

TRANSACTIONS

American Laryngological
Association

FORTY-FIRST VOLUME

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TRANSACTIONS

OF THE

Forty-First Annual Meeting

OF THE

American Laryngological Association

HELD AT

ATLANTIC CITY, N. J.

JUNE 16TH, 17TH AND 18TH, 1919

TOGETHER WITH REPORTS AND CONTRIBUTIONS FROM FELLOWS
IN ACTIVE SERVICE DURING THE WAR

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TRANSACTIONS OF THE FORTY-FIRST
ANNUAL MEETING
OF THE
American Laryngological Association

HELD AT
ATLANTIC CITY, N. J., June 16, 17 and 18, 1919

The Forty-first Annual Congress of the American Laryngological Association was called to order by the President, Dr. Cornelius G. Coakley, at ten o'clock, Monday morning, June 16th, 1919. Sir St. Clair Thomas of London, England, and Major Ferand Lemaitre of Paris, France, were present as foreign guests of honor.

The secretary, Dr. D. Bryson Delavan, called the roll, and the following Active Fellows were present:

ARROWSMITH, HUBERT	GOODALE, JOSEPH L.
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CANFIELD, R. BISHOP	HOLMES, CHRISTIAN R.
CHAMBERLIN, WILLIAM B.	HOPKINS, FREDERICK E.
CLARK, J. PAYSON	INGERSOLL, JOHN M.
COAKLEY, CORNELIUS G.	LOEB, HANAU W.
COATES, GEORGE M.	MACCOY, ALEXANDER W.
DABNEY, VIRGINIUS	MACKENTY, JOHN E.
DEAN, LEE WALLACE	MAYER, EMIL
DELAVAN, D. BRYSON	MOSHER, HARRIS P.
FETTEROLF, GEORGE	MYLES, ROBERT C.
FRIEDBERG, STANTON A.	PACKARD, FRANCIS R.
FROTHINGHAM, RICHARD	PIERCE, NORVAL H.
GOLDSTEIN, MAX A.	RANDALL, B. ALEXANDER

RENNER, W. SCOTT	SMITH, HARMON
RICHARDSON, CHARLES W.	SWAIN, HENRY L.
ROY, DUNBAR	WATSON, ARTHUR W.
SLUDER, GREENFIELD	WINSLOW, JOHN R.

HONORARY FELLOWS

SIR ST. CLAIR THOMSON	J. SOLIS COHEN
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THE PRESIDENT'S ADDRESS

CORNELIUS G. COAKLEY, M.D.

Fellows of The American Laryngological Association:

The Annual Meeting of our Association has always been looked forward to by me with much pleasure, not only on account of the scientific knowledge obtained from the papers and discussions, but for the comradeship and benefit to be derived from the intimate acquaintance with the Fellows.

This year we count ourselves especially fortunate in having with us as a guest, our Honorary Fellow, Sir St. Clair Thomson and Mjr. Fernand Lemaitre.

Since we last met our numbers have been diminished by the loss of our one time Active Fellow and later Honorary Fellow, Arthur W. DeRoaldes, and our Active Fellows, Walter F. Chappell and John H. Lowman. Our Historian and Biographer will, at the proper time, present to you an account of their life work. As a tribute to their memory, and I would ask you now to rise and face west for a moment.

At the meetings of the various medical societies this year, many papers have been offered upon the various phases of Medicine and Surgery as developed or brought out by the recent World War. Our own program is no exception. When our country entered the war, the personnel of the Medical Department, regulars and reserves, had to be increased many times. The War Department acting through the various states made a survey of the physicians of the country and attempted to give a proper rating to each and

every physician. It was soon found that many of these ratings hastily obtained were not an accurate measure of the individual's usefulness in the Medical Corps. General Munson, in an article presented to the 15th Annual Conference of the Council of Medical Education of The American Medical Association held in Chicago, March 3d, 1919, gives us the procedure employed for the selection of those who volunteered their services in the Medical Corps. He states:

"It must be emphasized that the medical officers who finally reached the medical training camps represented much better than the average of the medical profession of the country, for these candidates had been subjected to several processes of elimination:

(a) They had to be invited to appear for examination by the Surgeon General, and unless they appeared to be probably desirable, this invitation might not be forth-coming.

(b) They had to be graduates of reputable medical colleges, which ordinarily eliminated men coming from institutions of poor character.

(c) They had to be licensed to practice in the state in which they lived, which would exclude medical graduates who had been found later to be not thoroughly qualified.

(d) They had to be in active practice of their profession, thereby excluding the failures in medical practice who were making their living by some other vocation.

(e) They had to pass an examination before a Local Board, which had to be satisfied with their professional, physical and moral qualifications. Here occurred the greatest number of rejections, for the Local Board was in a position not only to test out qualifications by examination, but in many instances it knew the candidate personally or by reputation, and was well informed as to his antecedent, activities and conduct.

(f) Further, before being commissioned, The American Medical Association investigated and reported in their cases, to make sure that there was nothing in their careers which would render undesirable their appointment as medical officers."

After candidates for the Army had been accepted, many of them were found not to be qualified to perform the medical duties assigned to them, so that General Munson states:

"One deduction is that the general reputation of a man is not necessarily a criterion of his actual qualifications. Another, that in their estimates of each other gained by ordinary contact, physicians are not infallible. Another, that a large number of men actually practicing as specialists in this country, and generally accepted as such, are not duly qualified as the experts they are supposed to be. The latter point is one of special interest and concern to those interested in post-graduate and specialist education in this country."

"This experience would seem to carry a moral for medical educators. Have they not a field of usefulness in civil life whereby men who were originally qualified but who later deteriorated could have their deficiencies brought home to them and effectively removed?"

With these facts before him, the Surgeon-General took steps to remedy the deficiencies by two methods:

First: By farming out small squads for special instruction in a number of hospitals in the large cities. Many of these hospitals had never before been used for teaching purposes, and since the termination of the war, have relapsed into their former policy of not utilizing for teaching purposes the abundant clinical material at hand.

Second: Schools of instruction for medical officers were established at several camps; these were later combined into one large school at Fort Ogelthorpe, at which many of the specialties were taught. The school of Oto-laryngology was in charge of Major Harris, one of our Fellows.

The training given to these medical officers was of an intensive and practical character, and it has been my privilege to talk to many who had taken it at various places, and no single student had anything but praise for the earnestness and enthusiasm of the instructors, and the highest appreciation of the great value of the instruction received.

These men will all return to civil life much better medical men as a result of their Army instruction.

Confining ourselves henceforth to the subject of Otolaryngology, there are two distinct sources for believing that many who are holding themselves out as specialists in this branch of medicine do not measure up to a desirable standard. Mr. J. S. Bowman, *Bulletin Amer. College of Surgeons*, Vol. III, No. 2, 1917; commenting on applicants for admission to the College, said "The poorest records came to us from Eye, Ear, Nose and Throat Specialists. Practically none of these men were able to gain admission by examination. Their records were incomplete, the cases were apparently insufficiently studied." General Munson states that 70% of the alleged oto-laryngologists, after the establishment of the school at Fort Ogelthorpe, were rejected. There is a book published purporting to give the names of those who in the United States regard themselves as specialists in Diseases of the Eye, Ear, Nose and Throat. We find therein, approximately 15,000 names; deducting from this number those who devote themselves solely to diseases of the eye or the ear, we have approximately 13,000 specialists in oto-laryngology who also treat the eye. If 70% of this number is incompetent, it means that there are in this country about 9,000 so-called oto-laryngologists whom the War Department would not consider competent to care for soldiers. They surely are no better fitted to care for the civilian population. Until this war there has never been anything before to uncover the deficiencies among oto-laryngologists. That there are such deficiencies is known to you all. That they exist in such numbers is a revelation to me. The principal reason for the incompetency of a large number of oto-laryngologists is the insufficient training acquired, before the individual buys an office outfit and begins to spray noses, cut out tonsils and wash out ears. At many of the post graduate schools a six weeks course of instruction is sufficient for the granting of a certificate which is beautifully framed and hung up in the office as testimony of the competency of the individual. The

best trained men are those who have been fortunate enough to serve as internes for a year or more at one of the hospitals devoted to Oto-laryngology, of which, unfortunately there are comparatively few. These internes are usually recent graduates who have previously had an internship in surgery or medicine at a general hospital, quick to learn, enthusiastic and capable. It is probable that less than fifty such internes are graduated each year from the hospitals devoted to Oto-laryngology. The wealth of clinical material and the opportunity of learning diagnosis and performing operations both minor and major under the supervision of the several visiting Surgeons, sends their men forth with an initial training that is good and an incentive to continue in this high grade work. The alumni association keeps them in touch with their parent institution and they make frequent returns to their Alma Mater, and to other medical centers here and abroad, for the purpose of study and to acquire new methods in diagnosis and operative technique. The six weeks specialist, on the other hand, is usually a much older man, slow to learn, who never gets beyond the rudiments of our professional work. There are, of course, brilliant exceptions to this latter picture.

A certain number of Oto-laryngologists received their training abroad. In Austria and Germany the opportunity to utilize material for anatomical study was abundant. There was excellent training to be had in the examination and diagnosis of patients, and a limited amount of minor surgical work was permitted. There was abundant opportunity to witness major operations, but no training in the actual performance of major operations. The museums were rich in anatomical anomalies and pathological specimens, and as a finishing off course, those of us who went abroad with considerable knowledge of the subject were made broader and better men as the result of being able to assimilate the good and reject the poor that we observed. There was, however, no systematic instruction and unless the student was rightly advised, he did not get the sort of knowledge that from a pedagogic standpoint, is correct.

There are manifestly two problems for us to consider:

First: How to afford young men desirous of making otolaryngology their life work, the best facilities for doing so.

Second: How to bring up to a higher plane the work done by sub-standard specialists.

It is far easier to plan for the first than for the second group. For the solution of either problem two things are necessary, money and time. The expense of educating an oto-laryngologist and the time required to lay the foundation are the main reasons why existing post-graduate schools have not been able to afford the kind of instruction that is desired. Well equipped laboratories including anatomical material, an abundance of clinical facilities and a quantity of expensive, short-lived modern instruments, of necessity, place the cost of education at such a figure that if the cost fell solely upon the candidate, few students could afford to avail themselves of the instruction. Our present day post-graduate school gives all it can afford for the tuition it charges. Under-graduate schools find it costs more to educate medical students than the income from tuition. Much of the laboratory instruction of the under-graduate school may with but slight added expense, be used in teaching graduates. The most economical arrangement is for the graduate school in medicine, to be a part of a university and stand in the same relation to the under-graduate school in medicine, as the graduate school in philosophy does to the college. The graduate school must be endowed either by individuals or the State. The schools would then be in a position to accept or reject candidates who desired to pursue any special graduate course of instruction by determining in advance whether they are qualified to receive such instruction. They would also be able at any time during the course of instruction to drop registrants for inefficient medical progress. The teaching in such an institution should be supervised by the leaders in the profession, who should have conferences and quizzes with the students and instructors at frequent stated times. The bulk of the actual teaching must be performed by the younger men who have not yet

reached that stage in their professional career where their private practice occupies nearly every available minute of their time. The instructors should be adequately paid for their services. Such an association with the university would prove highly attractive to the instructors and result in bringing the best young men to the University centers, where the opportunity for research and study would be greater. If funds were provided by which any one university were able to establish a graduate school in medicine, in all the specialties on the lines above indicated, it would not be long before other universities would find it necessary to seek and secure the funds to establish similar schools.

It is beyond the scope of this address to plan in detail a post-graduate course of instruction in Oto-laryngology, suffice it to say, that it should be a combined laboratory and clinical course.

Laboratory Course:

The laboratory course occupying about five hours daily for a period of six or eight months comprising:

- (a) Anatomy
 - Dissections of head and neck
 - Neuro Anatomy
 - Anomalies (museum)
- (b) Embryology
- (c) Histology
- (d) Pathology—
 - Including cutting, staining and examining all specimens from the clinic.
- (e) Bacteriology—Examining of all secretions from nose, throat and ear.
- (f) Surgical anatomy
- (g) Surgical technique—
 - Specially as applied to brain and bone surgery.
- (h) Operative Surgery on the Cadaver
 - Including Bronchoscopy
 - Esophagoscopy
 - Suspension.

(i) Roentgenology

Study of plates of proven findings.

(j) Attendance at all autopsies when brain is examined.

Clinical Course:

About three hours daily during same period.

(a) Instruction in use of all indirect and direct methods of examination including the ophthalmoscopic examination of the eye.

(b) Instruction in systematic history taking.

(c) Diagnosis of lesions.

(d) Minor operations under local anesthesia.

(e) Course in syphilology and dermatology.

(f) Neurology and localization of intracranial abscesses and tumors.

Those who complete such a course would be advised to spend at least one year on the interne staff of a standardized hospital, university or extra mural, devoted to Oto-laryngology. On the completion of the interne service in a manner satisfactory to the medical board of the hospital and on the presentation to the university authorities of a set of completed histories of all operations performed and the results obtained, the university should grant a degree.

I have such faith in the earnest desire of the young physicians of today to perfect themselves in the practice and art of their chosen life work, that physicians will gladly avail themselves of such advanced courses of instruction as soon as our universities shall find the means to establish them.

I wish to thank the Fellows for the great honor conferred in electing me to the Presidency and to express to Dr. Delavan my warmest appreciation for the laborious task of acting as secretary during the past year. He has done so under difficulties that would have caused many another to have given up the office in despair.

The Forty-first annual session of the American Laryngological Association is now open and will proceed according to the program.

THE PROGNOSTIC IMPORTANCE OF TUBERCULOSIS OF THE LARYNX

SIR ST. CLAIR THOMSON

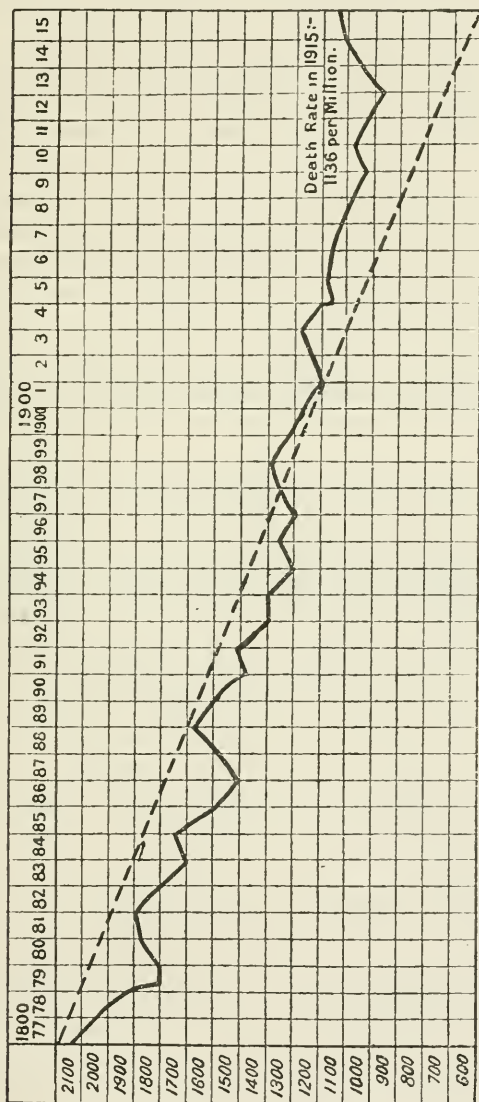
London, England

Laryngology for many years has been exploring some half-tilled fields of general medicine and surgery, and as soon as they were brought under cultivation, we have added them to our own special province. This policy of annexation, without indemnity, has been evident since the beginning of the present century. General surgery has had to yield up not only the throat, nose and accessory sinuses, but she has had to retreat from the oesophagus and all the air passages, leaving the frontiers of laryngology extended from the pituitary fossa to the stomach. So far as this large province is in need of technical administration, I think it must remain in the hands of those who possess the *tactus eruditus* which is acquired by long and patient study, and can only be maintained by constant practice. But some of the harvest we have gathered is now ready to be shared with the general commonwealth of medicine, and today I have the honour to submit for your consideration a little work I have been engaged on for many years in one corner of the harvest-field and hope that the gleanings may be of interest and value to medicine generally.

Tuberculosis is one of the most common and most deadly scourges of humanity. There is no other which stays so many of our people in the very prime of their career, for it causes one-third of the total mortality during the chief working years of life. It kills 53,000 individuals annually in the small population of England and Wales. It is the greatest cause of disablement in adult life. It leads to more loss to the family and to the nation than any other single disease. It is one of the saddest afflictions.

At the present moment the tuberculosis question is of ever increasing urgency, for a study of statistics would tend to

demonstrate that the death rate has not only ceased the steady decline it had been pursuing for many years, but that since the year 1912 it has been steadily rising.



PHTHISIS RATES, ENGLAND AND WALES, PER 1,000,000 OF POPULATION.

Had the death rate in 1895-1915 made the corresponding decrease it did in the previous 20 years, 1875-1895, it would stand at 600 per million.

Fig. 1.—Diagram illustrating the mortality of tuberculosis in England and Wales since the year 1877. The dotted line shows the steady decline up to the year 1901. In the following years the rate of decline was insignificant, and since 1912 there has been a steady rise in the mortality. (Dr. Chowry Muthu.)

The early diagnosis of tuberculosis is of primary importance. Every one knows this and I need not enlarge upon it. But only secondary to it, is the value of prognosis. On this, to a large extent, is based out clinical care of the case, and the hopes we can hold out of cure or arrest. Besides, if we can see into the future with the eyes of today, we can help in any plan of campaign so as to obtain the greater value from it and avoid the useless expenditure of energy, time and money.

What can the laryngologist do in this direction? I would at once reply that he can do so much that I hold that every case of pulmonary tuberculosis and every suspected case should be examined by a skilled laryngologist, not once only, but at regularly recurring periods: every Tuberculosis Sanatorium should have a laryngologist on its regular staff; and every laryngologist should embrace any opportunity that may come his way of examining the throat in consumptive patients.

