VOL. IX. MARCH, 1933. No. 6

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THE BULLETIN

of the

Vancouver Medical Association

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Ascheim-Zondek Test for Pregnancy

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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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VANCOUVER HEALTH DEPARTMENT

STATISTICS, JANUARY, 1933.

Total Population (Estimated)		250,000
Japanese Population (Estimated)		8,300
Chinese Population (Estimated)		7,700
	Rate per 1,000	of Population
Total Deaths	208	9.8
Japanese Deaths	8	11.3
Chinese Deaths	10	15.3
Deaths—Residents only	188	8.8
Birth Registrations	287	13.5
Male 146		
Female 141		
INFANTILE MORTALITY—		
Deaths under one year of age	9	
Death Rate—per 1000 births	31.3	
Stillbirths (not included in above	12	

CASES OF CONTAGIOUS DISEASES REPORTED IN CITY

	December, 1932		January, 1933		February 1st to 15th, 1933	
	Cases	Deaths	Cases	Deaths	Cases	Deaths
Smallpox	0	0	0	0	0	0
Scarlet Fever	20	1	17	0	13	0
Diphtheria	1	0	2	0	2	0
Diphtheria Carrier	–	–	0	0	1	0
Chicken-pox	26	0	61	0	47	0
Measles	3	0	6	0	0	0
Mumps	17	0	37	0	21	0
Whooping-cough	22	0	52	0	19	0
Typhoid Fever	0	0	1	0	3	0
Paratyphoid	0	0	0	0	0	0
Tuberculosis	64	12	61	14	22	–
Poliomyelitis	0	0	0	0	0	0
Meningitis (Epidemic)	0	0	0	0	0	0
Erysipelas	7	0	3	0	2	0
Encephalitis Lethargica	0	0	0	0	0	0
Influenza	–	3	–	3	–	–

VANCOUVER MEDICAL ASSOCIATION

Founded 1898 Incorporated 1906

PROGRAMME FOR REMAINDER OF THE WINTER SESSION 1933

February 7th—General Meeting.
Ten-minute Talks:
Sterility—Dr. W. S. Turnbull.
Dysmenorrhoea—Dr. J. W. Arbuckle.
Vaginal Discharge—Dr. W. L. Boulter.
Menorrhagia—Dr. J. E. Harrison.
Menopause—Dr. J. P. Bilodeau.
February 14th—Special Meeting.
Dr. Paul Flothow of Seattle.
February 21st—Clinical Meeting.
March 7th—General Meeting; Osler Dinner.
Lecturer—Dr. I. Glen Campbell.
March 14th—Clinical Meeting:
April 4th—General Meeting:
Papers:
Surgical Emergencies—Dr. J. A. Gillespie.
Medical Emergencies—Dr. W. S. Baird.
April 18th—Clinical Meeting.
April 25th—Annual Meeting.

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EDITOR'S PAGE

We are living in a critical time of the world's history, and while some day we may look back at a historical milestone, with a feeling of pride that we were privileged to see it set up, there is no doubt that it is a painful and distressing period for all of us.

We are at a parting of the ways. Those who would appear qualified to utter judgments, assure us that a new social order is in the making, that whether it occurs quietly or with tumult and bloodshed, a social revolution is in progress. They point to our present distresses as the culmination of a long series of social mistakes and injustices, which must be removed and corrected before we can again return to security and happiness.

Amongst the criticisms of our present social order are those who condemn a never-rising tide, as it seems to them, of paternalism on the part of governments. They feel that the people are being spoon-fed too much, are being spoiled by a continually increasing list of benefits conferred on them, in the shape of free education, free medical care, money relief, methods of health inspection and health preservation in schools, and through clinics of various kinds. They feel that the independence and self-reliance of the ordinary man are being gradually sapped, and that he is being taught to rely less and less on himself, on his own resources and initiative ,and more and more on State help and support.

There is, perhaps something in this, and yet one feels that we have put our hand to the plough, and cannot now draw back. Are we to return to the old days of individualism, and the attitude of devil take the hindermost? If so, we need feel no regrets at the recent turn of events. To many Spartan-minded citizens (who have themselves received the benefits of free education) the sentiment attributed to a local bank-manager, that so much education is unnecessary, will seem sound common sense; and the curtailment of University and high school education will bring no pangs.

We confess that we cannot take such a courageous view; and feel it to be a desperate tragedy, that we must contemplate a state where our children are to be denied the blessings of education, which we ourselves enjoyed. It may be inescapable, it may have to come that our educational curricula must be heavily cut into and limited, but it is a tragedy, none the less, the greatest tragedy of the depression, perhaps, after hunger and physical suffering, in some ways greater, for there is a stage in the child's development when education is most possible and most productive, and if this be missed, the ground lost can never be regained.

And in our own domain of health. We are told that the contraction of the budget in this particular will grievously injure health measures which we all feel are vital, and which after some years of operation, have just begun to produce results in lessened disease and greater social well-being. To eliminate these measures is the worst kind of false economy, and we hope, with all our hearts, that it may be found possible to retain and even extend them. As medical men, and through our organizations, we should in every way possible, support our Health authorities, and endorse their counsels in this matter.

THE NARCOTIC DRUGS ACT

The Bulletin has received a request from members of the Pharmaceutical Association to bring certain aspects of this Act to the attention of our readers, and to ask them to bear them in mind when prescribing narcotics for patients.

As the Act stands, a doctor who wishes to prescribe certain drugs, named in the Narcotic Drugs Act, *must do so in writing, on his own stationery, and must sign his name in full.* He has no right to telephone such a prescription, at least, the druggist has no right to fill it unless the law is complied with as stated.

The druggist is forbidden to accept prescriptions for such drugs *over the telephone,* and he lays himself open to heavy penalties if he does so.

A certain doctor telephoned a certain druggist recently, and ordered morphia for a patient. The druggist refused to fill this prescription, and was told by the doctor "never mind, I can get it filled elsewhere" (naming the store). Now, observe the consequences. The druggist was absolutely within his rights, he was working under the owner of the drugstore and obeying the latter's quite correct instructions. He did not know the doctor's voice, and might have been talking, for all he knew, to an addict. In any case, he was obeying the law, which the doctor was not. The employer was rightly resentful and approached the druggist named; under the law, it is his duty to notify Ottawa of such a dereliction of duty. The "good-natured" druggist has let himself in for a peck of trouble.

