowering of the acidity and more rapid emptying of the stomach. Food is frequently poured out through the new opening too rapidly. As Alvarez points out, it may be well in these patients to begin the meal with some solid food.

Elman and Rowlette (1931), experimenting with animals, found that

when all the circular pyloric fibres were cut by a longitudinal incision down to the submucosa, a change in the acidity was noted in that there was a more rapid drop in the acidity and usually a quicker emptying time. They used 200 c.c. of 0.5 per cent hydrochloric acid as a test meal. They believe that the stomach is rendered more accessible to regurgitation and believe that their experiments indicate the pyloric control of gastric acidity. They quote Einhorn as having recently relieved symptoms of duodenal ulcer in poor surgical risks by stretching the pylorus by means of a balloon inflated in the duodenum and pulled back through the pylorus.

In conclusion, I may say that after many years of investigation and experimental work, both by the physiologists and the clinicians, many of the problems of gastric secretion remain unsolved, but progress is being made. The recent discovery of the anti-anæmic factor in gastric secretion establishes the stomach as an important secretory organ. I do not believe that such an important organ as the stomach, with all its special characteristic functions and its complicated histological make-up, can be of so little value to the organism as some would have us believe.

The problem of achlorhydria has not been solved, and I believe it will only be solved in the future by concentration of efforts both from the physiologic and clinical viewpoint. If we accept the condition as one of no importance our initiative will be discouraged.

The control of the pylorus is another problem which no doubt will continue to engage serious investigators of the future. The knowledge of its mechanism is essential for the proper understanding of many of the problems of digestion.

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BRITISH COLUMBIA ACADEMY OF SCIENCES PROGRAMME

Our attention has been directed to the following programme of the B. C. Academy of Sciences, and we have great pleasure in publishing it.—Ed.

Date	*Subject:*	*Speakers:*
Nov. 15	The Age of the Earth.	Dr. M. Y. Williams Dr. W. F. Seyer Dr. T. C. Hebb
Dec. 13	The Origin of Carbon Compounds.	Dr. R. H. Clark Dr. F. Dickson Dr. G. H. Harris
Jan. 11	Radium and Its Uses.	Dr. C. W. Prowd, St. Paul's Hospital. Dr. A. E. Hennings
Feb. 15	Enzymes, Hormones and Vitamins.	Prof. G. J. Spencer Dr. Blythe Eagles Dr. J. Allardyce
Mar. 15	The Gene—The Unit of Heredity.	Dr. A. H. Hutchinson Dr. G. G. Moe Dr. W. Ure
Apl. 11	The Nucleus of the Atom.	Dr. Henderson, Univ. of Wash. Dr. G. M. Shrum

This is a new departure for the Academy. Large crowds are not anticipated, as the discussions will not be of a popular nature. The pure science aspect will be stressed.

Three speakers on each topic will open and direct the symposia, but the whole group will participate in the discussions.

It will also be the policy of the Executive to invite any outstanding visiting scientists to address the group.

Time: 8:15 p.m. Place: Room 200, Science Building, University of B. C.