In a few cases, tuberculosis can be diagnosed in the larynx before it has sufficiently advanced elsewhere to cause any physical signs. One such patient now under my care has been one of the allied plenipotentiaries in Paris since the beginning of the Peace Congress. Another was under observation, in and out of a Sanatorium, for three whole years before my diagnosis of his laryngeal condition was confirmed by signs in his chest; he still has no tuberculosis. Another, a medical man, died from tuberculosis in his larynx and pharynx without a pulmonary symptom. These cases are quoted to show the responsibility which the laryngologist may have to bear in the matter of diagnosis and prognosis.

In the last eight years I have examined the larynx in 1750 patients admitted to a Sanatorium for Tuberculosis. So as to be able, as far as we can, to see what the end results are, I have limited my investigations to the cases examined during the four years from July 1st, 1911 to June 30, 1915. Hence I can deal with the after-histories of these cases for a minimum of three years after leaving the Sanatorium,

while in some cases the after-history extends over a period of seven years. In this way we can obtain much more definite and reliable results than if we simply recorded the condition of the patient on discharge.

At the King Edward VII Sanatorium, at Midhurst, we have a well-worked system by which we obtain a report as to each patient's condition once every year after his discharge. Every case is therefore followed all the years of his life, and till his death is recorded. In our island kingdom this task is doubtless easier than on large continents, and so enables us to produce some records which other countries might have no opportunity of securing.

Now, what may we learn from the after-history of over a period of 3 to 7 years, of the 883 consumptive patients whom I examined first between the years 1911 and 1915; and how does this after-history differ if we separate these 883 patients into (A) Non-laryngeal cases, and (B) Laryngeal cases?

This is at once shown by reference to the two tables, A and B.

After-history up to 30th June, 1918, of 883 patients examined between 1st July, 1911 and 30th June, 1915.

TABLE A. NON-LARYNGEAL CASES

Group	Males				Females				Both Sexes			
	No. of Cases	Died from tubercle	Died from other causes	Percentage of deaths from tubercle	No. of Cases	Died from tubercle	Died from other causes	Percentage of deaths from tubercle	No. of Cases	Died from tubercle	Died from other causes	Percentage of deaths from tubercle
I	109	19	1	17.4	71	9	2	12.7	180	28	3	15.6
II	236	95	5	40.3	109	36	1	33.0	345	131	6	38.0
III	85	61	...	71.8	77	53	...	68.8	162	114	...	70.4
Total	430	175	6	40.7	257	98	3	38.1	687	273	9	39.7

TABLE B. LARYNGEAL CASES

Group	Males			Females			Both Sexes		
	No. of Cases	Died	Percentage	No. of Cases	Died	Percentage	No. of Cases	Died	Percentage
I	11	5	45.5	3	1	33.3	14	6	42.9
II	53	38	71.7	37	19	51.4	90	57	63.3
III	54	43	79.6	38	29	76.3	92	72	78.3
Total	118	86	72.9	78	49	62.8	196	135	68.9

(I should explain that at Midhurst every case, on admission, is placed in one of three Groups, according to the Turban-Gerhardt method of classification. Briefly stated, a patient is placed in Group I, if the disease is limited to a small area of one or both apices; these are the slight cases. Group II embraces cases more extensive than Group I, but affecting, at most, the whole of one lobe, or severe disease extending at most to the half of one lobe; such cases would still be called of slight severity. Group III includes all cases of greater severity than Group II and all those with considerable cavities; these are more serious cases).

Looking first at Table A, the Non-laryngeal cases, we note that, of course, the percentage of deaths is lowest in the cases of Group I; that it is more than doubled in Group II; and that in Group III 70% are dead within seven years. Of all three groups together, and both sexes, 39.7% have died within this period of observation.

Now, comparing with these results the cases in Table B, i. e., those with the larynx involved, what do we find? The first thing which strikes us is that the prognosis as shown by the percentage of deaths is rendered graver in both sexes and in all three Groups. In Group I the percentage rises from 15.6% to 42.9%; and in Group II it rises

from 38% to 63.3%. In Group III the increased mortality is not so striking, viz., from 70.4% to 78.3%, and this is what we would expect, viz., that in advanced cases the outlook is so serious that a further addition to it is not noticeable. Taking all three groups together, the presence of tuberculosis in the larynx, raises the percentage of deaths, during the 3-7 year period, from 39.7% to 68.9%.

Put in other words, amongst all the fairly early cases of pulmonary tuberculosis admitted to a Sanatorium, the expectation is that 60% of them will be alive in 3 to 7 years later. But of similar Sanatorium patients with the larynx diseased only 30% will be alive at the end of that period.

We also note that, just as in non-laryngeal cases, the percentage of deaths in Table B is higher in Group II than in the early cases of Group I, and still higher in the advanced cases of Group III. But it is very striking to observe that the ratio of the death rate in these three groups to one another is no longer the same as in Table A; for in Group II the deaths are no longer about double those of Group I, but only half as many again; and in Group III the frequency of death is only slightly in excess of the figures of Table A. Moreover, whereas in the non-laryngeal cases the death rate of the early cases of Group I was less than a fourth of the Group III cases, we see that in the laryngeal cases of Group I the proportion of deaths has risen to more than a half of those in Group III. This surely shows that, even in a slight and early case of pulmonary tuberculosis—a Group I case—the detection of a laryngeal lesion renders the prognosis more gloomy than in a case of more advanced pulmonary infection with a free larynx. Put in another way—if a case, whose pulmonary condition warrants the patient being classified in Group I, is discovered to have a laryngeal lesion, this would at once grade him down to Group II. It also demonstrates that in cases whose pulmonary condition would place them in Group II, so that only 38.0% would be dead within 7 years, the involvement of the larynx lowers their prognosis to nearly that of the Group III cases, and 63.3% will be dead within the period of observation.

Other conclusions might be drawn from these Tables, as for instance that—

The proportion of laryngeal cases amongst all admissions to a Sanatorium is.....22.2%

The incidence of laryngeal disease amongst Males being21.5%

The incidence of laryngeal disease amongst Females being23.3%

We might even refer to the greater mortality amongst Males than amongst Females, whether with or without laryngeal lesions. But I refrain from the temptation to squeeze too much out of insufficient material, particularly as I hope to publish later on a study founded on 10 years sanatorium work.

As, at all stages of pulmonary tuberculosis, so much depends on the prognosis, it is sufficient if I have shown the importance of a skilled examination of the larynx. One glance into a laryngeal mirror will often show that

“A man may prophesy

With a near aim of the main chance of things

As yet not come to life.” (Henry IV. Part 2. iii.1)
much more correctly than he can from all other clinical investigations without it.

This small investigation, after all, is only confirmatory of what we already all knew. I submit it with much hesitation, not only because a satirist has said that there are three sorts of lies,—lies, damned lies and statistics,—but also because I am in the land where the study of statistics is almost a national talent and where the dry bones of figures are made to speak.

DISCUSSION

The President: You have heard this very interesting address of Sir St. Clair Thomson. I think there are few of us who have had the opportunity of studying laryngeal tuberculosis as he has. It will be most interesting to hear what treatment is used in the King Edward Sanatorium.

Dr. Cohen: May we ask what are the signs that define the laryngeal infection?

Dr. Swain: Following out the suggestion of Dr. Cohen, it seemed to me that Sir St. Clair Thomson was able to make a diagnosis of laryngeal involvements rather earlier than some of us here. We would like to have him elaborate to some extent, if he will be so kind, the signs upon which he depends, in addition to the active ulceration, which we all recognize, for the diagnosis of tuberculosis of the larynx.

Sir St. Clair Thomson: I have not enlarged upon the subject of diagnosis, because it is rather a large subject to enter into, and I can only say that the chief thing in diagnosis is the skilled eye of the diagnostician, because it is almost impossible to put down in words the conditions that one sees. It is not only the conditions themselves, but the slight change in these conditions, with progress or temporary improvement. To put it briefly, pallor is a suggestive thing, general pallor, whether pallor of the soft palate, or of the epiglottis and larynx generally, though on the other hand, particularly among men and among elderly subjects, congestion may be present.

Then I hold a great deal in comparing very carefully with one's eye the two sides of the larynx, because if there is a congestion or a catarrh, or a thickening such as a syphilitic infiltration, it is more likely to be more or less evenly disposed on both sides, whereas, if it is on one side, it is much more suspicious. Then I think that the favorite spot to find an early tangible sign, what you call a physical change, is just above the vocal process, hidden to a great extent because it is low down on the laryngeal surface of the arytenoid, just where the arytenoid and the vocal process join one another, and one has to see some patients several times to determine that the little hollowness there, the little solution of continuity, or a little crinkling, is an early lesion. There are, of course, the later signs, ulceration and periconchitis, these are only late stages of the disease,—the thing is, these early stages. Sometimes, of course, we have a change of voice, but I have records which will be published some day, of a considerable number of people who had no complaint of the larynx, whose voice was not changed, and yet who had distinct tuberculosis.

As to the treatment, the treatment is to a great extent mostly inactivity. I am quite opposed to all the violent surgery of the larynx in tuberculosis, from which we suffered chiefly through the work of Herring in Warsaw, many years ago. It is no use curing a patient of a little huskiness in his throat at a great deal of expense and pain and suffer-

ing if we know that he is going to be dead within three, four or even five years. On the other hand, if the tubercle is of a fibroid type, it is very important to be able to improve the voice of a cashier in a bank, although he is a slowly dying man, he is able to gain his living. As has been said before, the cure of tuberculosis depends chiefly on a good stomach and a good purse, and these poor people that take years and years to die, it is impossible to herd them all into sanatoriums. The thing is financially impossible. They must just be sheltered for the remaining years of their lives, and in such patients to restore the voice is a very valuable thing.

Well, rest is the first thing, vocal inactivity. The first treatment, I think, is the sanatorium, not only because the principles of sanatorium life are so excellent, but because in the sanatorium the patient is, as the Lord's prayer teaches us, "not led into temptation." Once in temptation you are done for, but lead us not into temptation, and it is in the sanatorium that the temptation to talk doesn't come his way. Everything is done for him, he presses a button and makes a little sign and everybody knows what he wants, and there are other patients in the same condition and he is distracted with little games and walks and amusements, and not as at home, having the family hanging around him and asking him questions and luring him to talk, because vocal rest is the great thing, local treatment is very little used by me. Once a patient is out in the open air and leading a quiet life the larynx clears up as if it was by enchantment and all this unwholesome, sloughy ulcer, that we see in our patients in city life and on which in former years we used to blow iodoform and disinfectant, clears up. The fresh air does all that.

Then coming down to more active treatment my reliance has been put entirely, for many years, in the galvanocautery. I very seldom use punch forceps. I amputate the epiglottis with punch forceps generally if the dysphagia is keeping the patient from rest or dragging him down. But even there I find the use of galvanocautery has lessened the frequency of amputation of the epiglottis. I have given up lactic acids and practically all chemical caustics are found to be ineffective compared with the galvanocautery. It is the one treatment, not only for ease but for cure.

Now if the audience doesn't mind a demonstration I think it might interest some of those who don't know if I tell you that I have brought with me a patient to show, who

has been treated on these lines without the galvanocautery and the patient stands before you. In the year 1901 I discovered that I had tuberculosis. I had a thickening of my right arytenoid and a slight abraded ulcer on the right vocal cord. I had abundant bacilli in the sputum and I had some haemoptysis and I had a little cavity at the top of this apex. I went into a sanatorium in 1902 for six months, during which six months I never spoke a word, and I did another six months of what we call an after-cure. I wasn't in a sanatorium, I was in rooms and walked about on Dartmoor where the prisoners walk about, and then I returned to work in London and for two years (which is the rule) I was very careful. I never smoked, never went to a theater, began to do a little work; and when those two years of trial were over, I went full speed ahead and have done more work since then than I did in my life before.

The President: A very good example of the result of treatment of tuberculosis.

REPORT OF A CASE OF INFLUENZA, FOLLOWED BY
PNEUMONIA, LARYNGITIS, OTITIS MEDIA SUP-
PURATIVE, ACUTE, RIGHT SIDE: TONSIL-
LITIS HYPERTROPHIC, CHRONIC, BI-
LATERAL, STREPTOCOCCUS TYPE

JOSEPH H. BRYAN, M.D.

Lieut. Colonel, O.R.C., U. S. Army,

Washington, D. C.

Major B., Construction Division, was admitted to the Walter Reed General Hospital October 8, 1918, with double pneumonia following influenza. He was critically ill, but made a satisfactory recovery as far as his pneumonia was concerned. During his convalescence it was noticed his voice became very husky and he complained of pain in the region of the larynx, and pain referred to the ears. He was then transferred from the Medical Service to the Ear, Nose and Throat Section. On admission to this section his voice was rhonchus and there was some cough and pain in the larynx. Examination showed both tonsils hypertrophied with some exudate from the crypts on pressure, smears showed positive streptococcus hemolyticus. The larynx congested, the congestion extending well down into the trachea. There was a marked ulcerative condition noted along the free margin of the epiglottis, the free margin of the right vocal cord over the processus vocales of the left vocal cord, and near the apices of the arytenoid cartilages. The character of these ulcerations was unique in that the mucous membrane covering the cartilages was not actually broken through, but there was an undermining of the sub-mucous tissue leaving marked depressions with cup-shaped and everted margins. This was especially true along the margins of the epiglottis.

Another interesting feature of these depressions in the mucous membrane was they were dry, no secretion what-



ever being in evidence and the mucous membrane had a highly glistening appearance which is quite unlike the usual forms of ulcerations met with in the larynx.

Fig. IV shows a picture of the larynx and Miss Stocking, the artist, has been most successful in bringing out the character of the ulcerations with their everted margins.

My first impression was that this patient was suffering from tuberculosis of the larynx, but upon further study concluded the ulcerations were of streptococcic origin. One point in favor of this view in making a differential diagnosis was the unbroken and dry membrane covering the depressions, whereas if the case had been tubercular, the membrane would have been broken and bathed with secretion.

A few days after his admission to the Ear, Nose and Throat Section, an abscess developed in the left ear, smears taken from the secretion showed the streptococcus to be the prevailing organism.

X-RAY FINDINGS OF THE LUNGS: All lobes are involved by this hemorrhagic pulmonitis and show a high degree of mottling. The picture is a true streptococcus type.

LABORATORY FINDINGS: Tubercle bacilli after numerous examinations not found. Streptococcus hemolyticus the prevailing organism found in cultures from secretion from the tonsils and middle ear.

The tonsils, which may have been the primary source of the infection, were enucleated with marked improvement in the patient's general and local condition.

After a month's furlough I saw this officer and on examination of his larynx found the ulcerations completely healed, simply white cicatricial lines remaining. The abscess in the ear had healed and he had gained about twenty pounds in weight.

DISCUSSION

The President: Dr. Bryan's paper is before you for discussion.

Dr. Harris: Mr. Chairman, it was my privilege to see

two cases at Oglethorpe which were diagnosed as streptococcic laryngitis, the clinical picture of which resembled a little, but not markedly, the description in Col. Bryan's case. These occurred in two officers, both of whom were desperately ill, as I remember the cases, of pneumonia. The picture in these cases, or in their larynges was rather that of diphtheria. They were both cases of streptococcus pneumonia. They both were aphonic, they both had some dyspnoea, and when the examination, which was made with some difficulty, was accomplished, we found intense engorgement of the mucous membrane of the larynx with a partial pseudo-membrane in the larynx. There were spots of pseudo-membrane over the false cords, over the epiglottis and over the aryepiglottidean folds. The examination for Klebs-Löffler bacillus was negative, the findings were not of streptococcus infection. It was seriously considered whether the cases would not require intubation, but that was not found necessary. I cannot, because I am quoting from memory, recall whether any serum or vaccine was given in these cases, but the form of the infection was one of extreme acuteness. The cases without any treatment further than merely inhalation, as I recall it, proceeded to certain and rapid recovery, and the condition, so far as the larynx was concerned, was well along before the pneumonia had left the patient.

Dr. Swain: Mr. Chairman, I think this case of Dr. Bryan's is very interesting. * He had influenza, and presumably a streptococcus pneumonia, then a streptococcus throat, and the fact that the moment he had his tonsils out he got better is a very interesting thing that stands out it seems to me, from the history of the case. In Dr. Bryan's case, he saw no false membrane to any extent, but in a couple of cases I happened to see, not in this year's epidemic, but with streptococcus throats, there was very marked false membrane in the larynx and we have had a number of croup cases this year in which it was hard to differentiate between diphtheria and croup, which they really were.

As I remember it now, while I am standing and talking, I had one case of dry croup, where the whole larynx was dry, the trachea was dry, and I had to intubate on account of sub-glottic swelling, and there was at the top of the epiglottis an ulceration similar to this that you have here, Dr. Bryan. I had forgotten about it until you spoke this morning, but it had just exactly such an ulceration on the top of the epiglottis—dry, more like a clot of blood upon it. The

patient made a beautiful recovery with simple intubation and the ordinary hospital treatment.

The President: Have you anything to say, Sir St. Clair Thomson?

Sir St. Clair Thomson: No, sir. I am afraid I am absolutely ignorant of these streptococci infections, when they are more or less of a sub-acute character. I have only had to do with the streptococci infections in the larynx in the form which we call acute septic laryngitis, which, of course, is accompanied by extreme prostration, and is generally fatal within a few days, sometimes within forty-eight hours, cases in which with considerable stenosis of the larynx, tracheotomy does not cure the patient, because the patient dies of toxemia and heart failure. Such cases are not common. One has to recognize, and, of course, to distinguish this type of streptococcal infection. The clinical conditions, whether it be the acute toxic cases which I have seen, or these which Dr. Bryan told us about, the general condition, the temperature and the pulse, are our guides. In these acute septic conditions, the temperature is sometimes normal, and nothing helps us except our clinical knowledge in recognizing that the patient is a very sick man and that he is going to die. We recognize the prostration, bluish condition and congestion of a pseudo-edema often in the larynx and the tendency to cardiac failure.

I only mention this to show that there are other forms of streptococcus, such as those of which I have learned this morning.

The President: The picture that Dr. Bryan shows of the larynx is one that is quite familiar to me. I see five or six such cases a year. They are all in adults, and sometimes they are in adults of advanced years, and where they have appeared in adults of advanced years and they have been seen by other laryngologists, the diagnosis has nearly always been an early stage of epithelioma. I have had several such cases. The ulceration lasts from two to three months, does not seem to be benefited by any local treatment that I have tried; in fact it seems to be made worse and I have given up local treatment in these cases.