A doctor could easily, if telephoning from a house leave a signed prescription to be picked up by the drugstore's messenger; if from his office, he can drop the signed prescription in the mail, though even this is stretching a point fairly far, we imagine.

But if he telephones without some such step, calculated to protect the druggist, he should feel no resentment if the druggist declines to put himself in jeopardy of a heavy penalty. The druggists have been always more than ready to help us out, and have gone as far as they possibly can; it is for us to play fair with them, we must remember that it is they who run the risk, and they do it entirely out of consideration for us. We believe that if every possible precaution is taken, and good faith shewn, no harm can arise, but in any case we must admit that the druggist must be the judge of his own conduct. If we put ourselves in his place, we can readily see the justice of his position, if he declines to run such a serious risk.

ANNUAL DUES—LAST CALL!

Please remember that on March 31st, those who have enjoyed the privileges of the Association for the full year without payment will automatically cease to be members.

MEETINGS

The general meeting of the Vancouver Medical Association was held in the Auditorium of the Medical Dental Building, on Tuesday, February 7th, at 8 p.m. Owing to the illness of the President, Dr. Murray Blair, Dr. W. L. Pedlow, Vice-president was in the chair. After the Minutes of the last meeting had been read and adopted, Dr. Vrooman, as Chairman of the Committee for Provision of Medical Care, presented a progress report outlining what had been done and read the brief which had been presented by the Committee to the City Council. Dr. Vrooman moved that the Association endorse the principles presented in this report. This was seconded by Dr. F. P. Patterson and carried. Dr. Bagnall reported that the Committee investigating Contract practice in the City was not yet in a position to present a complete report but would place same on file prior to the next meeting.

Dr. G. A. C. Roberts, of New Westminster, was unanimously elected an Associate member of the Association.

The papers of the evening were then presented and took the form of a symposium on a series of gynaecological cases. Dr. W. S. Turnbull discussed the question of sterility, stressing most the value of tubal insufflation in suitable cases. Dr. Arbuckle discussed the subject of dysmenorrhoea reviewing reports from several large schools for girls with a high percentage of dysmenorrhoea. Dr. Arbuckle emphasised the fact that a basis for most menstrual pain was largely laid down by suggestion and faulty early education of these young women. Dr. W. L. Boulter read a paper on vaginal discharge outlining a large number of causes of this condition in all ages and making brief references to treatment.

Dr. J. E. Harrison took up the subject of menorrhagia. After reviewing the local causes the speaker proceeded to consider the cases from the standpoint of disordered endocrine secretions, particularly of ovarian and pituitary origin. Dr. J. P. Bilodeau concluded the symposium with a discussion upon the menopause. He laid emphasis on the fact that many endocrine disturbances are present at this time and gave an interesting account of pathological processes accruing at the climacteric.

The discussion was opened by Dr. A. C. Frost, followed by Dr. C. F. Covernton, W. K. Burwell, J. W. Ford, A. W. Hunter and others and much useful information was brought out.

SPECIAL MEETING

The special meeting held on Tuesday evening, February 14th, to hear Dr. Paul Flothow was a great success and it is most unfortunate that weather conditions were so miserable, as not only was the paper excellent, but the discussion and Dr. Flothow's reply were very instructive and entertaining. Dr. Flothow's paper is published in the current issue of the Bulletin.

Dr. Appleby opened the discussion reviewing the history of sympathetic surgery since the visit of Dr. Royle some years ago, particularly emphasizing the fact that the operations upon sympathetic nerves had for some time fallen into disrepute through most of them having been performed for muscular hypertonus with the usual poor results.

He reported three cases of Hirschsprung's disease and two of Raynaud's disease treated by sympathectomy with almost perfect results comparing these types of cases with earlier failures on hyptertonus cases. He also brought up the question of treatment of spastic colon and in his reply Dr. Flothow emphasized the fact that although only a very small proportion of cases of constipation require operation yet of those who do he was prepared to guarantee almost perfect results, the bowel subsequently developing an automaticity without diarrhoeal sequelae.

Dr. Brown brought up the question of mouth and throat ulceration and asthma. Dr. Flothow offered no help in chronic ulcerative pharyngitis, and reported two rather tragic failures in asthmatics which dampened enthusiasm in treating this particular type of case. Dr. Prowd brought up the question of relief of pain in advanced carcinoma of the rectum and cervix but Dr. Flothow felt that here a high dorsal chordotomy was the operation of choice in cases with a six months expectancy, rather than sympathetic surgery. Dr. MacDermot raised the question of a case of leg injury with painful cold blue foot with great primary relief following lumbar ganglionectomy but with subsequent recurrence—Dr. Flothow made casual reference to an as yet unpublished paper of his own on anomalies of the lumbar sympathetics feeling that the relapse could be explained by the presence of an anomalous and untreated chain of sympathetics and suggested that a diagnostic novocaine injection could very readily demonstrate if that were so.

Dr. Patterson stated his experiences had been very similar to those of Dr. Appleby—early failures on hypertonus cases and subsequent better results in the other groups of cases, stressing the great value and importance of the diagnostic injections as a pre-operative control of what one might expect post-operatively and permitting a sure method of selection of suitable cases. Dr. Meekison brought up the question of arthritic pain but Dr. Flothow said he had not been doing as many arthritic cases as formerly believing that the cold bluish type of case with little osseous involvement offered the best results. Dr. Strong was very much interested in the relief of angina and particularly in the abolition of the warning which these patients receive but Dr. Flothow pointed out that the warning is still there as a sense of constriction or suffocation, but no pain, and believed that all angina cases should be treated by injections as he considered them unsuitable subjects for surgery.

Dr. MacDemot brought up the question of coccygodynia and Dr. Pedlow the question of pruritus but in his reply Dr. Flothow felt they were unsuitable for sympathetic surgery and advised epidural injections in the sacral canal of twenty per cent. alcohol which he states gives prompt relief.

Dr. Appleby drew an analogy between the works of Dr. Royle and Dr. Flothow pointing out that although the early work of Royle had failed to be substantiated yet he deserved great credit for the tremendous stimulus to the study of the sympathetic system. Dr. Flothow as a pioneer in the relief of pain on a sympathetic basis is curing pain by the interruption of fibres which are stated by physiologists to be all efferent and

to contain no pain producing fibres. This has again stimulated a lot of research into the pathways of pain transmission and to Dr. Flothow as a clinician belongs a great deal of the credit for erecting no inconsiderable part of the scaffolding upon which this newer physiological structure is being built.