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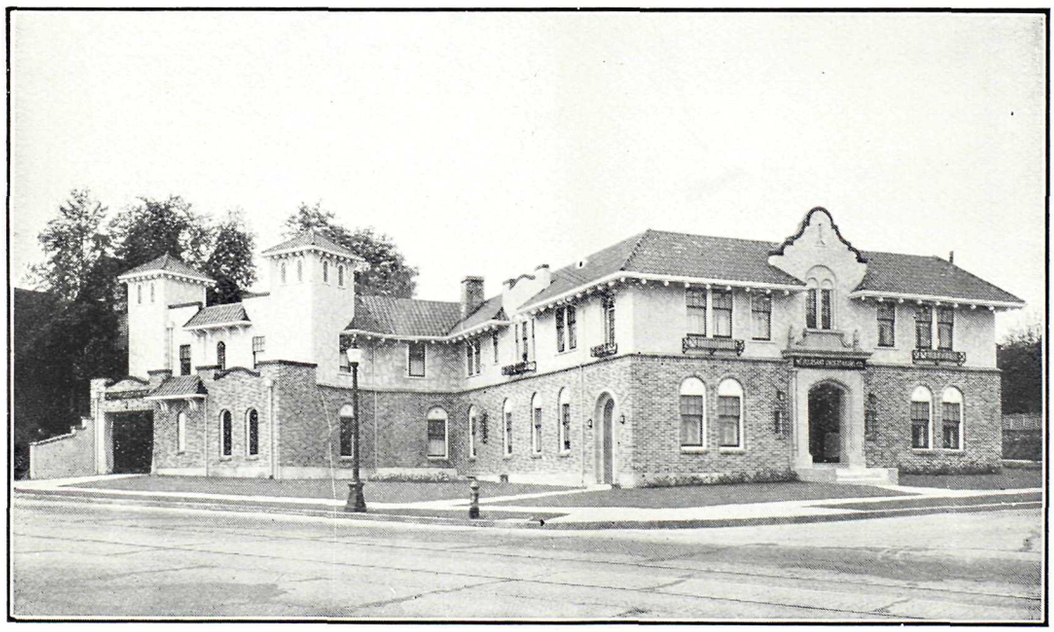

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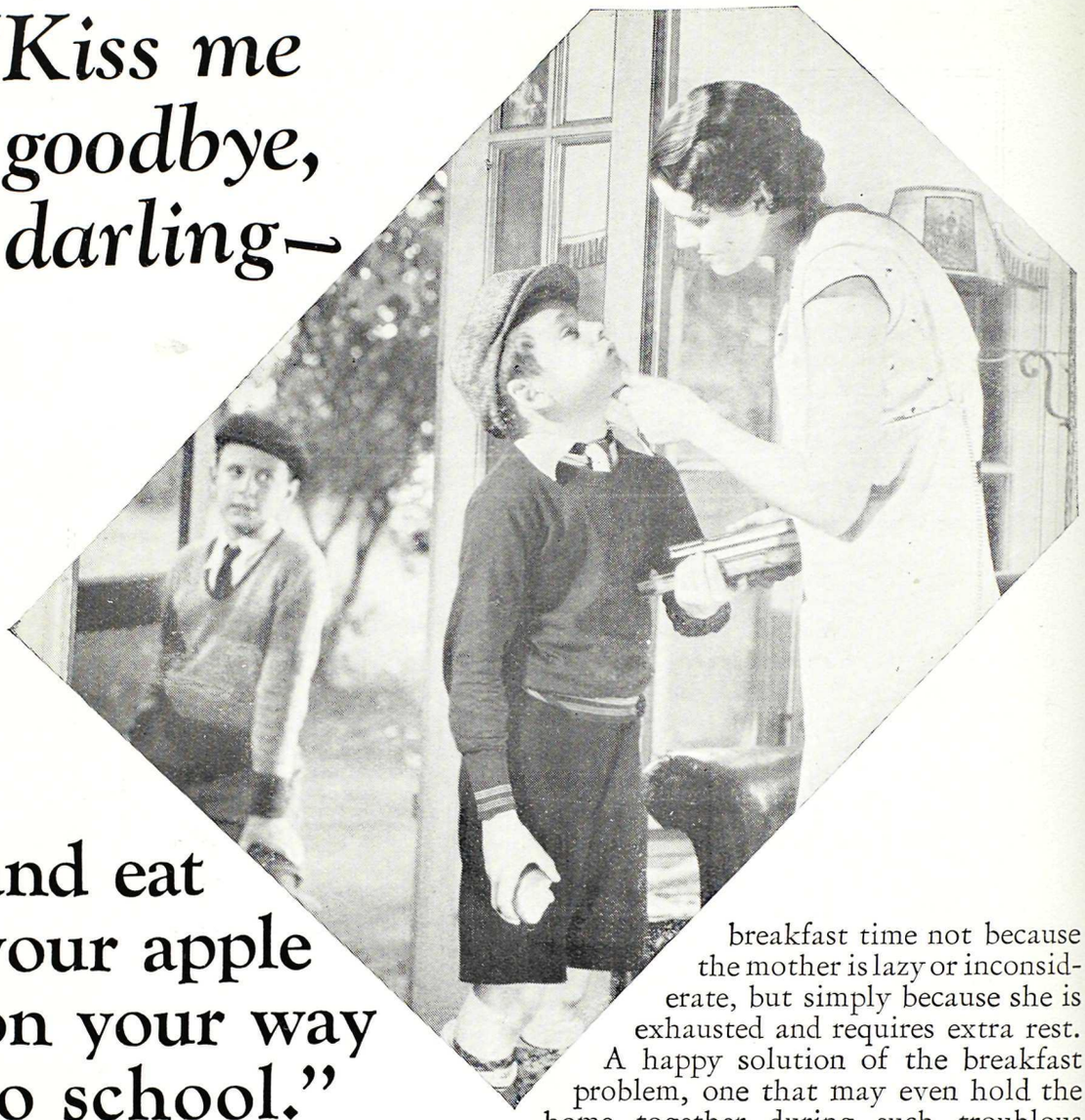