A case that probably was of the same nature as that which Dr. Bryan records was that of a distinguished army officer who was invalided home from France, and whom I saw in the Rockefeller Institute. He had a pulmonary in-

volverment that was diagnosed as bronchiectasis, probably lung abscess, although they were not sure about it, with considerable involvement of both lungs, more on the right, and he had an ulcerated condition on his left vocal cord identical with that which you see here. The most distressing symptom was his cough. Of course, that was partly a local cough. His voice was but slightly impaired. We tried local applications to his distinct distress so far as increase in cough, and then we omitted them. The ulceration healed in about eight weeks. His pulmonary condition was still present when I last saw him, but he is very much better.

I have also regarded these as influenza cases, up to this particular one, which was unquestionably a streptococcus involvement, as almost all of them have had a history of influenza preceding the attack, and this of course, was before we saw so many cases of streptococcus, such as we have seen in the recent epidemic. But those in previous years have always given a history of influenza. The picture, however, is so similar that I shall certainly be on the lookout for a streptococcus infection as well as the influenza.

Dr. Bryan: Mr. President, there are various types of streptococcus. In my experience at the hospital, I saw no cases in which there was a membranous deposit, such as Col. Harris speaks of in a case that he observed at Oglethorpe. There are various types of streptococcus. It is the streptococcus hemolyticus which we believe is the active organism in these cases. There are other types which probably have been isolated, and I believe probably tomorrow we may hear something further upon some other form of streptococcus, which has not thus far been made public.

The only cases similar to this were described by Cole and McCullum in their investigations of pneumonia in the epidemic at Camp Fort Sam Houston. McCullum dissected a number of larynxes and the photographs of these depressions or ulcerated conditions bore out almost exactly the picture that is shown in this one, that I am now passing around. The question is whether the streptococcus is the cause of the inflammation, or whether it is the pneumonia. This particular case started in as an influenza, followed by pneumonia of the streptococcus type. These tonsils were found, when he was able to come to the clinic, to be of positive character, triple plus, and it was our belief that it was after the influenza affected the patient that there was a descending infection producing pneumonia, and also an ascending infection in which the middle ears became in-

volved. In regard to the temperature, when this patient appeared at the clinic he was in a stage of convalescence. Although complaining of the ear, there was a slight inflammation, not suppurating at that particular moment, and there was no temperature, but as the activity in the ear increased, and the suppuration set in, there was a slight rise of temperature. In this case we gave him no treatment except to excise the tonsils and as soon as that was done and the patient was sent off for a month's furlough, there was an immediate recovery, the ulcerations completely closing in, leaving, as I stated in the paper, a mere cicatricial line. All the abrasions at the edges had closed in so that the parts had practically healed without any local treatment.

LEUCOPLAKIA LARYNGIS

NORVAL H. PIERCE, M.D.

Keratosis as it affects the larynx is most frequently limited to the region when pavement epithelium forms normal covering, namely, the interarytenoid space over the vocal processes and is then most commonly known as pachyderma laryngis.

However, the disease does rarely appear in regions when cylindrical epithelium is the normal covering, namely, in the upper surface of the vocal cords. These occurrences have been used as support to the hypothesis of metaplasia by adherents to that thesis as islands of pavement epithelium have been found in laryngeal tissue when cylindrical epithelium is the normal covering it is more reasonable to suppose that the keratosis develops from these islands than that one type of cutis transmuted into another.

The disease as it occurs in these extraordinary regions is rare, and for this reason I have availed myself of the privilege of reporting the two following cases:

G. DeV., male, age 63, a composer of music and vocal teacher, a student of Garcia, came from England to visit the Chicago World's Fair. He determined to remain in Chicago and opened a studio. He consulted me because of a hoarseness which appeared whenever he used his voice in vocalization. He was a vigorous, well preserved man, and at the time I first saw him was not at all hoarse. Laryngoscopy disclosed the following picture: A large larynx; the interarytenoid space and vocal processes were normal. In the middle of left vocal cord was a pearly white patch about a fifth of an inch long. Laterally it extended from the border of the left false vocal cord to the edge of the true vocal cord over which it projected in a finely cerated manner. The anterior and posterior edges of the patch were square,

but had a frayed appearance—that is, delicate pearly white lines alternated with pinkish introspace. There was no interference with movement of the cord. The rest of the cord was slightly more hyperemic than the right, which might be classed as of the brunette type. Considering the man's age and the laryngeal picture malignancy was suggested to my mind. However, I advised him to use his voice as little as possible, and requested him to report from time to time for observation. This he did for a period lasting over five years, and no striking change occurred in the appearance of the disease other than this: he informed me that occasionally he coughed up a small piece of membrane. He was never able to save this for me so that I was never able to examine it myself, but after such an occurrence the patch was distinctly less white in appearance. We had then here a periodical desquamation of the outer layers of epithelium. He returned, I believe, to England after an unsuccessful struggle in America, and I have not heard from him since.

A. B., male, age 57, American, a grain operator, dealt extensively "on the floor," used tobacco and spirits liberally. Consulted me in consequence of hoarseness. The laryngoscope revealed a pearly gray patch about a quarter of an inch long on the middle of both vocal cords, the edges of which were irregular. The cords themselves were pink and distinctly thickened. The mucosa over vocal processes was thickened and of a bird color, but there was no visible pitting. The movements of the cords were normal. He was advised to abandon floor trading, and the normal treatment for chronic laryngitis instituted. The inflammatory condition subsided, and his voice, though cloudy, lost much of its hoarseness. The patches remained unchanged. During the course of three years he had many relapses which were easily explained by absence of the voice on the Board. At length, after an unusually severe relapse he returned to me with the information that he at last had come to agree with me regarding the cause of his trouble, and had decided to go to California and give his voice a long rest. The ap-

pearance of his larynx at this time was distinctly alarming. The cords were more thickened, the edges more grossly irregular, but the patches were unchanged or only slightly increased in area. He complained of a sense of discomfort in his throat. After some months' stay in California, he returned. He could speak only in hoarse whispers. There was dyspnoea on exertions. The laryngoscope disclosed two tissues replacing the vocal cords with coarsely granular surfaces, pinkish white in color, and so large as to leave only a small chink between them in the middle line. The process had been diagnosed malignant from pieces removed. He had been advised to have the growth removed by the direct method. I disagreed with this opinion, my reasoning being thus: If the growth was malignant, nothing short of a total laryngectomy extirpation could save him. If it was not, laryngo-fissure provided a more exact method of removal than direct laryngoscopy. The subsequent history of the case justified my view. The patient was tracheotomized, the larynx was opened, the growth removed, and immediate frozen sections confirmed its non-malignancy. Radium was placed in direct contact with the cut surfaces within the larynx on several days, after which the larynx was closed. The man has had no recurrence after a year.

We have here several points of interest to contemplate. Keratosis as it affects the laryngeal mucosa may infrequently appear primarily in regions other than those for which it shows a predilection and where the flat type of epithelial cell is not the natural covering. Indeed, the entire mucosa of the larynx as well as that of the epiglottis may undergo this keratotic change as exemplified by the case reported by Flotan. It may be well to remember that this keratosis is a disease, *per se*, but may accompany other diseases such as tuberculosis, syphilis, and carcinoma itself. While in the first case there was a histological confirmation, the diagnosis of leucoplakia was sufficiently assured by the laryngoscopic appearance, and clinical course of the affection. Herbert Tilley reports a case (Proc. Royal Soc. Med. 1915-1916) which in a general way corresponds to mine.

2. The desquamation feature in the cases that occur in regions other than the outer arytenoid regions is interesting. Our distinguished guest, and others have reported such instances. No doubt it frequently occurs in leucoplakia of the tongue and vocal surfaces. Here, however, the scales are rubbed off by food and are swallowed without attracting the individual's attention. In the larynx, however, they form a source of irritation during the process of exfoliation and are forcibly projected into the mouth. One can readily imagine that if the case is first seen at the moment when the desquamation is occurring, this factor might add to the difficulties of a differential diagnosis. This is especially true when the process affects the lower margins of the cords.

3. The change in type which occurred in the second case from pachydermia planus to pachydermia verrucosa was interesting. The change is very simple and consists in the ingrowth of the epithelial elements and an increase of the connective tissue elements and may be accounted for by the activating influence of the whatever irritating agency that causes the original disease.

4. The method of approach in dealing surgically with such conditions as the second case illustrates may furnish a just ground for difference in opinion. It is my opinion that where extensive disease of the interior of the larynx necessitates removal, laryngo-fissure is preferable to indirect or direct endo-laryngeal methods, because it gives us greater liberty of movement, greater visibility, is more rapid and is quite as safe.

DISCUSSION

Dr. Smith: That recalls to my mind a case I saw a number of years ago, a gentleman of about fifty years of age, whose wife was subject to tuberculosis. She was in Saranac being treated for the same, and during a visit there he became hoarse and consulted a laryngologist. He diagnosed tuberculosis and as he was a great advocate of strenuous treatment, he began curretting these ulcerations, as he supposed them to be, or scraping off the epithelium piled

upon the vocal cord, and then subsequently burning these places with lactic acid. In due course of time I saw his larynx and it was very much abused surgically, but I didn't believe it to be tuberculosis as there were no signs in the lungs, he had no temperature, nothing that led me to believe it to be tuberculosis further than the evidence of the larynx.

However, he went out from my care. He came from Dr. Swain's city, and I think that Dr. Swain has seen him in times gone by. He may or may not recall the condition, but anyway, believing that he had tuberculosis and continued to go to Saranac, continuing under the treatment of this laryngologist so-called, the man ultimately developed carcinoma of the larynx and died therefrom.

There is a second case that I have reported before this Association which began in a similar manner on one cord with this typical leucoplakia and a differentiating point is that these projections come out at a more angular form in the beginning before they become of a malignant character. They stand out like the snow-capped peaks of the Alps, if I may call your attention to that—sharp pointed and extremely angular, projecting out from the border of the cord. These cases to my mind are unquestionably the beginning of the epithelioma. In other words, any piling up of the epithelium is an epithelioma, and it depends on the progress of this epithelium dipping down and reaching down in its unnatural environment, whether or not it becomes malignant, and malignancy in itself is a relative form. One case which the microscope says is malignant may continue for years, and another case, bearing the same microscopic appearance, may die within a short while, so that malignancy, as we understand it, varies in its type.

I believe these leucoplakia to be the beginning of a low form of malignancy. If left alone or if treated gently, they may continue for years. If treated violently, scraped and curetted, touched up with caustics, I believe they can become more readily a malignant type, such as we know malignancy to be.

Dr. Swain: Mr. President, I remember the case that Dr. Smith has mentioned and it is very gratifying to me to discover that whereas I had told him many times my view of his case, that I did not believe it to be tubercular and that I believed it was a simple form of change taking place in his larynx which had better be left alone rather than given the vigorous treatment that Dr. Smith has referred to—I say it

is pleasing to me to think that whereas the gentleman in the country had succeeded in convincing him of the seriousness of his trouble, he also did not respond any better to the blandishments of my distinguished confrere of New York than he did to those I gave him to counteract those of the man up in the country. I think that was a sheer case of charlatanism and that that man was traumatized, if you will, into his epithelioma that he had subsequently in his larynx. It was a sheer case of over-treatment carried on through a long period, and I am very glad that Dr. Smith happened to remember the case because it is very similar in its beginning. I saw it before Dr. Smith numerous times, and it is exactly similar to your second case of a broad, white plaque upon the center of one vocal cord, and subsequently another appeared over the processus vocalis of one of the cords—I cannot remember which, but it was a very interesting case of showing how continued irritation will tend to make epithelial structures degenerate into a malignant process. I suppose what Dr. Smith describes, keratosis, like a corn, is really a beginning of epithelioma, if you wish to look at it so.

Dr. Pierce: I am very sorry that Sir St. Clair Thomson felt it incumbent upon himself to miss my very entertaining paper and I would like to have him know that one of my cases was a case of so-called desquamative leucoplakia. I believe he has reported a similar case and the question of leucoplakia of the larynx has been a subject of discussion before the Royal Society on several occasions. With this enlightening resumé, you might say a few words about it.

Sir St. Clair Thomson: I am very sorry, sir, and gentlemen, that I had to be absent, but it was entirely due to this boundless hospitality of America in connection with a visit that I ought to pay in Philadelphia, and I was called out by Dr. Ring to settle that matter. I am very sorry to miss this, because these cases of leucoplakia interest me particularly because of the difficulty in diagnosing them from malignant disease and because we have always got to keep the possibility of malignant disease in our minds in all these cases of leucoplakia.

I have watched these leucoplakia for months and sometimes years, and in no inconsiderable number of cases they have eventuated as epithelioma. There is one celebrated case in the annals of this Association. I know Dr. Harmon Smith's name is connected with it and I believe Dr. Glide, which, if I remember, was a case illustrated in your trans-

actions, sir, with a white appearance as of leucoplakia, and that is a historical case, and in that case it was proven to be epithelioma, although it took thirteen years. One case of mine which I left alone, I think lived seven years. I have had others of three years and one of six months, but as usual America beat the record with a thirteen-year case.

Even if we remove this leucoplakia, the patient should be warned. I have seen cases where very skilled laryngologists have removed the thickening, sometimes made a microscopic examination, but unfortunately sometimes omitted to microscope it. The patients, finding a recurrence of their hoarseness two, three and four years afterwards, don't go back to the same man—they come to me, perhaps my cases go to somebody else. But I know more, I think, about malignant disease than I know about leucoplakia, and there I am a little biased in simply insisting (though perhaps Dr. Norval Pierce has done it) that the thing at the back of my mind in all cases of leucoplakia, behind the scenes, is probably malignant disease.

Dr. Delavan: Mr. Chairman, with regard to this very admirable paper I have only one thing to say, although many things might be said. That is to call attention to the fact that in the treatment of the case, after the removal of the diseased area, radium was applied. I wish the Association would realize that statement. I shall have more to say about it tomorrow in my paper, but I believe that the post-operative treatment of such conditions (and there are few conditions that are more treacherous than this one of so-called leucoplakia) is going to be a very important thing in the future and I feel personally indebted to my friend for his paper, for having brought the matter forward. I feel very deeply on the subject. I have seen a number of cases within the last year that have been instructive and inspiring. I believe there is something in it.

Dr. Pierce (closing): There is very little more to say except that we must also remember, on the other hand, that leucoplakia may accompany tuberculosis, syphilis and every malignant disease. We may have areas of leucoplakia well defined histologically, leucoplakia in all three of these processes. That is a very important fact to bear in mind in excising portions of tumor for diagnostic purposes. I am quite sure we all agree that as in tuberculosis masseter inactivity is the proper mode of treatment, so in all these conditions we should do as little as possible and be as gentle as possible in our treatment of the larynx. I do not believe

even in excising the pachydermia, I think they get along equally well with very simple, soothing treatment, and we don't run the risk by this method of aiding in the transmutation of these growths into malignancy.

BRAIN ABSCESS DEPENDENT UPON EMPYEMA OF THE FRONTAL SINUS

LIEUT.-COL. THOMAS J. HARRIS, M.R.C.

W. P., age 26, native of Mississippi, was admitted to the eye ward of U. S. General Hospital No. 14 on September 10, 1919, suffering from a swelling of the right eye. Family history and past personal history negative. Both lids were found swollen and the conjunctiva congested. Vision 20/50 in each eye. He was referred to the Department of Otolaryngology for a report as to the condition of the nose and accessory sinuses. The swelling occupied chiefly the outer third of the orbit. No pain was complained of. The fundus was normal. Examination of the nose showed pus high up on the affected side. Irrigation of the antrum brought away pus. There was a deviation of the septum to the right. A diagnosis of pan-sinusitis on the right side was made. This was confirmed by X-ray pictures. An intranasal operation for correction of the septum to secure better drainage was advised but refused. The patient gave the impression of being a person of low intellect. He spoke slowly and with a distinct drawl. As a result of local treatment the swelling for a time improved. At the end of a month, however, it had increased to such an extent that the eye was closed. Under threat of court martial the patient finally consented to operation. A radical Killian operation was performed by Captain Francis W. White on November 25th. This will be reported by him in the near future. It is sufficient here to state that a large defect was found in the posterior wall of the sinus together with extensive necrosis in the anterior wall. The dura did not appear to be affected. The wound was only partially closed, and a drainage tube was introduced. Convalescence was slow. The patient suffered from repeated attacks of vomiting. This was thought to be due to the enormous appetite which

he had and the over-eating which he practiced. There was at this time no complaint of headache nor any alteration in the pulse or temperature curve. Complete healing had taken place only toward the end of January. We were on the point of transferring the case to the medical ward for a supposed digestive disorder when in a casual way the nurse in charge remarked that the patient's eyesight had been rapidly failing during the last few days. A test of his vision confirmed this and an examination of the fundus revealed two dioptries of neuritis. Careful palpation of the operated field showed a soft, apparently fluctuating mass. The temperature and pulse were normal. There were no paralyses. A diagnosis of brain abscess was made which was confirmed by the neurologist. After careful consideration, an expectant course of treatment was decided upon. For the next twenty-four hours no change could be marked in his condition except an increase in his apathy. Suddenly, at the end of twenty-four hours he became almost completely comatose. The pulse had dropped to a little over forty and the optic neuritis was found to have increased since the last examination to three dioptries. Immediate operation was decided upon. This was performed under 1% novocaine. An incision was made directly through the integument over the swelling. Retraction of this revealed at once the dura with little or no granulation tissue intervening. Palpation at this time no longer gave any sensation of fluctuation. With the desire to reduce to a minimum the danger of meningitis, extreme care was exercised in the exploration of the frontal lobe. A probe introduced through the dura immediately entered a large cavity without meeting any resistance at all. Bearing in mind the proximity of the ventricles, the probe was not carried beyond 2 centimeters. No brain tissue was encountered and pus in quantity was not evacuated, a few drops only following the incision of the dura. No irrigation whatever was employed. A rubber drainage tube was introduced and held in position by a suture to the outer wound. The wound was left open. An immediate improvement in the condition

of the patient took place. His pulse in the course of a few hours returned to normal and within seventy-two hours he was mentally in the same state as he had been a short time previous to the onset of the active symptoms. There was at no time any escape of cerebro spinal fluid. A small brain hernia, however, took place, which gave some trouble. Amputation of the protruding mass was practiced with benefit. The patient was still in the hospital when I left in February. Later reports are to the effect that while it was necessary to open up the wound for purpose of better drainage, and the patient had proved to be the victim of recurring erysipelas, there had been no return of the brain compression symptoms.