LIBRARY NOTES

ABSTRACTS

THE HEART AND THORAX, A COMPARISON OF ORTHODIAGRAPHIC AND TELEROENTGENOGRAPHIC MEASUREMENTS — Paul D. White and Paul D. Camp, Annals of Internal Medicine, October, 1932, Volume 6,number 4, page 469.

Thirty years ago Moritz introduced Orthodiagraphy in order to overcome the distortion which occurs in all roentgenograms. In his method with the central rays only he outlines the silhouette of the heart and chest wall and, since there is no divergence in the central ray, the exact size of the object is obtained, the X-ray tube necessarily being movable. The authorities give the comparative findings in a series of heart cases examined orthodiagraphically and teleroentgenographically, the films being taken at a distance of seven feet. The measurements taken were,—Transverse diameter—T, the distance to the left border of the heart —ML, the longitudinal diameter—L, (that is from the point of junction of the right auricle and the aorta or the superior vena cava to the apex), the width of the great vessels just above the shadow—GV, the internal horizontal diameter of the chest—Th, the cardio-thoracic ratio —CTR, (obtained by dividing the transverse diameter of the heart—T —by the internal transverse diameter of the thorax—Th. The cardiac areas—A, were computed with the use of a planimeter, the latter not being a very accurate computation. Comparing the two methods with a group of normal sized hearts the transverse diameter was greater by teleroentgenography in all cases. The greatest difference was 1.4 cm. and the smallest .4 cm., the average 0.9 cm. For the MR the teleroentgenographic average was 0.2 cm. greater and for the ML the average was 0.7 cm. greater than the orthodiagraphic average. The L was greater by 1.5 cm. In the GV the difference averaged 0.1 cm. greater in the teleroentgenograms; in the Th, the intrathoracic diameter, the teleroentgenograms gave larger measurements in every respect, the average being 2.5 cm. For the cardiothoracic ratio—CTR—the teleroentgenograms averaged less by 0.9 cm.

The variations caused by the effect of respiration were interesting. Measurements were taken during quiet, normal breathing, during quiet, normal breathing fitting about half way between the two extreme phases of respiration. The intrathoracic diameters show marked variations with the respirations and, since this is the largest diameter, it is easy to see that the cardio thoracic ratios are greatly altered during the phases of respirations. The authorities found that the orthodiagraphic mehod gives smaller measurements of cardiac and thoracic diameters than does the teleroentgenographic method and that the larger the object studied the greater the divergence when the teleroentgenogram is used. Since the

ratio of magnification is always the same, however, in the teleroentgenogram, we should theoretically find the cardiothoracic percentages equal by two methods. In giving cardiac and intrathoracic diameters it is essential to say which method has been used.

C. E. Brown.

CLINICAL ASPECTS OF GASTRIC SECRETION. Arthur L. Bloomfield, Annals of Internal Medicine, Sept., 1932, page 307.

For the study of stomach secreions the author believes that the stomach contents should not be altered by the ingestion of a meal. What is desired is the pure gastric juice. Histamine, 0.1 mgm. per 10 kilos. of body weight is injected; specimens are then taken continuously over periods of ten minutes each.

The volume of output and peak of acidity reaches its height in 20-30 minutes. (Technique—Pollard, Roberts and Bloomfield, Journal of Clinical Investigation, Volume 5, page 611.)

There is a wide variation of normal acidity and volume of secretion in health. Some healthy individuals secrete no juice at all. In 100 normals the largest 10 minute average was 21-35 c.c. in about half but values of 5c.c. and 70 c.c. were encountered. Three-fourths showed acid peaks of over 100. The acidity decreases with advancing age. Gastric digestion in man is a matter of no consequence, some mammalians, like the rat, possess no acid gastric secretion. A resting "basal" secretion in most normals may reach 20 c.c. in 10 minute periods and show acidity to 100. When the basal secretion is high in volume and acidity there is little elevation following stimulation as e.g., after histamine.

Pepsin secretion usually parallels acid secretion, being abundant with high acid cures and absent or of small amounts in anacidity. Measurements of pepsin is, therefore, of no clinical value.

Clinically there is no symptomatology of variations in secretion volume and acidity. Symptoms are referable to motor disturbances rather than secretory. In Addisonion anemia absence of HC1 is almost a constant finding. In duodenal ulcer volume and acidity are usually above the average, high acidity in itself does not indicate ulcer. In cancer of the stomach low acidity, of course, is usual.

Does disease of the stomach lead to alteration in the secretion? The author believes rather that ulcer tends to occur in people whom to begin with secrete an abundant highly acid juice, just as cancer usually occurs is those who already have a "gastritis" with deficient secretion.

C. E. Brown.

* * *

THE FRIEDMAN MODIFICATION OF THE ASCHEIM-ZONDEK TEST FOR PREGNANCY

From the Laboratory of the Vancouver General Hospital

By EVELYN A. GEE, M.D.

This paper presents the work done in the Vancouver General Hospital Laboratories, under the directorship of Dr. H. H. Pitts, on the Friedman modification of the Ascheim-Zondek test for pregnancy.

This test is based on the fact, that during pregnancy large amounts of the anterior pituitary body hormone are excreted in the urine. Pregnant urine contains a sufficient quantity to cause a typical reaction in the rabbit's ovary when injected intravenously. The reaction is ovulation, which in the rabbit is demonstrated by the macroscopic presence of corpora haemorrhagica. In a negative reaction the ovaries are small and show no change. In a positive reaction, from one to fourteen haemorrhagic spots are found in each ovary.

Technique—Virgin female rabbits over three months of age, are given intravenous injections on two consecutive days, of 6—8 cc. of the patient's urine; the marginal vein of the ear is the most satisfactory. The first urine voided in the morning contains the greatest amount of hormone. The specimen should be obtained in a clean receptacle; catheterization is not necessary. In specimens sent from a distance, a preservative should be used such as tricresol (one drop in 30 ccs. of urine). Urine to be injected is kept in a clean receptacle in the refrigerator. In 48 hours from the time of first injection of the rabbit a laparotomy is done under ether anaesthesia and the ovaries examined for the typical reaction. The above technique is recommended by different authorities and has been followed in the cases about to be presented. An operative procedure whereby the ovaries are approached from the back has been devised by Goodale and Flanagan and reported in the October issue of the Journal of Laboratory and Clinical Medicine. We have used this method in only one case to date but shall probably adopt it exclusively in our routine work.