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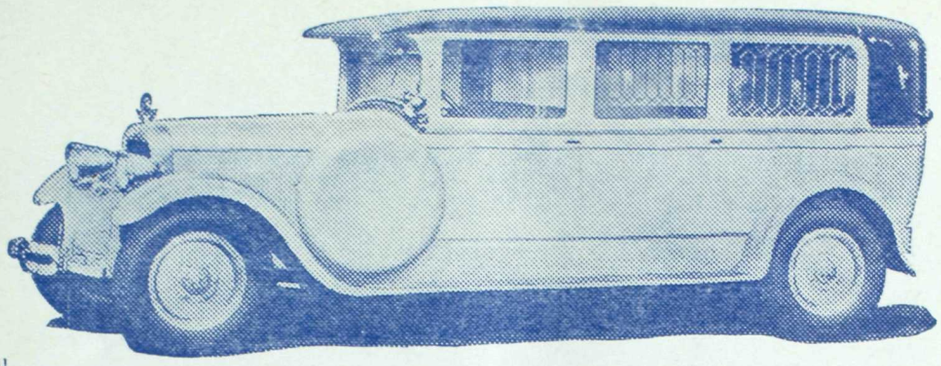

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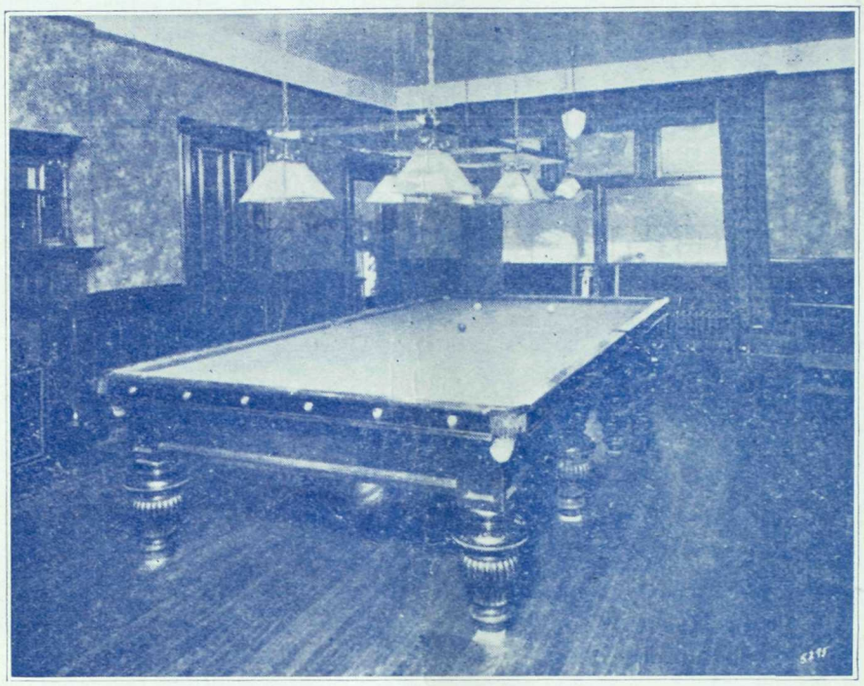

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