Comment: Brain abscess due to disease of the accessory sinuses has attracted, compared with brain abscess of otitic origin, comparatively little attention. It is, however, by no means an uncommon complication. In 1919 a careful review of the literature was made by Gerber who succeeded in finding reports of 240 cases of intracranial complication dependent upon disease of the accessory sinuses, of which 65 were brain abscesses. Since then cases have been reported by Berens, Mackenzie, Freudenthal (4 cases), Onodi (3 cases), Butzengeiger, Heigel, Elschmig (2 cases), McCoy (2 cases), Zemmann and Piffel among others. In all 18 cases including our own. Even this probably does not begin to represent the actual number of cases for, as Freudenthal justly remarks, many cases have occurred following operation which were never reported, and many cases have occurred which were not recognized ante mortem. Gerber's statistics show that brain abscess occurs most frequently between the ages of 30 and 40, and is much more common in males than in females. In the great majority of cases necrosis of the posterior wall of the frontal sinus most often associated with perforation was shown at the time of operation (49 times out of 65 in Gerber's cases, of which 44 showed an actual defect).

As distinguished from abscess of the temporo-sphenoidal lobe, abscess of the frontal lobe is virtually symptomless.

Unless the disease has extended beyond the silent area no paralyses take place. This greatly increases the difficulty of making an early diagnosis. Headache is probably the most characteristic symptom. It is by no means constant nor characteristic in its location. In our patient, headache was never complained of. Several of the case reports contain reference to the apathetic condition of the patient. This was peculiarly true in our case. His appearance, lack of education, locality from which he came, all tended to ascribe this to other causes than a lesion of the brain itself. Projectile vomiting has long been recognized as a symptom of brain abscess. Repeated references are made in the literature to vomiting. As has been stated, our patient was subject to this for weeks before the abscess was recognized, and to this day we are not prepared to say positively that the cause lay in the brain. The latent period can last for an indefinite time. Only when brain compression has taken place, or the abscess has extended so far as to cause absorption, is it capable of easy recognition. At this time, through the changes in the pulse, as well as in the fundus of the eye, diagnosis is not difficult. Clinically speaking, the cases divide themselves into those of an acute and chronic type. The acute cases are associated with pain and temperature. Usually an empyaema of the frontal sinus has been recognized and a radical operation performed without relief to symptoms. Often at the time of the operation, a disease of the posterior wall of the sinuses is discovered. In these cases immediate operation has followed. In others, the brain has been explored only at an interval of several days.

The case of Beren's is notable as an illustration of the chronic or latent type. A radical operation for pan-sinusitis had been performed one year previous to the onset of the pain. The second operation revealed granulations hiding a perforation through the posterior wall.

The prognosis is grave, but by no means hopeless. A number of cases reported made satisfactory recovery after operation. This depends upon the type of case, whether one

of an acute or chronic nature with a walled off cavity. Meningitis is chiefly to be dreaded.

Treatment: The presence of a brain abscess calls for an operation to promote drainage. Extreme care is to be exercised in the measures taken. At the same time meddling interference is strongly to be condemned. Where disease of the dura is recognizable and a fistula is discovered leading into the brain, it is in order thoroughly to explore and drain. Measurements of the brain in this locality show that it is safe to work forward and backward to a distance of $2\frac{1}{2}$ without danger of wounding the lateral ventricle. Usually after the abscess is found, direct drainage is all that is necessary. As McCoy points out in his report of two brain cases, drainage is all important. In the latter of his two cases he secured this by making a second counter opening through the lateral wall of the temporal bone. To this procedure he ascribes the recovery of the patient. In the absence of clear evidence of a walled off cavity, especially where no disease of the dura is recognizable pointing to the blood or lymph vessels as the channels of infection, a simple decompression operation is deserving of consideration.

A valuable suggestion is made by Elsburg who states that if before an abscess of the brain is opened packing of gauze soaked in tincture of iodine is placed under the dura all around the wound the danger of meningitis is practically avoided. He further recommends that two drainage tubes be introduced, neither of which should be removed until ready to be taken out and that they should be shortened from time to time.

*Bibliography and Abstracts of Cases of Brain Abscess
Reported in the Literature Since 1909*

Berens, T. P. *The Laryngoscope*, Vol. XXVI, 1916, p. 1085. W., age 30. Radical operation for pansinusitis on Jan. 16. This did not stop discharge and pain. One year later a second operation discovered granulations in the roof of the sinus. These were hiding a perforation through

which a probe extended $2\frac{1}{8}$ inches. Rubber drainage inserted. Cure.

Butzenzeiger. *Münchener Medizinische Wochenschrift*, 1911. Case of cured frontal sinus abscess. No details.

Elschnig, A. *Prager Medizinische Wochenschrift*, Vol. XXXIX, 1914, p. 37. CASE 1. Boy, age 12. Phlegmon of left upper eyelid. Incision. Apathy. Paresis of right side of body. Roof of orbit removed. Incision of frontal lobe abscess. Cure. CASE 2. Male, age 45. Chronic frontal sinusitis. Killian operation. Aphasia. Orbit contained granulations. Removed orbital roof and incised abscess in frontal lobe. Exitus. Purulent meningitis.

Freudenthal, W. *The Laryngoscope*, Vol. XX, 1910, p. 60-75. CASE 1. J. S., age 25. Headache and discharge. Acute empyema of right frontal sinus. Edema of right eye. Radical operation on frontal sinus and incision into bulging dura both evacuated pus. Drainage through nose. Patient in stuporous condition. Second opening of dura emitted more pus. Death in few hours, due, it seems, to delay of operation. CASE 2. L. K., age 25. Swelling over right eye 2 weeks after attack of influenza. Frontal sinus opened after Kuhnt, evacuating pus. Part of bone removed. Semi-stupor and bulging of dura led to second operation 5 days later. Incision of dura evacuated about 100 ccm. of pus. Cure in 6 weeks. CASE 3. L. S., age 19. Semi-stuporous condition and edema of left eye and forehead. Removal of small portion of anterior wall of frontal sinus evacuated pus. Stupor. Motor aphasia. Later, paralysis of right upper and lower extremities. Second operation made wide opening into frontal sinus and opened ethmoidal cells, evacuating pus. Probe discovered that the sphenoidal sinus and adjoining brain tissue formed one large abscess cavity. Death in few hours. CASE 4. Tailor, age 38. Frontal sinus and ethmoid cells opened, both showing some pus. Continued pain led to reopening of frontal sinus 2 months later, disclosing no pus. Dura incised with negative result. Exitus in coma. No autopsy was permitted, but the assump-

tion that there were one or more pus cavities within the brain seems safe.

Gerber. "*Die Complicationen der Stirnhohlenentzündungen*," Berlin, 1909.

Heigel, *Prager Medizinische Wochenschrift*, 1914. Patient, age 33. Case of acute sinusitis. 5th day, radical operation. Eight days later, incision of dura. No pus. Exitus 1 month later. Organisms of diphtheria and influenza.

Mackenzie, G. W. *Proceedings of the Royal Society*, 1914. A manifest fistula in frontal sinus. Abscess in orbit. Opened and drained. Fistula did not close. Six weeks later operation; X-ray "normal frontal sinus." Probe entered large abscess in frontal lobe through opening in posterior wall. Drained. Recovery. Disease present of frontal and maxillary sinus.

McCoy, J. *Annals of Otology, Rhinology and Laryngology*, Vol. XIX, 1910, pp. 287-294. CASE 1. J. L., age 1½. Upper eyelids swollen after attack of pneumonia. Incisions evacuated pus. Operation on frontal and ethmoid regions, discovering necrosis. Incisions into forehead disclosed osteomyelitis. Paralysis. Frontal lobe entered through dura, emitting pus and cerebrospinal fluid. Death in few hours. CASE 2. H. E., age 10. Incision of swollen upper eyelids. Frontal sinus exposed through Killian incision. Incision of swelling on left forehead discovered epidural abscess. Area of necrotic bone removed. Two months later ethmoid labyrinth removed. Convulsions. Large abscess found in the brain but not drained well, and 5 days later a second abscess appeared. Both were now well drained. Recovery.

Onodi. *Semon's Internationales Centralblatt*, Vol. XXVI, 1910, p. 423. (Transactions of the International Medical Congress in Budapest, 1909). Three cases of brain abscess. No details.

Piffl, O. *Prager Medizinische Wochenschrift*, Vol. XXXIX, 1914, p. 39. Male, age 36. Chronic frontal sinusitis left. Exophthalmos. Intranasal treatment. Cerebro-

spinal fluid cloudy. Diplopia. Vomiting, Ptosis. Killian operation. Optic neuritis. Five weeks later, pain and rise of temperature. Vomiting. Orbital roof removed. Frontal lobe incised. No pus. Exitus. *Post-mortem*: left frontal lobe adherent to orbital roof. Abscess in frontal lobe.

Zemann, W. *Zeitschrift für Laryngologie, Rhinologie und ihre Grenzgebiete*, Vol. VI, 1913-14, p. 545. G. B., age 37. Chronic frontal sinusitis. Fistula through left eyebrow. Killian operation on both sides. Necrosis of posterior wall of right frontal sinus. Facial paralysis on left. Paralysis of left hypoglossal nerve. Left hemiplegia. Clonic spasms of upper extremities. Stupor. Cheyne-Stokes breathing. Exitus. *Post-mortem*: Leptomeningitis. Frontal lobe adherent to posterior surface of frontal sinus. Cortical abscess in frontal lobe. From here there is a fistula leading to two deeper abscesses in frontal lobe.

Elsberg. Abscess of the frontal lobe following orbital cellulitis. *Annals of Surgery*, Vol. 66, 1917, p. 508.

DISCUSSION

Dr. Chamberlin: I would like to emphasize a point Dr. Harris made in regard to the lack of symptoms in compression of the frontal lobe. Some three or four years ago at the meeting in Washington I reported before the Triological Society the involvement and practical loss of the entire frontal lobe on the left side. This patient presented absolutely no brain symptoms and consulted me on account of a discharging sinus beneath the margin of the left orbit. The probe went so far that I was afraid to introduce it any further. At operation we found practically the whole of the frontal lobe gone so that the area was represented by a line drawn through the external auditory meatus, through the midline of the skull and bounded by the floor of the skull. This man had no brain symptoms before operation or afterwards. At the time of the operation we removed large masses of polypi which had extended up through the nasofrontal duct. We removed the entire posterior portion of the frontal sinus as a sequestrum and this cavity persisted as long as I was able to follow the case, some six or eight months, as a smooth wall cavity, and the man presented absolutely no symptoms afterwards.

Sir St. Clair Thomson: I think this subject is well ripe for further study. As Dr. Harris has pointed out, I am not aware of any symposium on the subject since Dr. Gerber's collection in 1909. The condition is rare, but as Dr. Harris says, probably not so rare as you might think. I had one case which has never been recorded, and I am afraid the notes are lost, as it must be twenty years ago, but it had a great point of instruction about it. That, I remember, was a woman with pansinusitis and I forget what I did to her antrums, but I started in to do the so-called radical operation on one frontal sinus. Locally, everything appeared to go well, but as has been well described this woman became apathetic and silly in her manner and I am afraid that as this was the only thing about her we rather neglected to recognize the seriousness of her condition. Nothing locally was wrong, as I say. She lay in her bed and she was stupid and silly, and we let her die. We made the post mortem examination and found she had an abscess in the frontal lobe on the opposite side, which had not been operated on and which from its appearance must have existed weeks, possibly months.

The lesson is that we must not be in too great a hurry to blame ourselves or our colleagues for cerebral complications in sinus cases unless we get a post mortem.

Dr. Swain: Mr. President, one of Dr. Gerber's cases that has been referred to by the reader of the paper is one that I reported to him and some reference has been made to it on other occasions, but it is perhaps of interest here to relate that I think we see these cases and do not recognize them, as Sir St. Clair Thomson has said just now.

This particular case that came to my notice was a lady who had the habit of occasionally visiting some of her family who lived in New Haven and on two different occasions she came to me and I removed some simple polyp growths. On the second occasion, following the removal of one of the polypoid growths in the usual manner with the snare, there was a little pus came down from the ethmoid region and I told her I thought she must be told of that and pay attention to it. She came back to me for a third visit in New Haven a year after her second visit and more pus followed the removal of polypoid and I said, "You haven't had this thing attended to." She said, "No, I haven't, but I will as soon as I go home."

Then her immediate nasal stoppage being relieved by the removal of the growth she went to visit friends in New

York and while there, she had a time of semi-consciousness and fell into the hands of my confreres in New York. I never knew who did the operation, nor in what hospital it was done. I simply know that in operating upon the ethmoiditis they discovered a large flow of pus from an intracranial complication and before they could make up their minds that it was necessary to operate, or that it would be wise even to operate, the patient had another unconscious spell and never came out of it.

I haven't any doubt now from the histories of the case, as well as I was able to get them together, that she must have had for more than five years, in all human probability, the presence of an abscess in this silent area in her brain from which she had no other symptoms except occasional headaches.

The President: At the dinner a couple of weeks ago of the American Medical Association given to our distinguished guest, it was my good fortune to sit alongside of Dr. Ellsberg, and one of the subjects that was brought up in our conversation was the frequency of frontal lobe abscesses associated with sinus disease. Dr. Ellsberg said that he had recently had a number of cases, I wouldn't like to state the exact number, but it was either nine or eleven, and his remark to me was, that he thought sinus disease must be a terrific thing because so many patients with sinus disease developed brain abscesses and I told him that we see very many sinus cases, but the proportion of brain abscesses following them were very small. It is only the difference in viewpoint.

Here is a man who is dealing in brain surgery to a very great extent, probably more so than anybody in this country, with the possible exception of Cushing, and he is struck with the frequency of frontal lobe abscess and the association of that with sinus disease. Now there is one symptom that has been alluded to here which Dr. Tilney, who does a great deal of the cerebral localization, regards as quite suspicious of frontal lobe neoplasm, whether it be a growth or an abscess, and that is the change in disposition. Sir St. Clair Thomson spoke of it, and whenever that is a prominent symptom or noticeable thing in the course of the history of any post-intracranial lesion, Dr. Tilney places a great deal of emphasis upon that as evidence of a probable or possible involvement of the frontal lobe. We haven't the means of diagnosing accurately frontal lobe abscesses on account of the silent area, that we have in other regions of

the brain, where brain abscess is consecutive to suppuration and this is, I think, the main reason why they are overlooked so frequently.

RECURRENT CALCULUS OF THE TONSIL

Report of a Case

HENRY L. SWAIN, M.D.

New Britain, Conn.

Take it all in all, calculus of the tonsil has been, in the experience of the writer, not of very frequent occurrence. The cases which I have met have been without any special symptoms other than slight soreness or disturbance in the tonsil, and in looking through the crypts of the tonsils carefully I have, by merest accident, discovered the presence of the concretions and removed them. Such calculi may be no larger than the average sized allspice, and several that I have happened to take out have been similar in appearance, possessing rough surfaces, some of them quite corrugated, like the one that will go around in the box with the larger specimens, and have been correspondingly difficult to remove on account of this rough exterior.

The case which forms the basis of the report came in to see me first in the year 1904. She said that some ten or fifteen years previously—as a matter of fact in the year 1890—she had consulted Dr. Chapman, who was a member of this Society, and that he had removed from her throat quite an accumulation, from the right tonsil; and she said that she thought her symptoms now were similar to what they were that day. She evidently was suffering a good deal of pain and discomfort; the glands in the neck were somewhat enlarged and tender; and it certainly hurt her to swallow quite exquisitely. She was a woman then of fifty-seven years of age, small of stature, and otherwise nothing in her history that was remarkable as bearing upon the present ailment. She was not subject to serious attacks of sore throat except as she had the one at the present time, and the previous one when Dr. Chapman had seen her.

On looking into her throat I found the right tonsil apparently covered with a grey exudate. The tonsil was very much swollen, very red, the anterior pillar of the palate being edematous. On wiping off the grey exudate from the surface with peroxid, my cotton caught in the rough surface of what proved to be the calculus. Immediately I discovered what it was, and, after cocainization, proceeded to remove it. You will perceive as the specimen goes around, the one styled "Exhibit A." It is composed of three fragments as you see, which have been held together by threads in order to show the relative positions that they occupied, and also to get a good photograph. With considerable effort I was able to remove the first fragment, the one to the left as they are now bound together. Considerable bleeding followed it, and in spite of the cocain, the pain was considerable. After the bleeding had ceased, to my surprise there was a second piece visible, which you will see as the middle one of the group; and the third came to light later on and was also removed, the rough surface, as you will perceive, being very tightly, closely and intimately imbedded in the substance of the cavity wherein they were located, which made it very difficult—as the patient was a good deal of a "gagger"—to get them out, and the bleeding which followed was not inconsiderable.

It occurred to me, as I talked with the patient while waiting for the bleeding to cease, that, as she had had a similar concretion, which as you will see was a not inconsiderable one, removed fourteen or fifteen years previously, there might be some connection between the lining membrane of this sac and the production of a calculi, the idea having been impressed upon me as being in a way similar to that in which the biliary calculi form in the walls of the gall-bladder. I therefore especially requested the patient to come back as soon as she could in order that I might have a chance to more carefully examine the lining membrane of this sac than I was able to do then on account of the bleeding. The patient was instructed to use simple saline gargles, and to report not later than a week. She carefully

forgot the latter part of my instructions, and I did not set eyes on her again. Having forgotten her name, by one of those slips that occurs in the life of a busy practitioner, I was not able, by writing to her, to urge her to come again and thus settle in my mind the cause of the trouble.