Cases were chosen not in order to prove the value of the test, which is already widely accepted, but to develop a technique which, it is hoped, will give results equal to those shown by laboratories elsewhere, i.e. 98% accuracy.

SUMMARY OF RESULTS IN TESTS DONE IN VANCOUVER GENERAL HOSPITAL LABORATORIES

Patient	Rabbits injected	Pos.	Neg.
Full term pregnancy	3	3	0
Known non-pregnant—			
Male urine	2	0	2
Hysterectomy	1	0	1
Rabbits not injected	2	0	2
Hydatidiform mole, immediately after removal	1	1	0
Hydatidiform mole, 6 months after removal	1	0	1
Curetted abortion, 2 days post operative	1	0	1
Unknown urine, for diagnosis	14	8*	6†

* 7—clinically confirmed.
† 5—normal menstrual periods since.

The test was first used with known pregnant and non-pregnant urines and two rabbits were examined without previous injection. The

urines from two different patients with hydatidiform mole were examined. The one urine specimen was obtained immediately after removal of the mole and a strongly positive reaction was observed. The other urine specimen was obtained six months after removal and the negative reaction would indicate that the mole had probably been completely removed. A negative reaction was noted in a specimen obtained from a patient two days after a curetted abortion. This result is in keeping with the teachings of the authorities. Ascheim and Zondek in the original reports drew a curve to indicate the increase of anterior pituitary body hormone in the urine. This shows it increasing rapidly from the time of conception to its greatest height in the second week, remaining almost constant, though dropping slightly to the end of the eighth month, then dropping in the ninth month and rapidly disappearing from the second to the tenth day post partum.

Of the unknown urines injected for diagnosis of early pregnancy, final results cannot be given in all cases. Of the six negative results, five patients have had normal menstrual periods since. Two at least would seem to have had hysterical amenorrhoeas, both having missed two periods, the normal menstrual cycle being resumed after the fear of pregnancy had been removed. One has not yet reported to her physician. Of the eight positive diagnoses, seven have since been confirmed clinically by the physicians in charge; one has not yet returned to the physician. The cases diagnosed positive have given histories of 18—50 days possible duration of pregnancy. The 18 day history seems quite authentic and is one of the cases since confirmed by the physician.

The above test is of value in the immediate differentiation of early pregnancy from menstrual irregularity due to other causes, delayed return of menses following pregnancy and pelvic masses simulating pregnancy.

Schneider of Evanston, Illinois, suggests that application of the test in excluding early pregnancy prior to uterine instrumentation, as in tubal inflation, or pelvic operative work and abdominal surgery, or therapeutic use of radium and X-ray, should eliminate many of the unfortunate experiences which occur.

Tillman, reporting 5,205 cases recorded by 27 different observers with an accuracy of 98.25%, states that it seems likely that the possibility of error is greater when a negative result is obtained than when the test is positive. He considers the test of especial value to the physician who wishes to make an early diagnosis in a patient who may require termination of pregnancy, thus preventing delay of a month or two. He considers the test of value in the differentiation of salpingitis, abortion, ectopic pregnancy, intra-uterine pregnancy, hydatidiform mole and chorioepithelioma.*

* * *

*This test was undertaken at the request of Dr. E. M. Blair, who has taken a keen interest in the experiments in this laboratory and was instrumental in supplying the rabbits and much of the material for the initial tests. The Laboratory is now prepared to undertake these tests at a very nominal fee, or in indigent cases free of charge.

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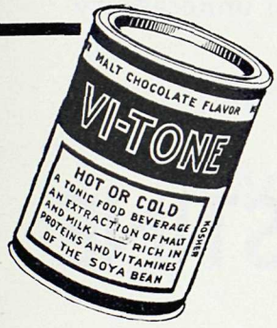

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July 4th, 5th, 6th, 7th, Hotel Vancouver, Vancouver, B. C.

President—Dr. B. D. Gillies

GUEST SPEAKERS

Dr. A. T. Bazin, Professor of Surgery, McGill University, Montreal.
Dr. C. H. Best, Professor of Physiology, University of Toronto.
Dr. Wm. Boyd, Professor of Pathology, University of Manitoba.
Dr. J. G. Fitzgerald, Dean of the Faculty of Medicine, and Director of the School of Hygiene and Connaught Laboratories, University of Toronto.
Dr. A. H. Gordon, Professor of Medicine, McGill University, Montreal.
Dr. A. T. Mathers, Associate Professor of Medicine, University of Manitoba, Winnipeg.
Dr. S. A. Kinnier Wilson, 14 Harley St., London, England.
Dr. D. E. S. Wishart, Junior Demonstrator of Oto-laryngology, University of Toronto.

Tuesday, July 4th—
8:00- 9:00 a.m.—Registration.
9:00- 9:40 a.m.—Dr. A. T. Mathers, "Medico Legal Problems."
9:45-10:25 a.m.—Dr. Wm. Boyd, "Tumours of the Neck."
10:30-11:10 a.m.—Dr. A. H. Gordon, "Migraine."
2:00 p.m.—Surgical Clinic, Dr. A. T. Bazin.
8:00- 8:40 p.m.—Dr. D. E. S. Wishart, "Vertigo."
8:45- 9:25 p.m.—Dr. Kinnier Wilson,
9:30-10:10 p.m.—Dr. J. G. Fitzgerald, "Some aspects of the Problem of Meningococcic Meningitis."
10:15-10:55 p.m.—Dr. C. H. Best, "Recent Work on Carbohydrate Metabolism."

Wednesday, July 5th—
8:30- 9:10 a.m.—Dr. A. T. Bazin, "Acute Osteomyelitis."
9:15- 9:55 a.m.—Dr. A. T. Mathers, "Psychoneuroses."
10:00-10:40 a.m.—Dr. C. H. Best, "Recent Work on Fat Metabolism."
10:00-11:00 a.m.—Dr. D. E. S. Wishart, "Mastoiditis in Children."
10:45-11:25 a.m.—Dr. Wm. Boyd, "Why Does a Patient Recover from Infection?"
2:00 p.m.—Medical Clinic, Dr. A. H. Gordon.
8:00- 8:40 p.m.—Dr. A. T. Bazin, "Tumours of the Colon and Rectum."
8:00- 9:25 p.m.—Dr. J. G. Fitzgerald, "Acute Respiratory Infection; a Problem in Preventive Medicine."
9:30-10:10 p.m.—Dr. Kinnier Wilson,
10:15-10:55—Dr. A. H. Gordon, "The Diagnosis of Disease with Coincident Enlargment of the iver and Spleen."

Thursday, July 6th—
8:30 -9:10 a.m.—Dr. C. H. Best, "Liver Function Tests from the Physiological Point of View."
9:15- 9:55 a.m.—Dr. A. H. Gordon,
9:00-10:00 a.m.—Dr. D. E. S. Wishart, "Sinusitis in Children."
10:00-10:40 a.m.—Dr. Kinnier Wilson,
10:45-11:25 a.m.—Dr. A. T. Mathers, "Sleep and its Disorders."
2:00 p.m.—Golf Tournament, Shaughnessy Golf Course.
7:30 p.m.—DINNER.

Friday, July 7th—
9:00- 9:40 a.m.—Dr. J. G. Fitzgerald, "The Nature of Antigens."
9:45-10:25 a.m.—Dr. Wm. Boyd, "The Pathology of the Breast regarded as Disordered Physiology."
10:30-11:10 a.m.—Dr. A. T. Bazin, "Lesions of the Breast."
2:00 p.m.—Neurological Clinic, Dr. Kinnier Wilson.

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THE RELIEF OF PAIN ON A SYMPATHETIC BASIS

P. G. Flothow, M.D., F.A.C.S.
Seattle, Washington

The sympathetic nervous system was thought to be purely an efferent system until recent years, and for this reason was not supposed to contain afferent pain fibres. Kuntz, Ranson, and others have shown the presence of large nonmedullated fibres in the sympathetic trunks and ganglia, which are apparently sensory. There is much clinical evidence that pain fibres course in the sympathetic nerves. In spite of this there is still a wide variance of opinion. The following is taken from Cadwalader:

"Owing to the fact that a sensation of pain may persist in spite of resection of a series of adjacent posterior roots, and that this disappeared on section of the corresponding anterior roots, it has been asserted that an auxiliary sensory pathway must exist through the anterior roots and the sympathetic system." (Foerster, Wartenberg, Davis.)

"The sympathetic system assists in the sensory innervation of every part of the body." (Foerster, Kuntz.)

According to Foester the afferent sympathetic nerve fibres of the upper extremity radiate down as far as the fifth thoracic root. Whether they radiate above the first thoracic or eighth cervical root; whether they enter the cord through the seventh, sixth, fifth and fourth cervical roots, can not at present be stated definitely, but Foester's experience would tend to make this the most probable and he concludes that ignorance of these facts has been responsible for many failures to relieve pain by performing resection of the posterior roots alone.

Those that hold against the presence of pain fibres in the sympathetic nerves explain the clinical phenomena by various technical explanations, often with experimental work to justify their conclusions. The statement is made that the sympathetic nerves carry visceral afferent fibres which are not sympathetic in origin but which accompany the sympathetic fibres. Another explanation (Davis) is that stimulation of sympathetic nerves produces a metabolite which causes painful stimuli to be transferred over somatic nerves, and that relief of pain is not due to cutting pain fibres but is due rather to stopping this chemical stimulus which results in pain. This may be true, but this explanation does not account for the relief of pain in those cases where it remains after all somatic connections have been severed and ends only with the severing of the sympathetic nerves. Several years ago I reported two such cases and I have had others since. As clinicians it is not necessary for us to know the exact physiologic explanation. We are interested in results and we know that severing of sympathetic channels relieves many types of pain.

The more I see of the results of interruption of sympathetic pathways in relation to pain, the more I am convinced that we must greatly alter our concept of the mechanism of pain. On numerous occasions I have demonstrated not only relief of pain by blocking only the sympath-

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Dr. Flothow shewed slides which illustrated very fully the anatomy of the Sympathetic System and the correct and safest method of approach.

etic nerves, but also relief of tenderness, a type of pain which in the light of our present knowledge is purely somatic in origin. This phenomena is most marked in cases of vascular insufficiency, particularly where gangrenous or ulcerated areas are present. Parts which could not bear the slightest touch may often be readily manipulated with but a minimum of discomfort, this ofttimes even in the face of little or no improvement in the vascularity of the part. This fact we always bear in mind in the treatment of such conditions. It is surprising how much pain is referable to the sympathetic rather than the somatic nerves.

Diagnostic Injections

Diagnostic injection is almost invariably performed before any therapeutic measure is instituted. Figs. 1, 2, 3, illustrate the technique of this injection for a description of which I refer you to a previous publication. For the institution of these diagnostic procedures we are indebted to Von Gaza and White. Before the introduction of diagnostic injections, therapeutic measures directed toward the sympathetic nerves were largely hit or miss procedures. Now the question of whether a pain is sympathetic in origin or transmission is quickly and definitely decided by injection of the proper sympathetic segments. This is fortunate for the future of sympathetic surgery since we are now able to avoid useless operations.

It is my purpose to cover, as completely as possible, in as few words as possible, the entire subject of pain of sympathetic origin. This is a difficult undertaking, since each subject warrants as much space as is available for the entire paper.

Pains in the Head and Neck

Migraine: This term is very loosely applied. Many headaches are called migraine which are not migraine. By migraine we mean hemicrania, a disease characterized by severe one-sided headaches often associated with visual and gastric disturbances.

There is considerable evidence that true migraine is a sympathetic syndrome. Some of the earliest operations on the cervical sympathetics were performed for migraine. Jonnesco in 1896 removed the cervical chain with inconclusive results. (It is well to note here that the inconclusive results of the early work were probably due to the inadequacy of the surgery rather than an error in the principle, which in many instances was correct). Dandy, in 1931, reported relief of hemicrania by removal of the inferior cervical and first thoracic sympathetic ganglia.

I do not wish to suggest indiscriminate surgery for headaches but where *disabling* hemicrania (a comparatively rare disease) occurs, a diagnostic injection at the time of the attack will very definitely determine whether or not the sympathetics are at fault. No doubt in some cases of severe headaches which are not true migraine, diagnostic injection will give valuable information as to possibility of treatment. Incidentally many of these are allergic in origin.

Trifacial Neuraglia: While no doubt the great majority of these cases respond to the classical methods of treatment, occasionally a case occurs in which pain recurs in spite of complete section of the sensory nerves. Perhaps this only occurs in atypical cases, but it does occur.