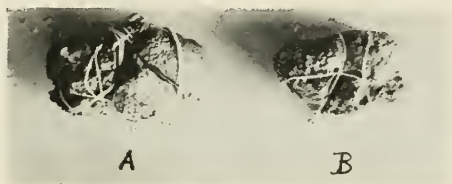
I saw this patient again on the 22nd of July of last year, an exceedingly hot day, when she had reached the discrete age of seventy-one, and was in a physical condition to be very much depressed by the heat and the exertion of getting in to see me. She seemed very frail and was suffering a good deal of pain. Recognizing her immediately as she came in, I said, "Well, have you got another stone for me?" She said, "I think so, Doctor," and she was right, as you will see from Specimen B.

I looked again into her throat, and asked her how long she had been suffering from the present accumulation, which one readily saw in the same tonsil and the same pocket where the previous one had been. She said that for the last two months she had been gradually having more and more pain, until now it seemed as though she could not possibly stand it any longer, and had to come in. Anyone who saw her throat would agree that she had certainly borne up bravely under the torment, and the impression that one received on looking into the throat was that he needed to be very careful that the stone did not fall out while he was getting the instruments ready to properly remove it. But mindful of the rough surface which held the previous one securely in place, I carefully applied the cocaine again, and plenty of adrenalin, applying both in order, if possible, to forestall the hemorrhage, and then was able to remove Specimen B, this time as a single stone. The cavity again bled profusely, in spite of the substances applied, and I again found nothing except a rough, bleeding, granulating surface, to which I applied some ferripyrin, and again besought her to put in an appearance before many days—in fact, gave her an appointment for exactly one week from date, as on the next day thereafter I was going away on my vacation.

She asked if she might take the stone home with her, and I told her if she would be careful to preserve it in its integrity and be sure to return it when she came back in a week, I would gladly let her take it. Asking her why she particularly wanted to take home this specimen when she did not express any desire to take home the previous specimen, she said her folks thought she was making an awful lot of fuss about her throat, and she wanted to take it home to show them what she did have there. I was glad to have her show her friends and relatives that she was a sufferer from a genuine error and not a delusion, and she then related to me that I was quite right in thinking that she did not feel well that day. She said that she had not been able to have any help this summer on the farm, and before coming over she had gotten up and milked three cows, done the chores about the place, then hitched up her horse and driven six miles so as to get to the station in time for the train, and she "did feel kind of tired that afternoon she was sure." She also related what is perhaps more interesting from a scientific standpoint, that in the year 1910 she had brought forth another stone, while in the Hartford Hospital for an operation for gall-stones. This specimen I have not been able to find, although the patient, after seeing both of them, says that it was similar in size and shape to the one last removed.

The patient again carefully forgot my instructions to return in a week or to bring the stone, and I went away on my vacation as scheduled. On returning in September I wrote her that I would like the stone at least, and would like her to bring it in, in order that I might see how the cavity looked. By that time the tonsil had returned to normal proportions, which consisted of a very thin layer of lymphoid tissue lining the right tonsil fossa. The cavity which had been occupied by the stone was smooth and intact, and presented nothing peculiar about its surface to distinguish it from any other tonsil crypt in a woman of her age. There was no evidence of calculus formation here at this time, although the cavity did contain a little of the ordinary cheesy secretion which one finds in old tonsils.

She rather wisely concluded that if she did not have these things occur any oftener than once in eight, ten, or fifteen years, she would not require a complete tonsilectomy or other form of treatment, and that if she ever got another one of these accumulations, she would be only too glad to have me have it to add to my collection. And so the history of the case ceases for the present. Whether in years to come I shall have the privilege of bringing before you another specimen, remains to be seen.



In these specimens which I have before you certain crumbs have broken off, and their study seems to show nothing different from the usual combination of phosphates and carbonates that one finds in calculi that occur in the mouth and salivary glands.

In commenting on this report it is, perhaps, worth while mentioning that while larger—much larger—calculi have been reported, these particular specimens are so large that they outstrip any of those usually found. The first one removed (A) is peculiar in that it is composed of three parts which by the act of swallowing and other motions of the tissues surrounding them, have had the contiguous surfaces smoothed off into facets exactly like those found on gall stones.

The fact that this patient also had biliary calculi is also interesting, as indicating the tendency of her secretions to give up their salts to make solid concretions. If ever another case should occur of a “repeater” of this type, two ways suggest themselves to dispose of such a tendency, either to destroy the lining of the cavity or pouch in which they re-form (and I wished to do for this patient, only she rejected the offer) or to do a complete enucleation. This

second alternative would dispose of any tendency to return.

Perhaps after all, as we contemplate a mass of the size of these before us, its greatest interest centers around the possibility of unexpectedly meeting such a hard substance when operating where the stone is entirely concealed in the midst of the tonsil tissue.

In the days long past, in the good old days of the tonsillotomy, such a stone would have been most disturbing. Only once did I meet such and then cut through squarely a small accumulation. Operating by the present methods would present but little trouble, because the dissecting wire of the snare would usually—perhaps always—go outside the mass, as it shells the tonsil out of the capsule. If we should meet the rare but the by no means to be ignored complication of an elongated styled process, I imagine that it would be either chopped by the snare, or again the latter would glide off from it.

I have sometimes wondered if the smaller stony masses may not lead to abscess formation. I once found gritty material in a small abscess where there was no history of an immediately acute process to account for a quinsy, and I can conceive of an infection forming an abscess in the area irritated by the presence of a stone. Then in the pus thus formed, a friable stone could readily become dissolved or broken up, a thing which presumably occurs in the case of salivary calculi of small stature.

In the case of this particular patient, I presume that if the patient could have longer endured the pain and soreness, ultimately these concretions would have fallen out into the mouth, readily being swallowed, unless by choking inspired into the trachea. Even Dr. Jackson's extensive collection of souvenirs of the chase of foreign bodies in the bronchial tree, I presume, does not include such an intruder, effectively disposing of this hypothesis; for what Jackson has not found indeed, is well nigh unheard of.

DISCUSSION

Dr. Delavan: Mr. Chairman, I have had my small share

of tonsillar calculi in the course of years and the finest specimen I ever discovered was in an old lady who, when I showed it to her, was very proud of it. I hoped to obtain this specimen and exhibit it. I have never seen a better one. I made every effort in extracting it to remove it with such care that nothing should happen, and so did the old lady, but just as the stone came out she sneezed slightly, and the stone disappeared.

The practical suggestion that arises from that accident is that if in operating on these cases the patient be inverted, be placed upon a sofa with the head hanging backward so that the law of gravity will not cause the loss of the specimen, it might also offer some protection against accident of one kind or another to the patient.

Sir St. Clair Thomson: I have not had a patient, sir, who developed this calculus habit which Dr. Swain refers to, but I am tempted to get up because of a recent case of calculus in the tonsil. It impressed itself upon me because he was a very valuable man to the British government in the midst of the war, a great authority on high explosives and that sort of thing, and he came to me simply because, being a very shrewd and scientifically trained man, he detected an enlarged gland beneath his right jaw and had some discomfort in swallowing. On examining him, I found the right tonsil looking blue and red and angry and projecting, and at one point there was a little gray slough. The man was 65 years of age.

I did what we all do, I think—that is, use the most valuable instrument in examining anything of that kind in the pharynx, and that is one's forefinger, and to my horror I felt in this tonsil an infiltration of cartilage-like hardness. I took a bad view of the case, and, in order not to break it to this man suddenly and yet to be prepared for anything, I had a consultation next day with a well-known surgeon who devotes himself to the surgery of the neck, and he agreed with me that it was suspicious, but he said, "Let us feel with a probe," and when feeling it with a probe, we found a calculus in the middle of it. The calculus was dug out on the spot and all his alarming symptoms disappeared.

A CASE OF NODULAR HEADACHE OF NASAL
(SPHENOPALATINE-MECKEL'S)
GANGLIONIC ORIGIN

GREENFIELD SLUDER, M.D.

Nodular or Rheumatic Headache as it is sometimes called is not frequent compared to other headaches. It is characterized by the presence of nodules from the size of a pea to that of a hazel nut in some part of the scalp or the nape of the neck which are supposed to be the cause of the headache. Sometimes they are spoken of as being found lower down in the shoulders.

The theories of their origin and their relation to the headache and the literature concerning the problem are profuse. Those interested will find much in the Monographs on Migrain.

The case I report is striking.

A lady 40 years old gives a clear history of a "lower-half headache" of great severity from her childhood, stating that when it was very bad "knots" came in her neck and over her scalp. She has been my patient for 15 years but I never succeeded in seeing her when the "knots" were present until one month ago. At this time she had an unusually severe attack of nasal ganglion neuralgia, for which she consulted me. She spoke of the severity of the attack and called attention to some "knots" in her neck. At the lowermost part of the occiput were two nodules near the middle line each side one centimeter wide and two centimeters long, tender to touch. Full cocainization of the nasal ganglion relieved the pain and an hour later the node of the right had disappeared. That of the left side was present 24 hours later but smaller and less sensitive. It disappeared in ten days more.

These are the cases that are spoken of by massage advocates. Auerbach¹ describes them as constant chronic head-

¹ Auerbach: Das Kopfschmerz, 1912.

aches with nodules. Patrick² described them as acute or chronic. Auerbach cut a specimen of one of them out for microscopic examination but could prove nothing. I cannot help thinking that these nodes are manifestations on the part of the sympathetic not unrelated to some of the skin lesions of neurotic sensory or trophic origin. One case, however, must be remembered merely as one case.

² Patrick: Indurative Headache, Trans. A. M. A. Sect. Laryng. & Rhinol., 1918.

NAUSEA AS A NASAL REFLEX

GREENFIELD SLUDER, M.D.

Nausea is a symptom of innumerable clinical conditions. It has been mentioned frequently as a symptom of nasal disorders of one kind or another, descriptions of which may be found on perusal of the literature of the past thirty years. It has, however, always been one of a dozen or more symptoms, all of which might have accompanied any acute inflammatory disease with pain.

Nausea as an isolated specific reflex from the nose, as far as I know, has not hitherto been observed.

My interest in this phenomenon began ten years ago when I injected the nasal (sphenopalatine-Meckel's) ganglion with plain 95% alcohol. It was not uncommon then to produce nausea by that injection. I have seen such a case in which the patient was nauseated instantly by the injection, vomit for six days, intermittently. I have seen this phenomenon also follow the post-ethmoidal-sphenoidal operation. Since I have added carbolic acid to the alcohol injection, nausea has been much less frequent, but still sometimes follows. Frequently, in the throes of severe pain produced by any cause, nausea and vomiting occur, a fact which has been well known probably throughout all time. Anything which will stop the pain under these conditions, will stop the nausea. So it has happened that on many occasions a severe nasal ganglion neuralgia has been accompanied by nausea which ceased with the cessation of the pain by anesthetizing the ganglion. Such cases have been quite frequent in my experience; but within the past year I have had a number where there was not any pain, although the nausea was severe. In one severe nasal neuralgia, on many occasions pain was absent, although a purposeless vomiting had continued for twelve hours, and was stopped in five minutes by the application of one drop of

90% cocaine to the nasal ganglion district. This has been repeated many times in this patient.

In another case, one of hyperplastic non-suppurative sphenoidal headache, marked nausea without headache, is sometimes manifest. Application of one drop of 90% cocaine solution to the floor of the sphenoidal cell stops it in about ten minutes. In this cell, the Vidian canal may be felt elevated from the floor about one-half centimeter.

These are two anatomical subdivisions of cases which are to be thought of as one type, namely, that of sympathetic nervous system irritations; or at least, I should think so. I say this because of the intra-sphenoidal cocainization of the Vidian nerve in the Vidian canal. Beyond this, I am unable to speculate as to the mechanism of this apparently well-defined reflex.

These observations indicate that the power of making nausea reflex from the nasal ganglion or the Vidian trunk, is independent of any pain complement. They suggest, however, that in whatever way the reflex is made, it is probably not unrelated to that which makes the pain, inasmuch as it is relieved by cocaine locally applied, just as the pain reflex is so stopped. Over dosing with cocaine makes nausea return in these cases.

In this association of speculative thought please see "Asthma as a Nasal Reflex," by Greenfield Sluder, M. D. Trans, Am. Med. Assn. Sect. Laryng. Rhinol. & Otol. 1919.

DISCUSSION

The President: Dr. Sluder's study of this subject is now open for discussion.

Dr. Smith: Mr. Chairman, I have nothing to say in regard to the first paper of Dr. Sluder, but in regard to the second, one case occurred in my practice three years ago—a man who had formerly been the patient of a practitioner in our town, old Dr. Greuning, who did eye, ear, nose and throat work. This man at regular periods of about six months would have a week of vomiting, projective in character, so that he couldn't attend to his business as a stock broker. Dr. Greuning used to cauterize the markedly devi-

ated septum at the apex of the deviation which would relieve the nausea for another period of about six months. This had gone on for a period of several years.

Subsequently, Dr. Greuning was called away and the patient fell into the hands of his successor, who did not confine himself to the throat work, but did eye, ear and nose work as well, and kept up the cauterization for about a year, and then sent the man to me, recommending that I should correct the deviation to relieve the nausea. I didn't believe that such would result. I protested against operative measures for this alone and so expressed myself to the patient and to Dr. Reese, but I corrected the deviation by submucous resection and from that time on over a period of three years, the man has had no recurrence of his nausea.

About a year ago, I had a similar case referred from the same source. Profiting by the experience of the first, I immediately corrected the deviation and again corrected the nausea. What influence this pressure, which in both cases was exercised against the inferior turbinate by the deviated septum, what influence that has on the nasal ganglion, or vice versa, I am unable to say, but unquestionably to my mind, it was a reflection nausea produced by the pressure in the nose and in both cases there has been a very decided and immediate and delightful result.

Dr. Mayer: I would like to say that in association with the cases of dysmenorrhea that I have mentioned more than once and have relieved frequently by intranasal treatment, there is also this question of vomiting, which I have, however, put into the same category, as Dr. Sluder does associated with the pain, but nevertheless, the relief of the nausea is just as prominent and just as quick as the relief of the pain in the cases where the relief follows:

Perhaps I might say in this connection that in recent years I have more and more carefully tested out these cases of dysmenorrhea by cocainization at the time of the painful menstruation to find out whether the patient did get relief from an application of cocaine to the sensitive spots, and in most cases where relief was immediate, I subsequently put trichloroacetic acid on the parts. Just before leaving home I heard of two more very successful results following this line of treatment.

Dr. Sluder: I am greatly interested in Dr. Smith's report; I can add nothing to it. It is valuable observation and I think ought to go in with the record of these cases. I can

understand how in a greatly irritated state of the nose the reflection may be projected from a point elsewhere than the nasal ganglion, from any part inasmuch as the sympathetic supply of the nose comes through the ganglion and proceeds to the nasal cavity.

DEMONSTRATION

CHARLES W. RICHARDSON,

Lieut. Col. M.C.N.A., Washington, D. C.

The President: Colonel Richardson has to present to us some of the very wonderful reclamation work that he has had the supervision of during the late war. I will ask Colonel Richardson to present his work.

Mr. President, it gives me great pleasure, at the request of the President of the Laryngological Society, to bring the patients and teachers of the Section of Defects of Hearing and Speech, whom I utilized for demonstration before the American Otological Society, for a demonstration before the American Laryngological Society.

I regret exceedingly that I have only the patients who have been treated for defects of hearing. Had I known you might request me to bring my patients before you, I should have had also some of the cases of corrective speech work, which are as remarkable, if not more so, than those of the Section of Defects of Hearing.

I wish you to take cognizance of my aides, to whom all honor is due for this work. It is only that the director can organize and direct. It is through the instrumentality of his instructors that he obtains the results, and I want to pay tribute to the remarkable efficiency, co-operation and enthusiastic aid furnished me by this band of teachers.

Our treatment has been through the individual instructive method; intensive in its character, the patients having from one to three or four, half-hour periods each day, as long as they could accomplish results without fatigue. They have had practice with each other, and with the use of the mirror. In other words, it has been our object to keep these patients in a complete and continuous atmosphere of speech reading, so that the new line of transmission of visual con-

ception of sound waves may be conveyed by the visual track to the auditory centre instead of by the old method through sound waves conveyed through the auditory track.

In order to create and maintain this at its highest degree of perfection it is necessary to have intensive work. These patients whom you see have only had the average period of training in speech reading, about two and a half months, and in them you see as perfect a type of speech reading as it is possible to produce.

Dr. Richardson presents his corps of teachers together with three disabled soldiers, totally deaf, who have been taught lip reading under the auspices of the government. Demonstrations were given by these three soldiers of their ability to converse and understand by means of lip reading. This demonstration was of extreme interest to all present and a vote of thanks was given to Dr. Richardson for presenting this phase of his work before the Association.

A SYMPOSIUM ON STREPTOCOCCUS HEMOLYTICUS CARRIERS—CHEMICAL ASPECT

JOSEPH H. BRYAN, M.D.

Lieut. Col. O.R.C., U. S. Army, Washington, D. C.

The role the tonsil plays in harboring infectious organisms has long been known, but its importance as a disseminator of disease has only been recently recognized, or, at least appreciated. As a carrier of the diphtheritic bacillus it has been demonstrated that it has a very decided influence on the individual's social and economic value as far as the public health is concerned. But by its recognition as a carrier of the streptococcus as a secondary invader, its dangerous role has been greatly increased. It needed only a large assembling of men from all walks of life in the camps all over the country when the new army was being mobilized in 1917 for various acute infectious diseases to develop, especially scarlet fever and measles. It was the latter which more extensively prevailed, and you will all recall how frequently the sequelae, laryngitis, bronchitis and pneumonia with empyema followed. The results were so serious as to cause great concern to the Medical Officers of the Army, and alarm as far as the general public was concerned. The importance of this subject is shown by the manner in which it has been studied at the Base and General Hospitals, and by the reports of commissions appointed by the Surgeon General to investigate it.

The variety of streptococcus that was the greatest factor in producing these serious complications was that known as the hemolyticus, an organism producing a lysis of the red blood corpuscles. The infection is secondary in character, and is ascending or descending; in the former, sinusitis, otitis media, and mastoiditis; and in the latter, laryngitis, bronchitis, pneumonia, and frequently empyema resulting.