In 1929, in a discussion of a paper by Adson, I reported such a case in which pain was relieved by removal of the stellate and second dorsal sympathetic ganglia. On the basis of my report Mixter did a similar case with a successful result. In future cases the question can be readily settled by use of the diagnostic injection.

Atypical Facial Pain: In 1928, Glaser analyzed one hundred and forty-three cases of atypical neuralgias. The pain is often a constant, burning, boring type of pain, rather than the lancinating shock pain of true trifacial neuralgia. Frazier in the same year reported his unsuccessful attempts to relieve this type of pain by operations on the cervical sympathetics. Peets' experience, reported in 1929, was also rather unsatisfactory. I am convinced that their failures in some instances were due to incomplete denervation of the sympathetics as I pointed out in 1930, when I reported a similar case relieved by removal of the sympathetics by the posterior route.

All of the above work was reported before the advent of diagnostic injection. The question could easily be settled now. I have ruled out the sympathetics in several such cases and in one similar case have relieved the pain by injection of alcohol into the sympathetics following diagnostic injection.

It is my impression that a fairly large percentage of these cases are psychogenic rather than neurogenic in origin.

Malignancies of Head and Neck: In my paper on injections published in 1931, I suggested that cases of painful malignancies might be treated by alcohol injection rather than surgery. My results have not been brilliant. I have injected three cases, in each the pain has been definitely improved but not entirely relieved. However, acting on my suggestion, Dr. Moore of Columbia, S. C., injected two such cases with excellent results. I feel that it is distinctly worth while to do a diagnostic injection; if this gives relief, alcohol should be injected, as surgery is not warranted in this type of case.

Angina Pectoris

A great deal of work has been done on the surgical treatment of this condition. Most of the work was done on the cervical sympathetic trunk, and for this reason the results were not constant. The early work was done by Jonnesco, Danielopolu and Leriche. In this country Coffey and Brown advocated removal of the superior cervical ganglion only and reported good results, but apparently this work has not stood the test of time.

Since the heart receives sympathetic innervation through the three cardiac nerves from the cervical trunk, plus branches from the first five dorsal ganglia on the left side, it is difficult to understand how surgery limited to the cervical chain could be expected to relieve pain in all cases. Removal of the stellate and upper dorsal ganglia is apparently effective in about three-fourths of the cases as reported by White, with an apparent mortality of about twenty-five per cent. To insure eradication of all sympathetic fibres to the heart it would be necessary to remove the first five dorsal ganglia on the left side and the possibility of recurrence

of pain in the right side would still remain. This operation is feasible and can be done by removal of the second and fourth ribs and transverse processes. In this type of case the mortality must be high. My experience is limited to one case, a very severe one, who chose the risk of operation rather than the injection. He expired on the table apparently in an anginal attack, before I had reached the sympathetics. Needless to say our enthusiasm for the surgical treatment of angina pectoris has been decidedly dampened.

Mandl, in Vienna, in 1924 was the first to employ injections for angina. He used procaine only and in some cases obtained relief up to one year. Obviously in most cases the effect must be very short lived.

Swetlow, in 1926 was the first to employ alcohol. White and Swetlow have reported quite a large series of cases. They show about seventy-five per cent. good results. I use a technique differing from that described by these men. I feel that it obviates the danger of entering the dura, and lessens the possibility of piercing the pleura. Furthermore in my hands it is much easier to perform.

I have now done fourteen alcohol injections in eleven cases of angina pectoris. In three of the cases it was necessary to do a second injection on the right side because of the occurrence of right sided pain, once four months after the first injection and twice eight months later. In none of the successful cases has there been recurrence of pain in the left side. Nine of the eleven cases had complete relief of anginal pain. Included in these nine were those in which a right sided injection was necessary subsequently. In two cases, while marked improvement ensued, the results were not entirely satisfactory; strangely enough both of these cases were women. All of the men had excellent results. This may be significant.

Because of the positive results always obtained, this is the one instance in which I do not feel that diagnostic injection is indicated. Alcohol is inserted directly after ascertaining that the pleura has not been entered. The patients are given sufficient gas for analgesia while the alcohol is being injected.

Although I have had no deaths as a result of the injection I feel that it is potentially a dangerous procedure, and am always prepared for an emergency.

Four of the cases have since expired. One two months after injection, one eight months after injection, one one year later. The fourth case, a recent very severe one, died one week later as a result of thrombosis of the major abdominal vessels, the anginal attacks which had been coming every few minutes did not occur after injection.

Practically all of my cases have been very severe ones of advanced years with unquestionable severe coronary disease, whose time has been limited at best. I feel strongly that injection should not be reserved for this type of patient. Our results would be better if we could get these people earlier in the course of their disease. The ideal case, of course, is the younger individual without coronary damage. I believe that practically every case of this type can be relieved and that life will be markedly lengthened.

Angina Pectoris is one of the few conditions in which I advocate alcohol injection of the dorsal nerves. In most other conditions surgery is preferable.

The neuritis which follows alcohol injection is often quite severe and may last from three to twelve weeks. Patients having had angina are however, glad to bear this to obtain relief from the pain of their disease. In most other conditions, however, surgical removal without the attendant neuritis of injection is preferable.

Painful Thoracic Aneurysm

White has reported three cases of painful aneurysm of the arch of the aorta successfully treated by alcohol injection of the first two dorsal ganglia. This is another type of case in which, due to the condition of the patient, injection is preferable to surgery. In his report White expresses the opinion that paravertebral injection of alcohol is a poor substitute for sympathetic ganglionectomy in any patient who is a reasonably good operative risk.

Brachial Plexus Neuritis

This condition may be due to a variety of causes such as arthritis, injury, infection and malignancy. I shall treat them all as one subject and merely wish to point out the fact that sometimes when all other measures have failed to give relief a diagnostic injection of the upper two dorsal ganglia will point the way to a positive method of treatment. At times all that is needed to give relief is the injection of procaine. Apparently the mechanism of this relief consists in breaking the pain reflex. This is a subject which I shall discuss later.

I have in mind two cases, both in old men, one a case of malignancy involving the brachial plexus, the other one of extensive arthritis of the cervical spine. In the first case simple procaine injection caused marked amelioration of symptoms and in the second alcohol was used also with marked benefit.

I must confess that in the majority of cases of this type the results are poor, but occasionally marked benefit will ensue.