Cole and MacCallum¹ in studying the epidemic at Fort Sam Houston state in their report the streptococcus hemolyticus was the chief cause of the broncho-pneumonia following measles in that camp. This statement alone demonstrates the importance of the subject, and when the results from the investigations that are being made by some of the best observers in the Army, both from the clinical and bacteriological standpoint, and the data all in, no doubt some definite plan will be formulated by which such serious epidemics in the Army will be prevented or lessened in the future. What is true of the Army may apply equally in civil life, as to schools, factories and other places where large numbers of individuals are collected together. In this symposium we propose treating the subject of streptococcus carriers from the clinical, the bacteriological and the epidemiological standpoints.

The bacteriological and clinical investigations were made by Lieut. Colonel H. J. Nichols, M.C., U.S.A., Chief of the Laboratory Service, and myself, Chief of the Ear, Nose and Throat Section of the Surgical Service of the Walter Reed General Hospital, Takoma Park, D. C. Captain Blake will take up the epidemiological side because of his general knowledge of the spread of this disease through the Army. Those officers who were stationed at Base Hospitals probably had a better opportunity of studying this subject because of their little more intimate knowledge of the soldier from his inception in the camp. With us, our cases came into the hospital as patients from the various camps within a limited radius of Washington, such as Camps Meade, Lee, Leach, Meigs, Potomac Park, Humphreys, and from the office of the Attending Surgeon in Washington.

No doubt many of these cases entered the Army from civil life as carriers. Levy and Alexander² in an examination of 489 new recruits from various sections of the country found 14.8 per cent carriers of the streptococcus hemo-

¹ Cole and MacCallum: Pneumonia at a Base Hospital, J. A. M. A., April, 1918, page 1146.

² Levy and Alexander: The Predisposition of streptococcus carriers to complication of measles. J. A. M. A., June 15, 1918, page 1827.

lyticus. These findings are interesting and very instructive when compared with their further investigation made on troops after six months' service, all being apparently healthy men. Of ninety-five men from one company examined, seventy-nine or 83.2 per cent were carriers of streptococcus hemolyticus, 64.3 per cent being heavily infected. The inference is this increase in the disease was acquired in the hospital from the original carriers.

For the sake of comparison I am quoting from an earlier communication by Lieut. Colonel H. J. Nichols and myself³ showing the degree of the infection of the tonsils of one hundred excised tonsils examined showed about 70 per cent markedly infected with hemolyticus streptococci. (These findings in excised tonsils will be seen to be very similar to those of Levy and Alexander's clinical findings.) It would have been interesting if we could have determined the evidence of streptococcus carriers in all patients immediately on their admission to the hospital, but this was not possible. The probabilities are that many of these cases entering the hospital for other than throat and nose conditions were carriers, and were only discovered after an indefinite stay. As soon as a patient became a suspect he was sent to the Ear, Nose and Throat Section for investigation.

The method of procedure was as soon as the patient presented himself at the clinic a thorough examination was made of the upper air passages, and a culture by means of a swab was taken from the pharynx, the tonsils, saliva and anterior nares. These cultures were immediately sent to the laboratory and if the report returned was positive the patient was sent to the isolation ward, which was set apart especially for the care of all streptococcus cases.

The isolation of all carriers was strictly carried out, no one from outside was permitted to enter this ward save the medical officers, nurses and corps men assigned to the care of these cases.

Clinically these patients presented the usual variety of throat and nose disorders found in the average clinic. The

³ Nichols and Bryan: J. A. M. A., 1918, vol. 71, page 1813.

tonsils were either hypertrophied with follicular degeneration, small and degenerated, or submerged.

The presence of the streptococcus organism can only be determined by a bacteriological examination.

Various local methods were thoroughly tried out by Captain Wm. H. Huntington, who was in charge of this ward until September 1, 1918, and subsequently by Lieut S. A. Alexander, to render the throats of these carriers negative, but they were found to be futile.

We divided the cases into five groups for treatment and observation. Group one received no treatment, group two received a hot alcohol gargle (20 per cent in water) every four hours during the day, group three received a hot Dobell's solution gargle every four hours during the day, group four received an application of a 5 per cent solution of dichloramine T, in chlorococane to the face of the tonsil every four hours daily, group five received an application of a 25 per cent solution of nitrate of silver every four hours. These cases were all discharged after two successive negative cultures were obtained on separate days.

The result of this preliminary study is shown in Table I.

TABLE I.

Group	Cases	Length of treatment before 2 negative cultures for <i>Streptococcus Hemolyticus</i>
1	39	17 days
2	6	15 days
3	24	19.4 days
4	6	19.8 days
5	22	8.8 days

Total cases, 961; average length of stay in ward, 16 days.

It will be seen from Table I that the results obtained in groups 1, 2, 3 and 4 were with slight variation about the same. That obtained from a 25 per cent solution of silver nitrate gave the best results in that the stay in the ward before two successive negative cultures were obtained was only 8.8 days.

Another series of experiments were carried out as shown in Table II.

TABLE II.

Group 1	Culture 1	Culture 2	Culture 3	Culture 4
Tonsil 1	+ + +	—	—	+
Tonsil 2	+ + +	—	—	+ +
Tonsil 3	+ +	—	—	+ +
Tonsil 4	—	—	—	—
Tonsil 5	+ + +	+	+ +	+ +
Tonsil 6	+ + +	+	+ + +	+ + +
Tonsil 7	+ + +	+	+ + +	+
Tonsil 8	+ + +	—	+	—
Tonsil 9	+ + +	—	+ + +	+ + +
Tonsil 10	+ + +	+ +	+ + +	+ +

Group 2	Culture 1	Culture 2	Culture 3
Tonsil 1	+ + +	—	—
Tonsil 2	+ + +	+	+ + +
Tonsil 3	+ + +	—	—
Tonsil 4	+ + +	—	+ + +
Tonsil 5	+ + +	—	+ + +
Tonsil 6	+ + +	—	+ + +
Tonsil 7	+ + +	—	+ + +
Tonsil 8	+ + +	+	+ + +
Tonsil 9	+ + +	—	+ + +
Tonsil 10	+ + +	—	+ + +

Plates from tonsils 1, 2, 3 and 4, group 1, cultures 2 and 3 are inaccurate because silver nitrate was not completely neutralized with sodium chloride. In this group note marked increase in colonies of culture 3 as compared with culture 2. Culture 3 was after tonsils had been squeezed. Note also increase of colonies on face as shown in group 2, culture 2. In first group crypts were irrigated with 2 per cent silver nitrate.

Group 1, Table 2, consisting of 10 tonsils were treated and cultured as follows:

1. Culture from crypts of tonsils before application of 25 per cent silver nitrate and irrigation of crypts with 2 per cent silver nitrate.

2. Culture from face of tonsil and superficial extremities of the crypts, after excess of silver nitrate was neutralized with sodium chloride.

3. Culture of face of tonsil after they had been greatly squeezed.

4. Culture from deep portions of crypts.

Group 2, Table 2, consisting of 10 tonsils were treated and cultured as follows:

1. Culture before application of 70 per cent silver nitrate to face of tonsil.

2. Culture from face of tonsil after excess of silver nitrate had been neutralized with sodium chloride.

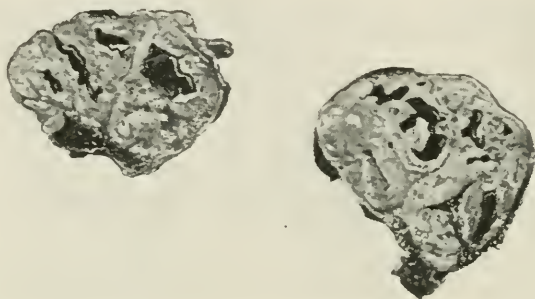
3. Culture from deep portions of crypts.

It seems evident that it is impossible to sterilize the tonsils with their innumerable crypts running in every direction. The face of these tonsils, although sterile immediately following an application of 25 per cent silver nitrate becomes contaminated with streptococci from the crypts as soon as sufficient pressure is brought to bear upon the surface of the tonsil as in deglutition or in vomiting.

Post operation findings in a series of 20 cases showed pure streptococcus hemolyticus from the crypts of excised tonsils in 18 cases or 90 per cent, and negative in 2 cases or 10 per cent. Adenoids were found in 3 of these cases and were positive in one case or $33\frac{1}{3}$ per cent, and negative $66\frac{2}{3}$ per cent. Of these 20 cases six or 30 per cent never gave positive culture after operation. The remaining 14 showed positive culture from the fossae and they were treated daily with a local application of a 10 per cent solution of silver nitrate. These throats became negative in 10.7 days after operation.

From the above it will be seen how futile local treatment is in attempting to eradicate the streptococcus hemolyticus from the tonsils. While it may be possible to sterilize the surface of the tonsil and some of the crypts there will never-

theless remain a number of these crypts that are inaccessible to any chemical means of disinfection. Granting that all the crypts were accessible there still remains the possibility of still further disease in the deeper and more inaccessible parts of the gland. It is probable within the experience of all who have enucleated many tonsils to find on sectioning a large or even multiple abscesses which gave no evidence of their presence.



Photograph I shows a sectioned tonsil injected with lamp black and a large cavity in its center.

This case may have given a negative culture for the surface and crypts and still be a menace, needing only some intercurrent disease such as measles or scarlet fever to lower the patient's vitality and to light up and make more active the organisms located in the abscess.

We consider, therefore, all local treatment after the cultures show the presence of streptococcus hemolyticus as not only deceptive but a waste of time.

A complete enucleation of the tonsil is necessary.

Any tonsillar tissue remaining after an incomplete operation harbors the organism and the patient continues to be a carrier.

THE BACTERIOLOGY OF THROAT CARRIERS OF STREPTOCOCCUS HEMOLYTICUS *

HENRY J. NICHOLS, M.D.,

Lieut. Colonel, Medical Corps, U. S. Army.

In controlling the spread of infectious diseases, the detection of healthy carriers of the specific organisms is a recognized part of the laboratory program along with the diagnosis of actual cases and vaccination when available. In diseases spread from mouth and nose, diphtheria offers the best example of what can be done by this method of attack. Diphtheria bacilli can be found in the throats of healthy carriers by suitable cultures; the virulence or significance of the organisms found can be determined; chronic carriers of virulent organisms, who are usually immune themselves, can be isolated or cured by tonsillectomy; acute carriers of virulent organisms can be examined for immunity by a skin reaction and if not immune can be immunized by antitoxin and isolated. In passing it may be said that this program is rarely ever completely realized in practice on account of the amount of work involved, but parts of it are of practical value. In the prevention of epidemic meningitis, carrier work also has its place which has been made more definite by the recent differentiation of types of meningococci. In lobar pneumonia, too, the differentiation of types of pneumococci has made the carrier problem more definite and practicable by excluding certain less important but prevalent groups from consideration.

In hemolytic streptococcus infections, however, the carrier problem is more difficult. No virulence test or differentiation of groups is available and the number of apparent carriers may be very large. In a recent survey of attend-

* Read before the American Laryngological Society, Atlantic City, N. J., June 16-17, 1919. From the Department of Pathology of the Army Medical School, Washington, D. C. Publication authorized by Surgeon General, U. S. Army.

ants and patients at the Walter Reed Hospital, Simmons¹ found the weekly carrier rate in March and April to be between 50 and 90% with no cases of streptococcus pneumonia. Judged by the evidence available at present these streptococci are as good streptococci as those isolated from exudates in fatal cases of streptococcus empyema or meningitis. By analogy and experience we are forced to believe that some of these organisms found in carriers are pathogenic and that others are practically saprophytes, but until we know which are which, we are equally forced to consider them all as potentially dangerous.

A word may be said here about nomenclature. The term *Streptococcus haemolyticus* has been recently coined and in itself does not stand for a definite biological species. It means simply haemolyzing streptococci of which there are at least two kinds, human and bovine. For clinical purposes, however, it is synonymous with the older term "*streptococcus pyogenes*" which culturally forms a single species. Using Holman's classification based on sugar reactions, different species may occasionally be found among the haemolyzing streptococci of the throat, but as has been said the great majority of these organisms are culturally identical.

A word may also be said about the haemolyzing enzyme. This is apparently not of clinical significance in the way of producing anemia. At least in a series of 10 cases of severe streptococcus infection compared with 10 cases of severe pneumococcus infections at the Walter Reed Hospital, no difference could be seen in the haemoglobin estimations; both series showed a secondary anemia averaging about 70%. Like pigment formation in certain bacteria, the property of hemolysis in streptococci seems to be a metabolic activity that has no clinical equivalent.

The detection of carriers of streptococcus hemolyticus is fairly simple and resolves itself into a question of obtaining suitable material from the patient and of making a suitable examination in the laboratory. The specimen of

¹ Simmons, J. S.: J. A. M. A., 1919.

the flora of the throat is usually obtained as in examinations for the diphtheria bacillus by passing a sterile cotton swab over the fauces and posterior wall of the pharynx. In strongly positive cases material collected in this way is satisfactory. It is known, however, the crypts of the tonsils are the most frequent habitat of hemolytic streptococci.² The evidence for this conception is as follows: (1) Cultures from the surfaces of the tonsils are positive more frequently and more strongly than cultures from any other area of the nasopharynx. (2) Crypt cultures in vivo are positive in a higher percentage of cases than surface cultures. (3) Crypt cultures of excised tonsils are positive in a high percentage. (4) Excision of the tonsil is the surest way of curing carriers. Whether these streptococci invade the crypt walls or simply multiply in the crypt contents has not been determined. At least they are present. Under these circumstances it is evident that cultures of the tonsils are the most reliable source of material. In a series of 50 normal cases examined at the Walter Reed Hospital, 28% were positive with the ordinary throat cultures, while 50% were positive by crypt cultures, an error of 22% in the ordinary examination. A proper tonsil culture can be taken only with due care as to exposure and instruments and is preferably made with the help of a laryngologist, although a light massage of the tonsil with the end of the swab suffices to bring out crypt contents in most cases.

Streptococci in such material are not very delicate and withstand some drying and change of temperature but of course should be cultured with reasonable promptness. The standard culture media for the first inoculation is blood agar. As originally introduced by Shotmüller in 1903 this consisted of 40% blood, but the percentage used at present is 5-10% defibrinated human, rabbit or sheep blood. The various technical steps in working out a positive culture are fully stated in the Methods of Identification of *Streptococcus hemolyticus* adopted by the Medical Department,

² Nichols, H. J., and Bryan, J. H.: *Journal of the American Medical Association*, 1918, 71, p. 1813.

U. S. Army, June 1, 1918.³ The method consists in subculture of the original hemolyzing colonies into plain broth for further identification by means of morphology, bile solubility and a second hemolysis test. This requires 48 hours. In large surveys by experienced workers the original surface culture answers the purpose in most cases and the result can be given in 24 hours. A prompt report is of course desirable in case of patients admitted to hospital or of recruits under quarantine.

The streptococci thus isolated seem to form a strikingly similar group of organisms as judged by many of the usual procedures in bacteriology. ⁴ Slight differences in morphology of certain cultures as to size of organisms, length of chains or appearance of colonies, etc., have been noted but when due allowance is made for cultural conditions, these differences do not appear significant. The degree of hemolysis is also an uncertain criterion for differentiation. Virulence tests are made by injecting different quantities of broth culture intravenously in rabbits or intraperitoneally in mice or rats. The striking feature about these tests is the absence of difference in cultures from clinically virulent infections and from healthy carriers. From both kinds of cases a comparatively large amount of culture is necessary to kill an animal on first inoculation, but the virulence can be raised somewhat by animal passage.

Differences in ability of different organisms to break up various sugars has long been used in bacteriology as a means of differentiation as is illustrated by the typhoid colon group but on various sugars these streptococci behave in much the same way. The following table gives the results of a careful examination of 100 strains; over half of these were from carriers while the others came from definite streptococcus infections. During the course of this work several differences appeared at first but as each tube was examined for purity and for growth and the examina-

³ Methods for Isolation and Identification of *Streptococcus hemolyticus*, Medical Department, P. S. Army, June 1, 1918.

⁴ Lucke, B., and Rea, M. H.: *Journal of Infectious Diseases*, 1919, 24, p. 533.

tion repeated when necessary all differences disappeared and the results were uniform.

SUGAR REACTIONS OF 100 STRAINS OF HEMOLYTIC STREPTOCOCCI

Source of Strain	Number	Glucose	Lactose	Saccharose	Mannite	Maltose	Dextrin	Inulin	Salicin
Tonsils excised	43	+	+	+	—	+	+	—	+
Throat carriers	26	+	+	+	—	+	+	—	+
Empyema	18	+	+	+	—	+	+	—	+
Miscellaneous (middle ear, etc.)	11	+	+	+	—	+	+	—	+

One advance, however, has already been recorded in the simple differentiation of bovine and human types worked out by Avery and Cullen.⁵ These workers have shown that the end reaction of bovine and human strains have a sharply defined range in the Hydrogen-ion concentration scale and that the simple addition of an indicator such as Methyl Red serves to distinguish the acid bovine strains with a range from 4.3—4.5 from the less acid human strains with a range of 4.8—5.3. This advance seems to dispose of one false lead proposed to explain the recent epidemics of streptococcus infections in the army—namely, that they came from milk, butter and cheese. Milk can, of course, spread hemolytic streptococci but the bovine types are of no clinical significance and milk is dangerous only if it has been contaminated by human strains. This differentiation may rule out a few cases of bovine strain carriers.

Immunological Differentiation. By analogy with the pneumococci the most promising field is that of differentiation by agglutination. As is well known in the case of the pneumococci the separation of type has been of great value in diagnosis, prognosis, prevention and treatment by focusing attention on certain groups which are more important than the ordinary pneumococci found in the mouth. Some preliminary work of this kind has already been reported by

⁵ Avery, O. T., and Cullen, G. E.: *Journal Experimental Medicine*, 1919, XXIX, p. 215.

Havens ⁶ although the possible clinical significance of a separation of this kind is not yet known. On the other hand according to Kinsella and Swift ⁷ the method of complement fixation again shows that these streptococci are alike.

It is evident that practical measures for the control of streptococcus infections through the carrier point of attack must depend on the result of bacteriological studies. If streptococci can be differentiated into more and less important groups attention can be directed to carriers of the most important group. On the other hand if the streptococci are all equally dangerous, measures must be based on this fact, but if this is the case frankness demands the statement that the problem will be very difficult on account of the large number of the carriers which exist at present. It is to be hoped that bacteriology may also contribute some specific answer to the following questions:

Is the chronic carrier the reservoir of streptococcus infections or is the disease spread chiefly by cases and by acute contact carriers? Is the chronic carrier dangerous to himself or is he immune? So far the answer to these questions must be attempted on epidemiological evidence; as no reliable test for virulence or immunity is available in the way of skin reactions or serum reactions.

Summary

1. Satisfactory carrier work in the effort to control the spread of hemolytic streptococcus infections is difficult for the following reasons:

(a) The carriers may be very numerous including over one-half of the population.

(b) The streptococci found are nearly all identical culturally with each other and with streptococci isolated from streptococcus lesions.

2. The problem will be made easier if progress is made in regard to

⁶ Havens.

⁷ Kinsella, R. A., and Swift, H. F.: *Jour. Exp. Med.*, 1918, XXVIII, p. 169.

(a) A virulence or specific test to determine the danger of chronic carriers to themselves and others.

(b) Some differentiation of groups which would limit the work to a practical basis.

BACTERIOLOGY OF STREPTOCOCCUS HEMOLYTICUS

O. T. AVERY, M.D., A. R. DOCHEZ, M.D., R. C. LANCEFIELD, M.D.

The importance of the problem of the systematic classification of bacteria for the proper understanding and control of infectious diseases is becoming increasingly evident. Such study is necessary not only in the elucidation of the biological relationship existing between varieties of the same species of bacterium, but is also essential to the intelligent working out of epidemiological problems and to the development of knowledge useful in the effort to control infectious diseases by means of specific therapeutic and prophylactic measures. Bacteria closely resembling those responsible for the pathological process in many acute infections have been found to be present and to live, apparently without harm to the host, on the mucous membranes of a large proportion of normal individuals. The resemblance of the pathogenic to the harmless variety of micro-organism is frequently so close that in many instances tests of particular specificity are required to show the existing biological differences. In fact, the problem in etiology today is to determine not only the bacterial species causing a given disease, but in addition how many varieties of the same species are pathogenic, and whether common and important non-pathogenic varieties exist. The study is one of varying complexity and methods suitable to one species do not give the desired information when applied to another.

The intent of such studies may be broadly defined as an effort to relate fixed and determinable characteristics of bacteria to pathogenicity. Though fluctuating variations of bacteria probably occur, it seems not unlikely that in most diseases a sufficiently constant equilibrium has been attained to justify the usefulness of the effort. The methods employed in these studies are numerous. In some species

morphological and cultural characters give important though somewhat limited information, and in many the biochemical reactions are of great significance. The most serviceable method, however, for obtaining the particular kind of knowledge desired is the study of immunologic relationships. For some as yet unexplained reason these latter specific reactions are very constant among the pathogenic varieties. In the following study of *S. hemolyticus*, chief dependence has been placed on the knowledge obtained from the study of such immunity reactions.

In the various classifications of the *Streptococcus* group as a whole that have been proposed, the custom has been to consider such strains as effect hemolysis of red blood cells as constituting a single or unit type. The validity of this assumption has been questioned and there has been much study and discussion of the probability of the existence of variations within this group, some evidence of which has been obtained from the study of sugar fermentations. Recent studies indicate that certain broad lines of differentiation may be shown between hemolytic streptococci of human origin, and those of bovine origin whether found in milk or cheese. Hemolytic streptococci of the human type are usually found in association with some pathological process such as puerperal sepsis, septicaemia, erysipelas, broncho-pneumonia, or other conditions, and hemolytic activity is generally considered as an indication of pathogenicity. With the development of our knowledge, however, these organisms have been found with increasing frequency when no pathological lesion has been apparent. Investigators for many years have been interested in these strains, and discussion has centered about the unity or multiplicity of the group. The evidence in general favors the belief that hemolytic streptococci pathogenic for human beings comprise a single type. In the present paper it will be shown that by the use of properly controlled immune reactions differential characters between individual strains can be shown to exist.

The strains of hemolytic streptococcus discussed in the

present paper all possessed the typical characteristics of the group. They are hardy organisms and grow readily in meat infusion broth and on blood agar slants. They survive for many months when grown for eighteen hours in rabbit's blood broth and subsequently placed at refrigerator temperature. In meat infusion broth the growth has been of two types—a granular sediment with clear supernatant fluid and a flocculent sediment with turbidity throughout the remainder of the tube. All the organisms are strongly Gram positive, grow in chains of varying length and are bile insoluble. Capsule formation has not been observed. On plates two types of colonies are seen—a small, round, smooth colony and a moist amoeboid colony with a slightly roughened surface. All the strains are actively hemolytic, showing a wide zone of hemolysis on the surface of rabbit's blood agar plates, and hemolysis is complete in two hours, when a five per cent suspension of washed rabbit's blood cells suspended in salt solution is mixed with an equal quantity of a twenty-four hour broth culture. The power of the different strains to ferment the usual test substances for streptococcus has been studied. The majority fall in the group of *S. pyogenes* according to Holman's classification of streptococcus on a basis of sugar fermentations. None of the strains ferments inulin and about twenty per cent of these actively hemolytic strains possess the power of fermenting mannitol. This latter characteristic will be shown to have an interesting relationship to the immunological classification of these organisms.

Although the finer differential classification of single species of bacteria by means of immune reactions is still in the early stages of development, enough evidence has been gathered to indicate that the more highly parasitic varieties of the species are more likely to consist of a limited number of unit types than are the less parasitic or the saprophytic members. In other words, unity of type seems to characterize the disease producing micro-organisms, whereas heterogeneity is more common among the non-pathogens. If this assumption is true, it then becomes important to choose for

purposes of classification such immune reactions as bring out most sharply the kind of differences sought, rather than a reaction which develops the basic relationship existing between all strains of the same species. For this purpose we regard the reactions of agglutination and protection as of superior usefulness to those of precipitation and complement fixation. The validity of any final classification arrived at, of course depends upon the possibility of fitting accurately into such a classification a large number of strains freshly obtained from their natural environment.

Specific agglutination has been found to be one of the most serviceable immune reactions for purposes of the biological classification of bacteria. In the typhoid and pneumococcus groups, for instance, it serves to distinguish clearly the different varieties from one another. It is likewise applicable to the classification of many other microorganisms. Efforts to classify the streptococci by means of this reaction apparently have not illuminated materially the relationship of one strain to another, nor have they shown a definite relationship between certain strains and a particular pathological process. A number of explanations of this fact may be proposed. In many instances no attention has been paid to the broader groupings of streptococci as determined by hemotoxin production and the fermentation of test sugars. Also streptococcus most frequently acts as a secondary invader in the production of disease, and it is probably an unwarranted assumption to suppose that type specificity is closely related to the character of the pathological process. One of the chief obstacles to the successful carrying out of the agglutination reaction has been the tendency of all types of streptococcus to undergo spontaneous granulation, and when used for tests to exhibit the phenomenon of "non-specific agglutination." As a result of this, the reactions must usually be read against a more or less granular background, making it difficult, if not impossible, to distinguish between the "non-specific" and the specific influences. The tendency to spontaneous clumping is occasioned by a variety of factors, only a few of which are un-

derstood. For instance, a homogeneous suspension of a granular streptococcus can easily be prepared by washing the organism several times with distilled water, and then resuspending in the same medium. Such a suspension will remain homogeneous for an indefinite period of time. If sodium chloride in concentrations above 0.06 per cent be added to the suspension, granulation immediately ensues. Many other salts act in the same manner. Substances antagonistic to this salt action exist and may be added to the medium and function even to the extent of suspending the participation of the salt in the immune reaction, so that specific agglutination may be completely inhibited. Fortunately intermediate combinations can be found in which most strains remain diffuse and in which the salt is still able to fulfill its role in the immune reaction. The most useful substance of this kind is ordinary meat infusion broth to which one per cent peptone has been added. In addition, if streptococci are exposed to too great acidity the tendency to granulation is increased. In order to avoid this, the reaction of the medium may be so adjusted and such quantities of balanced phosphate solutions added that during growth an acidity greater than ph 7.1 is not attained. Certain other undetermined factors cause granulation, which may be defined as a general unsuitability of the medium for growth, and these can only be eliminated by experimenting with a variety of preparations.

The immune sera used in the agglutination and protection tests were obtained by the immunization of rabbits, sheep and dogs. The animals were inoculated intravenously with repeated doses of heat-killed organisms, and in most instances a certain number of doses of living organisms were given. The employment for immunization of freshly isolated unpassed human strains, or the use of the same strains after a series of animal passages, does not alter in any recognizable way the specific qualities of the serum. The agglutinin and protective titer of the sera has remained undiminished for many months after the time of bleeding.

Great care is taken in the preparation of the organisms

to be used in the agglutination reaction. The broth is made from carefully selected meat and instead of the usual sodium chloride a sufficient quantity of a balanced phosphate mixture is added to give the required salt concentration and to adjust the hydrogen-ion concentration at a pH of 7.4. Experience has taught us that when no sugar is added to the medium, *S. hemolyticus* grown for twenty-four hours in such a medium does not develop an acidity greater than pH 7.2, which is just above the point at which the tendency to granulation appears. The organisms are removed from the culture medium by centrifugation and are washed once or twice in broth with a pH of 7.4 prepared in the manner described above. They are then resuspended in the same medium in approximately the concentration that is attained after twenty-four hours' growth and are ready for use in the reaction. The sera to be employed in the tests are made up to the various concentrations by dilution with the same broth used for suspending the bacteria. The reaction of each specific serum is controlled by a complete series of like dilutions of normal serum of the same animal. Equal quantities of serum dilution and bacterial suspension are added to each tube and the reactions are then placed at a temperature of 55° C. for one hour. A temperature of 55° C. must be accurately maintained during the entire period and the tests must be read after the lapse of one hour, since if they are allowed to continue longer, non-specific granulation occurs. If clumping develops in the broth controls or in more than the first two or three dilutions of normal serum, the reaction is to be regarded as unsatisfactory and discarded. By the use of this technic, it has been possible to carry out reliable agglutination tests of various strains of *S. hemolyticus* and to show that constant type relationships exist, and that the various types are sharply differentiated from one another. An analysis of the results from the reaction of agglutination shows that in the collection of organisms studied it has been possible to detect four different types of *S. hemolyticus*. These types have been noted as Type S 3, Type S 23, Type S 60 and Type S 84, from the number of

the chosen representative. In addition to the type strains, there remains a residue of unclassified organisms.

Study of the power of antistreptococcus serum to protect animals against experimental infection with this organism has given rise to a number of different points of view, both regarding its action against strains from different sources, and against the same strain before and after animal passage, and also concerning the kind and the different effect of varying antigens used in the process of immunization. Although in the present paper the classification of *Streptococcus hemolyticus* by means of the agglutination reaction has been presented first, practically we have obtained our primary indications of the degree of antigenic differences between strains by means of the reaction of protection. Later each reaction has been used to confirm the information obtained by means of the other.

In the successful carrying out of protection experiments two things are of especial importance; first, the production of a serum of high potency, and second, the possibility of raising the virulence of the test strains of streptococcus to such a point that very minute doses of culture are sufficient to kill white mice in a limited period of time. We have been able to produce sera, in the manner alluded to above, of such potency that 0.5 cc. administered intraperitoneally is sufficient to protect a white mouse against one hundred thousand lethal doses of a highly virulent streptococcus. In order to produce such a serum many animals must be used, only a few of which may give the desired result. It has been possible to raise the virulence of many strains by continuous passage through white mice and rats to such a point that doses of from 0.000001 cc. to 0.00000001 cc. of broth culture are sufficient to kill the former animals in from twenty-four to forty-eight hours. These seemingly difficult conditions must be attained in order that sufficiently long-range protective titers may be carried out to ensure the reliability of the information obtained. Protection against one or two lethal doses of a series of strains of streptococcus by a monovalent serum is subject to such a variety of interpretations

that the evidence so gained cannot be considered of much value in judging accurately the antigenic relationship of the different strains.

Consideration of the results obtained from protection experiments shows that the type relationships manifest from the agglutination reactions have been substantiated by the evidence obtained from the protection tests. As a matter of fact, each reaction has been used to supplement the other, the first clue as to the position of an organism sometimes being obtained by protection and sometimes by agglutination. On the whole, we are inclined to place greater confidence in the reaction of protection than in that of agglutination, and would be slow to draw general conclusions concerning type specificity from agglutination alone with such a variable organism as streptococcus, unless the results of this test could be confirmed by some other specific reaction such as protection. The various sera prepared have afforded a high degree of protection to white mice against infection with organisms of the homologous type. Little or no protection results when serum of one type is employed against organisms of heterologous types. There are, of course, some exceptions to this general rule. Occasionally strains of *S. hemolyticus* are encountered against which all type sera afford a varying degree of protection, and sometimes a serum is obtained from one strain which will protect against an organism of another type, and when the reaction is reciprocally reversed, no protection results. At present our knowledge is insufficient to discuss these intermediate reactions intelligently, and their elucidation must await further development of the technic.

The complete biological classification of any pathogenic microorganism presents a very complex problem. The first phase of the undertaking concerns itself with the development of reliable methods for the determination of antigenic differences between members of the species and the application of these methods to the discovery of the immunologic relationships between a limited number of strains purposefully selected. In this way the degree of similarity and

diversity of types is shown and also the probable number of types, and the proportion of classifiable to unclassifiable strains. The next step of necessity is the testing of the adequacy and universality of the information so gained by applying the tentative classification to a large number of strains of the organism obtained under what may be described as normal conditions of pathogenicity. That some sort of equilibrium has been established in nature among microorganisms that have produced disease over long periods of time is not unlikely. Indeed evidence obtained from the study of pneumococci supports this view, although departure from the norm may occur under special conditions. After the relationships of the pathogens of the species to one another have been discovered, it then becomes important for purposes of epidemiological study to compare by the same methods the pathogenic with the saprophytic varieties. Such a task requires years for its completion and many difficulties and seemingly unexplainable phenomena are encountered. In the beginning, the broader lines of differentiation must be drawn, and divergent results discarded for the time being since, if the original conception is correct, most of the discrepancies disappear with the advance of knowledge.

In this paper are presented the facts so far obtained in the present study of *S. hemolyticus* in accordance with the plan outlined above. The strains were collected in a limited community during the course of what may be considered an epidemic of broncho-pneumonia secondary to measles. Individuals, however, from all parts of the United States were passing rapidly through this community which was a center for primary training of the aviation service, so that a wider range of territory is represented than the immediate community itself. All the strains were investigated as to their cultural reactions, bile solubility, capacity to hemolyze red blood cells and to ferment the different test sugars, and as to the hydrogen ion concentration limiting their growth, and thus identified as accurately as possible as *S. hemolyticus* of the human type.

A technic was then developed for studying the immunologic reactions of agglutination and protection. By the reaction of agglutination four distinct immunologic types and a certain number of unclassifiable strains have been discovered among the 125 strains studied. Individuals of the same type are closely related to one another immunologically, and the different types can be sharply distinguished one from the other. In addition to the four types, study of the reactions of which has been completed, there are in addition two other types, investigation of which is as yet incomplete. The technic of the agglutination reaction demands great care, both as regards the handling of the organism and the preparation of the medium for their growth. In the medium used by us, a large percentage of strains have grown sufficiently diffusely to permit the preparation of stable suspensions. To what extent continuous growth in this medium has promoted the tendency to diffuseness, and whether the same percentage of freshly isolated strains will grow diffusely, we are as yet unable to say. We have found that by the immunization of sheep, a highly specific agglutinating serum is obtained, but that the serum produced from rabbits is not so specific and may show a wider range of crossing, especially in one of the types of streptococcus described. Variations in the specificity of different animal sera have been observed by students of the immunologic reactions of meningococcus. In order to fully understand this phenomenon, it would be necessary to compare the specificity of immune sera produced from different species of animals by means of the method of absorption. It is not as yet possible to undertake this kind of an investigation of *S. hemolyticus*. The observation has been made, however, that rabbit sera showing non-specific cross-agglutination reactions in general fail to manifest corresponding cross protection reactions.

Whenever it has been possible to raise the animal virulence of strains of *S. hemolyticus*, the evidence obtained from the agglutination tests has been confirmed by that gained from the protection reaction. In all instances in

which this has been done, the one reaction has corroborated the findings of the other. The performance of reliable protection tests has been made possible by the production of sufficiently high titer antistreptococcus sera, and by the possibility of raising the animal virulence of a certain number of strains to a high degree. The types of *S. hemolyticus* have been noted as Type S 3, Type S 23, Type S 60 and Type S 84, from the serial numbers of the representative strains. This nomenclature is not put forth as a final one, since we realize that probably many other human types exist, to say nothing of the bovine and cheese varieties, and that the proportional distribution of the different varieties pathogenic for human beings may be very different from that represented by this work. *Streptococcus* is the largest of all pathogenic groups of bacteria and many years will be required to bring out the information necessary to the perfecting of an adequate classification.

It is of considerable interest that all the members of Type S 60 ferment mannitol, and that none of the members of the other groups so far encountered ferment this sugar. A few unclassifiable strains, however, have been found to be mannitol fermenters.

This work has cleared up a number of points about *S. hemolyticus* which have been in dispute for many years. In the first place, *S. hemolyticus* of human origin is not a unit type as was previously supposed, but probably consists of a number of types, at least four of which have been definitely identified. Previous investigators have stated that freshly isolated human strains change their antigenic properties on animal passage, and that the latter procedure for the development of animal virulence gives a common antigenic character to all strains. We have found no evidence to support this contention, in fact immune sera produced with human strains that have never been passed through animals afford a high degree of protection against strains that have received many animal passages. In addition, the antigenic differences between strains of *S. hemolyticus* which have been passed through animals are quite

as distinct as those between strains which have not been so passed. The types of *S. hemolyticus* studied have been obtained almost exclusively from the respiratory tract and from a limited source of supply, and there is some reason to believe that those which produce cellulitis, erysipelas and septicaemia may be of somewhat different character. It is, therefore, readily seen that but a beginning has been made in the classification of *S. hemolyticus*, and that before the classification is complete, and the relative dominance of the different pathogenic varieties determined, much work must be done.

THE RELATION OF STREPTOCOCCUS HEMOLYTICUS CARRIERS TO STREPTOCOCCUS EPIDEMICS IN THE ARMY*

FRANCIS G. BLAKE, M.D.