Painful Amputation Stumps

I believe that I was among the first to call attention to the relief of this distressing condition by sympathetic ganglionectomy. Leriche reported good results years ago by stripping the major vessels of the extremity but success in this type of treatment was the exception rather than the rule.

In 1930, I reported three cases treated by removal of the stellate and upper dorsal ganglia by the posterior approach. In one of the cases the result was excellent, in another fair, and in the third case a failure. All of these cases were done before the advent of dianostic injections.

Since we have been employing diagnostic injection we find that the great majority of these cases are not suitable for sympathectomy. Even the diagnostic injection is not absolutely reliable because of the mental aspect of these patients. It seems rather difficult for them to evaluate the result of the injection. They are so anxious for relief that frequently I fear the result is psychic. In the past year, I have performed an oper-

ation based on what was apparently inaccurate deductions by the patient, with the final result a failure. A doctor with a painful stump informed me following a diagnostic injection that it was a most difficult thing to judge whether or not the pain was relieved. I feel that unless the patient states without reservation that the pain is gone, operation should not be done. In these cases occasionally alcohol is used as a glorified diagnostic procedure which may be followed by operation if the results warrant.

Obviously the case most apt to be benefitted is the cold cyanotic stump with excessive perspiration. In my experience where the stump is warm it is rarely one in which sympathetic measures will be of any use.

A recent report by Drury and Schwartzell is an example of the occasional cases benefitted by sympathectomy and warrants the application of diagnostic injection to every such case.

In this review I am leaving out of consideration such painful conditions as Raynaud's and Buerger's disease and arthritis, since the benefits of sympathectomy in these conditions are well known.

Abdominal Conditions

We now come to a phase of the subject which is still somewhat in the dark ages of conjecture. My experience is very limited. A great deal of what I have to say is therefore largely theory. There are some things, however, on which we have definite knowledge.

Since it has been rather definitely proven that the vagus does not play any role in visceral pain, it follows that all abdominal pain must of necessity be mediated through visceral afferent fibres coursing with, even if not truly part of, the sympathetic visceral nerves.

Laewen has shown (White) by infiltrating procaine at various levels in patients suffering from severe abdominal pain that the sensory fibres from the abdominal viscera enter the cord at the following segments:

Stomach—D7-D8
Gall bladder—D10 right
Small intestine—D9-D10
Kidneys—D12-L1
Appendix—L1-L2 right

With these facts in mind White has successfully applied injection and surgical removal in tabetic crises and other severe abdominal pains of undetermined origin. Archibald reports similar results.

I have been able to relieve several cases of severe abdominal pain of undetermined origin by injection of the lower dorsal segments. I have also had a number of failures, probably due to failure to properly locate the injection.

Pelvic Conditions

In the past year gynaecologic literature has contained numerous reports of pain relief by severance of sympathetic fibres in the course of gynaecologic operations.

Harris has reported relief of painful kidney and ureteral conditions by renal sympathectomy (stripping of renal vessels).

Learmonth reports relief of painful bladder conditions by removal of the presacral nerves.

I have two interesting pelvic cases to report. One a woman forty years of age, who for twelve years had been suffering with a very painful bladder spasm. All manner of treatment gave no relief. Cystoscopic examination showed no bladder abnormality. She was totally incapacitated and obtained only slight measure of relief by pouring hot water on her vulva and perinaeum every few minutes. Examination under anesthesia revealed a small tumor mass which under deeper anaesthesia relaxed, proving to be a spastic bladder. Pelvic exploration had revealed nothing except a retroflexed uterus which was suspended without relief.

This case was called to my attention at the Coffey Clinic and I suggested a diagnostic injection to see if the spasm could be relieved. Bilateral injection of the four lumbar segments using 5 c.c. of one per cent. procaine in each needle was done. Within ten minutes pain had entirely disappeared and vaginal examination disclosed no evidence of bladder spasm. Thinking, perhaps, the result was psychic alcohol was not injected. Approximately a year has now elapsed without any return of the spasm or pain.

This is another of those phenomena previously mentioned where simple temporary breaking of the pain reflex (in this case associated with spasm) has served to cure. Apparently there is some physiological principle involved which is hard to explain. Possibly it has to do with chemical reactions at the synapses of the neurones carrying painful stimuli.

The other case was a married woman, 26 years of age, who had suffered terrific dysmenorrhoea since the onset of menses at fourteen. For approximately six hours at the onset of each period she suffered excruciating pain requiring the use of morphia as nothing else gave relief. She had had several pelvic operations because of this dysmenorrhoea and all manner of medical treatment to no avail. The pain was always associated with exquisite lower abdominal tenderness which usually persisted for twenty-four hours.

On the occasion of my first injection her pain was disappearing rapidly. Bilateral injection of the lumbar sympathetics with procaine caused the abdominal tenderness to entirely disappear. At her next period I injected her in the midst of her pain at two o'clock in the morning. Bilateral lumbar injection of procaine caused all pain to disappear in less than ten minutes. On this basis alcohol was injected and she has been entirely relieved for ten months to date.

These two cases give some idea of the possibilities of treatment in painful conditions of this type.

Traumatic Sympathalgia

Traumatic sympathalgia is a term we have coined to use in contradistinction to neuralgia, applying to those cases in which the injury is apparently vascular and the pain transmitted over sympathetic channels. We feel that the term is more descriptive than causalgia, and more inclusive.

The condition is in the nature of a traumatic Raynaud's disease, usually the result of a crushing injury to the extremity. Frequently the trauma is apparently trivial. It also occurs following a compound fracture, especially of the lower extremities.

The condition may be recognized by the presence of a cold, painful, cyanotic extremity following an injury. The diagnosis is made by diagnostic injections. My first case reported in the Surgical Clinics of North America is typical of the group. A girl, twenty-five years of age, one year previously had run a hook into the back of her right hand. After the wound healed she continued to have pain. Later the injured area was explored on the assumption that periostitis was present. The pain persisted and when I saw her, the right hand was several degrees colder than the left, and definitely cyanotic. Diagnostic injection caused a marked increase in temperature and complete relief of pain. A ganglionectomy followed successfully, and the pain and coldness of the hand has not recurred. I have seen five such cases in the upper extremity, four in women. The other cases in two instances followed crushing injuries to the hand. One case followed a chemical burn on the back of the hand, and the other had as the inciting factor a bee sting on the hand. Four of these cases were operated on and in each instance there was relief of the pain; some of them were compensation cases and developed other complaints, but all were relieved of the original complaint.

I have seen a number of these cases in the lower extremities, some of which have been successfully treated by alcohol injections, others by ganglionectomy. In other instances the sympathetics as a factor have been ruled out by failure of injection to relieve pain. White, Spurling, Morton, Scott and others report similar cases.

Arteriosclerotic Pain

I believe that I was the first to point out that the old arteriorsclerotic with painful feet and claudication could be relieved by alcohol injection of the lumbar sympathetics. In September, 1931, I reported the result of this treatment in eight cases and in December of the same year reported four additional cases with excellent results in ten of the twelve cases. Since then I have done a great many cases with marked benefit in approximately 75%.

We are frequently able to relieve pain even though there is little or no immediate increase in the vascularity of the extremity at the time. Reichert points out that often there is no evidence of improvement in circulation until 10 days to 2 weeks after injection.

For this reason diagnostic injection is done and if relief of pain occurs, alcohol is injected even though there is no increase in temperature noted.

It is in this type of case that we so frequently find exquisitely tender feet can be manipulated without pain after injection, a point to which I have referred previously.

By experience I have found that the patient in whom we can look for a good result is the one having cold, clammy, cyanotic feet. If the feet are red and dry the outlook is not good.

One of my best cases was a man 83 years of age, so apparently age is no contraindication. It is surprising how much of a vasospastic element is present in many of these cases that we have previously considered entirely occlusive in nature.

The results in this type of case are among our most gratifying.

Surgical Technique

Little needs to be said on technique. For the upper dorsal and lower cervical ganglia the posterior approach by the way of the second rib suggested by Henry and modified by Adson who removes the first rib, remains the method of choice. I prefer to remove the second rib. The approach has been considerably simplified since Henry's description.

For the lumbar sympathetics, I feel that the simplicity and safety of the extraperitoneal approach described by Royle makes it preferable to the abdominal approach. I have modified the approach by extending the incision forward almost to the border of the rectus which gives a better exposure and makes for easier and firmer closure. Since adopting the extraperitoneal approach I have done approximately one hundred cases without a fatality.

In approximately the same number of cases of dorsal ganglionectomy I have had but one death and that in a severe case of angina pectoris. So we may say that the operations on the sympathetic ganglia are accompanied by as low a mortality as any major surgical procedure.

In the light of this fact with the added advantages of diagnostic injections to definitely outline indications, we may safely say that sympathetic surgery is on a firm, safe and rational basis.

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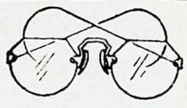

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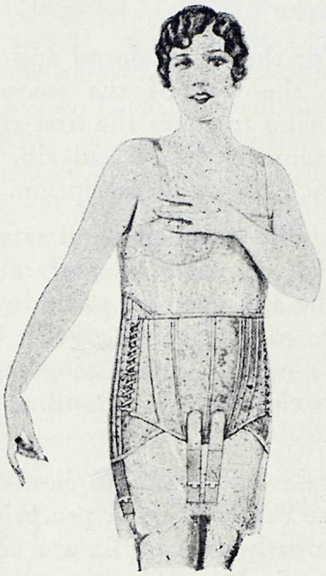

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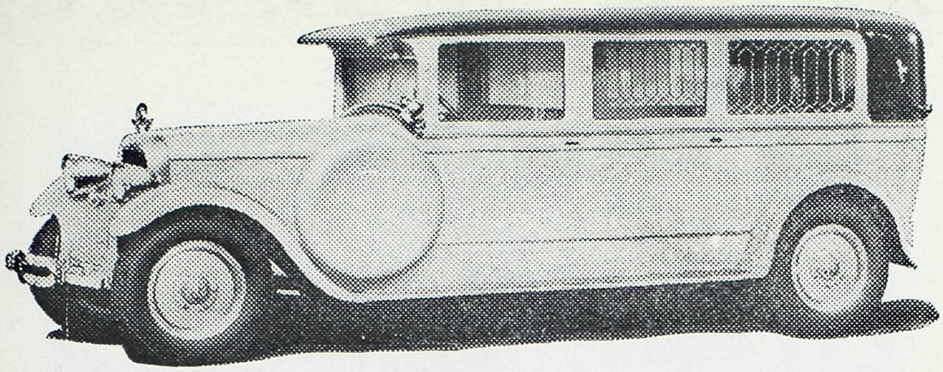

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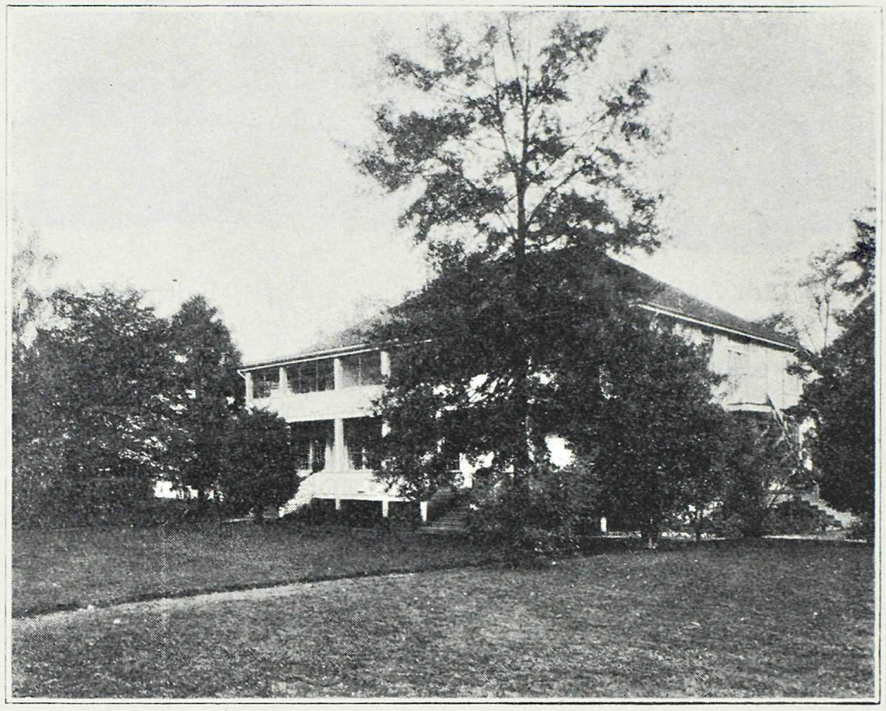

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