Captain, M. C., U. S. Army

Any consideration of the epidemiology of the widespread hemolytic streptococcus infections that have occurred in the army must of necessity be incomplete since our knowledge is still in the formative stage and there remain many gaps in the story that only further investigation can complete. It is merely necessary to state that no method for the immunological classification of hemolytic streptococci has been available for use, nor has any method been devised to make certain whether a given streptococcus is virulent for man or not, to indicate two of the many difficulties that have confronted us. The relation that streptococcus carriers have borne to the prevalent streptococcus infections of the last two years is one of the most important phases of the problem.

Before entering upon a discussion of this subject it seems advisable to recall certain facts with respect to hemolytic streptococcus infections in general, since they serve to a considerable extent to orient us in the particular field to which this discussion is devoted. Two facts stand out pre-eminently above all others. Firstly, hemolytic streptococcus infections with few exceptions are secondary in nature, that is they occur in large part only in the presence of some pre-existing disease or lesion which renders the individual susceptible to invasion by these organisms. This relation has been a matter of common knowledge for many years with respect to scarlet fever, puerperal sepsis, wound infection,

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erysipelas and other diseases. Certain exceptions, of course, exist as a conspicuous example of which may be mentioned epidemic septic sore throat. The second outstanding fact with respect to hemolytic streptococcus infections is that they occur mainly in epidemic form. We are all familiar with the history, at least, of the old time hospital epidemics of puerperal fever, wound infection, and erysipelas. We have all seen epidemics of streptococcus sore throat. Here again the rule is, of course, not absolute and isolated cases of streptococcus infection not infrequently occur without relation to a streptococcus epidemic. By way of comparison Theobald Smith has drawn attention to the fact that streptococcus infections in animals also occur as epidemics, mainly as secondary, not primary infections.

The direct application of these facts to conditions as they have existed in the army is quite apparent if one surveys the whole field. It is well known that the streptococcus infections that have occurred have in very large part affected the respiratory tract producing a secondary bronchopneumonia with frequent empyema. Otitis media and mastoiditis also have been very prevalent. It seems unquestionable that this is because the antecedent infections that have prepared the soil for secondary streptococcus invasion have been almost exclusively respiratory diseases, rather than that the streptococci in themselves have had primarily any special predilection for the respiratory tract. Two diseases have been especially prominent in this respect,—measles and influenza. During the winter of 1917-18 when streptococcus bronchopneumonia first became prevalent in the army camps it almost exclusively followed measles. In the spring months of 1918, however, it began to occur in increasing amounts independently of measles as the reports of Fox and Hamburger¹ and Lucke² from Camp Taylor, of MacCallum³ from Camp Dodge, and of The Empyema Commission⁴ at Camp Lee clearly show. Similar cases were

¹ Fox and Hamburger: J. A. M. A., 70; 1758, 1918.

² Lucke: J. A. M. A., 70; 2006, 1918.

³ MacCallum: J. A. M. A., 71; 704, 1918.

⁴ Dunham et al.: J. A. M. A., 71; 366, 443, 1918.

very numerous at Camp Merritt during April and May, 1918, where measles played a negligible role as a predisposing cause. The theory was put forward that the hemolytic streptococcus had attained such virulence by this time that it was capable of producing a primary bronchopneumonia in the absence of an antecedent infection of the respiratory tract. This may have been so to a certain extent. Without wishing to be too positive on the subject, it is believed in view of subsequent experience that this so-called primary streptococcus pneumonia was in reality in large part secondary to influenza, which for the most part was unrecognized at the time. It is impossible to go in detail into the reasons for this belief. It suffices to say that it has been clearly shown by Soper⁵, by Opie and his collaborators⁶, and by others that epidemics of influenza, differing from the fall epidemic only in degree, occurred in many of the army camps during the months of March, April, and May, 1918. Rereading of the clinical, pathological, and bacteriological reports referred to above will only serve to strengthen this opinion. The relation of influenza to hemolytic streptococcus infections during the fall of 1918 is too fresh in the minds of all to require further comment. One other disease has also predisposed to secondary streptococcus infections to an extent not generally recognized, namely lobar pneumonia. The reports of Cole and MacCallum⁷, Clendening⁸, and Opie⁹ have directed attention to this.

The epidemic character of the hemolytic streptococcus infections that have occurred in the army should be quite obvious to everyone, yet it is apparently often disregarded in discussions upon the relation of streptococcus carriers to secondary streptococcus infections. I wish particularly to emphasize the epidemic character of these infections since it has a very important bearing on the role played by streptococcus carriers. That streptococcus bronchopneumonia

⁵ Soper: *J. A. M. A.*, 71: 1899, 1918.

⁶ Opie, Freeman, Blake, Small and Rivers: *J. A. M. A.*, 72: 108, 1919.

⁷ Cole and MacCallum: *J. A. M. A.*, 70: 1146, 1918.

⁸ Clendening: *J. A. M. A.*, 71: 1513, 1918.

⁹ Opie, Freeman, Blake, Small and Rivers: *J. A. M. A.*, 72: 556, 1919.

has occurred in epidemic form rather than as an endemic disease such as pneumococcus lobar pneumonia is clearly brought out by the fact that during the winter of 1917-18 it occurred very extensively in certain camps, particularly those in the south, while many of the northern and far western camps were almost entirely free from it. A similar selective incidence has occurred during the fall epidemic of influenza. In certain camps hemolytic streptococcus pneumonia has been conspicuous by its absence, while in others it has been exceedingly prevalent. The epidemic nature of these streptococcus infections was very evident at Camp Pike during the fall epidemic of influenza. Streptococcus pneumonia did not appear to any extent until the influenza epidemic had nearly reached its height. It then gained very rapid headway and increasingly complicated or replaced secondary pneumococcus pneumonia as the influenza epidemic declined. Similar observations have been reported by Goodpasture¹⁰ from the Naval Hospital in Chelsea, by Rackemann and Brock¹¹ at Camp Merritt, and by Blanton and his collaborators¹² at Camp Custer.

It is quite clear then that the hemolytic streptococcus bronchopneumonia, otitis media, mastoiditis and other infections that have been so prevalent in the army have not differed from hemolytic streptococcus infections in general in their two principal features, that is they have been almost entirely secondary infections and they have been truly epidemic in character. With these two facts clearly in mind we can much more intelligently approach the subject of streptococcus carriers in their relation to the streptococcus epidemics that have occurred in the army.

In speaking of streptococcus carriers it is necessary in order to avoid confusion to divide them into three groups;—(a) chronic carriers, individuals who carry the hemolytic streptococcus over long periods of time; (b) contact or temporary carriers, those who acquire the hemolytic

¹⁰ Goodpasture: J. A. M. A., 72: 724, 1919.

¹¹ Rackemann and Brock: Arch. Int. Med., 23: 582, 1919.

¹² Blanton, Burhans, and Hunter: J. A. M. A., 72: 1520, 1919.

streptococcus and carry it for a relatively short time without its causing them any apparent injury; and (c) acute carriers, those who acquire the organism and in whom it produces disease. The first group is represented by individuals with more or less definitely pathologic tonsils in the crypts of which hemolytic streptococci find a suitable place for continued existence. The reports of Nichols and Bryan¹³ and of Pilot and Davis¹⁴ have dealt with this type of carriers. Undoubtedly opinion differs with respect to the incidence of these chronic carriers. It may be safely stated that most observers who have had wide experience in the study of the bacterial flora of normal throats have agreed that hemolytic streptococci are found with rarity in the absence of streptococcus epidemics. Since it does not appear clear, however, that most previous observations have depended upon carefully taken crypt cultures, it would seem necessary to reexamine this matter at some future time when the prevalent streptococcus infections of the last two years have entirely subsided. Little data is available with respect to the incidence of temporary carriers of hemolytic streptococci under normal conditions, but with little doubt their number is negligible, since as has been stated hemolytic streptococci are infrequently found in any numbers in normal throats in the absence of a streptococcus epidemic. On the other hand, under the abnormal conditions that have existed during the past two years in the rapid assembling of large groups of men in our army camps contact or temporary carriers of hemolytic streptococci have become very numerous and probably have played an important part in the development of the widespread streptococcus epidemics. It is only necessary to contrast the incidence of streptococcus carriers among new recruits before they have entered camp with that among men who have been in camp for varying periods of time to indicate the extent to which contact carriers may develop. In a group of 489 newly drafted men cultured as they arrived at Camp Taylor, Levy and

¹³ Nichols and Bryan: *J. A. M. A.*, 71; 1813, 1918.

¹⁴ Pilot and Davis: *J. Inf. Dis.*, 24; 386, 1919.

Alexander¹⁵ found 14.8 per cent to be carriers of hemolytic streptococci, while among men who had been in camp for a period of six months the incidence of carriers was 83.2 per cent. The third group of acute carriers is represented by the cases of streptococcus pneumonia, mastoiditis, tonsillitis, etc., and needs no further definition. It is of course obvious that the contact carrier may become an acute carrier if he develops measles or some other pre-disposing disease which renders him susceptible to invasion by the hemolytic streptococcus. Whether the chronic carrier may do so or not is not so clear. Data which I will present would seem to indicate that he rarely does so, except possibly as a terminal event in chronic diseases.

Two points of view with respect to the relation of streptococcus carriers to streptococcus epidemics have been advanced. The first has been expressed in a recent editorial in *The Journal of The American Medical Association*¹⁶ from which I quote in part;—"As hemolytic streptococci commonly present in the crypts of the tonsils are probably the most important source of the streptococcic complications of various infectious diseases in persons innocently harboring the microorganisms, it is important to ascertain how the secondary infections from them arise. At any rate, it seems more reasonable, on the basis of knowledge available, to charge the responsibility to the tonsil borne bacteria rather than to an invasion of unusually virulent strains from outside the body. Outbreaks of disease due to the entrance of foreign virulent streptococci unquestionably do occur at times as the epidemics of septic sore throat testify; but in general the streptococcic infections are presumably associated with preexistent foci, like the tonsils, which harbor the bacteria in the body." In brief this is the theory of auto-genous infection. The other point of view is indicated in the above quotation, namely that the secondary streptococcus complications are in large part due to invasion of viru-

¹⁵ Levy and Alexander: *J. A. M. A.*, 70; 1827, 1918.

¹⁶ Editorial: *J. A. M. A.*, 72; 1295, 1919.

lent strains from outside the body, that is to contact infection.

Although it is admitted that our knowledge is still far from complete, examination of all the available evidence would seem to indicate that the theory of contact infection is the only logical one with respect to the widespread streptococcus epidemics that have occurred in the army. In support of this opinion I wish to present briefly certain studies made at Camp Pike by The Pneumonia Commission headed by Opie*. This study covered the entire period of the 1918 fall epidemic of influenza from its beginning in early September until influenza had nearly disappeared in mid December. During the same period a considerable epidemic of measles occurred at Camp Pike. A particularly good opportunity to study the relation of streptococcus carriers to the development of streptococcus complications of measles, influenza, and influenzal pneumonia was afforded since the number of streptococcus carriers among normal men and among those entering the base hospital with measles, influenza, and pneumonia at the beginning of the study was at a low ebb following the favorable conditions that had existed during the summer months when respiratory diseases were at a minimum and streptococcus infections were nearly absent.

Three groups of normal men were studied. The first consisted of 64 drafted men assembled at Hot Springs, Ark., preparatory to entraining for Camp Pike. These men were from isolated rural communities, were cultured as soon as they reported at the place of assembly, and therefore afford an excellent base line. Throat cultures in all were negative for hemolytic streptococci. The second group consisted of 337 men from various organizations at Camp Pike. They had entered camp for the most part in the June, July, and August drafts. 25 or 7.4 per cent were positive for hemolytic streptococci. The third group consisted of 65 normal

* These studies are to be published in detail by members of the Commission. The members of the Commission were Lt. Col. Eugene L. Opie, M. C.; Major Allen W. Freeman, M. C.; Capt. Francis G. Blake, M. C.; First Lieut. James C. Small, M. C., and First Lieut. Thomas M. Rivers, M. C.

individuals comprising the nursing and medical corps personnel of the measles wards during September. 6 or 9.2 per cent were positive for hemolytic streptococci. For the purposes of argument it may be assumed that the positive cases represented chronic carriers, although it must be conceded that some may have been merely contact or temporary carriers. These figures are comparable with those of Levy and Alexander¹⁵ for new recruits cultured upon arrival at Camp Taylor. The incidence of streptococcus carriers among men admitted to the base hospital with measles, influenza, or pneumonia was quite similar. 867 cases of measles admitted between September 15 and December 15 showed only 37 or 4.3 per cent positive for hemolytic streptococci on the first culture at time of admission. 80 cases of pneumococcus pneumonia cultured during September showed only 1 or 1.3 per cent positive for hemolytic streptococci. Throat cultures in 100 cases of influenza made shortly after admission to the hospital on September 25 and 26 when the influenza epidemic was approaching its height showed 6 or 6 per cent to be positive for hemolytic streptococci. As with the normal men it may be assumed that the positive cases represented in the main chronic carriers of hemolytic streptococci. I wish to emphasize two points of particular interest with respect to these chronic carriers. The first is their relatively low incidence in the absence of a streptococcus epidemic. The second is that none of these chronic carriers admitted to the hospital with measles, influenza, or pneumonia developed secondary streptococcus infections, although suffering from respiratory diseases preeminently leading to secondary invasion by the hemolytic streptococcus.

Simultaneous observations on the development of contact or temporary carriers yielded very interesting results. But one group of normals is available. 88 individuals of the medical corps personnel on the measles wards were cultured in November after streptococcus complications had become fairly prevalent among measles patients. 16 or 18.2 per cent were positive for hemolytic streptococci, an increase of

100 per cent over the figures for September. Cultures were made in 138 cases of influenza between November 27 and December 5 at time of admission to the hospital. 39 or 28.3 per cent were positive, an increase of approximately 400 per cent over the figures for September. Not only was there a marked increase in the actual number of carriers but the much greater predominance of hemolytic streptococci over other bacteria on the plates was often very striking. It is believed that this increase in the number of streptococcus carriers was dependent upon the dissemination of streptococci coincident with or following a considerable epidemic of streptococcus infections that started at the height of the influenza epidemic during the last week of September and that the majority of these cases represent temporary or contact carriers.

The development of contact carriers in the measles wards was studied by weekly throat cultures. Of the 830 cases of measles negative for hemolytic streptococci at time of admission to the hospital 205 or 24.7 per cent acquired the hemolytic streptococcus while in the hospital. The development of streptococcus complications among these contact carriers was in striking contrast with their absence among the chronic carriers. These complications were bronchopneumonia 9, otitis media 27, mastoiditis 14, meningitis 2, suppurative arthritis 1, acute tonsillitis 4. These cases, therefore, became acute carriers, while the rest remained simply contact carriers without developing streptococcus infections, possibly an indication that the streptococci which were becoming more and more prevalent had not attained that degree of virulence which they attained in the spring of 1918. It is noteworthy that among these cases of bronchopneumonia, otitis media, and mastoiditis the complication developed in all but 5 instances nearly coincidentally with the acquisition of the hemolytic streptococcus by the patient in so far as the limitations of weekly throat cultures could determine.

Even more striking evidence of the contact nature of these streptococcus infections was obtained in certain ward

studies among patients suffering with influenzal pneumonia. These may be summarized briefly. In wards 3 and 8 between September 6 and October 5, 163 cases of pneumonia following influenza were admitted, of whom 49 or 30.1 per cent died. Cultures at autopsy showed that only 2 of these cases had streptococcus pneumonia. In striking contrast with this were the conditions in wards 1 and 2. Between September 24 and October 5, 141 cases of pneumonia following influenza were admitted to these wards. Of these 72 or 51.1 per cent died. Cultures at autopsy showed that 43 or 59.7 per cent of these 72 fatal cases had a secondary hemolytic streptococcus pneumonia. To appreciate the full significance of this striking difference between wards 3 and 8 on the one hand and wards 1 and 2 on the other, it is necessary to state that the patients admitted to these wards were in no sense selected. Sputum and throat cultures in cases admitted to wards 1 and 2 made prior to or shortly after admission to the ward showed that the majority of them as in wards 3 and 8 were pneumococcus or mixed pneumococcus and influenza bacillus pneumonias free from hemolytic streptococci at time of admission. The widespread and highly fatal secondary hemolytic streptococcus epidemic in wards 1 and 2 was shown directly to follow the introduction of a few cases of streptococcus pneumonia into these wards. Such a strikingly selective incidence of secondary streptococcus pneumonia can leave little doubt that these cases were due to invasion by highly virulent streptococci through contact infection from acute carriers. Even should it be granted that the majority of all these cases in both groups of wards were chronic carriers of hemolytic streptococci which the limitations of the throat culture method had failed to detect, the theory of autogenous infection can hardly be sustained in the presence of the almost complete selective incidence of secondary streptococcus infections between the two groups of wards.

In summary our studies at Camp Pike showed that in the absence of a streptococcus epidemic the incidence of hemolytic streptococcus carriers among normal men and among

patients admitted to the base hospital with measles, influenza, or pneumonia was relatively low, not exceeding 10 per cent in any of the groups studied. It may be conceded that these represent chronic carriers. Following the outbreak of an epidemic of streptococcus infections the incidence of hemolytic streptococcus carriers among normal men and among patients admitted to the base hospital with influenza showed an increase of from 100 per cent to nearly 400 per cent. It is believed that this increase represents a group of contact or temporary carriers due to the dissemination of hemolytic streptococci coincident with the streptococcus epidemic. Contact carriers also developed to a considerable extent among patients with measles during their residence in the hospital wards. Secondary streptococcus complications occurred exclusively among these contact carriers, chronic carriers of hemolytic streptococci among patients with measles, influenza, and pneumonia remaining free from streptococcus complications. In the majority of instances in which patients with measles developed a streptococcus complication, the onset of the complication was nearly coincident with the acquisition of the hemolytic streptococcus by the patient. Highly fatal ward epidemics of secondary streptococcus pneumonia among patients with pneumonia following influenza were shown to be due to contact infection and were directly traceable to acute carriers of hemolytic streptococci.

It remains to correlate these results with similar studies made by many observers during the spring of 1918 since there are certain noticeable differences, especially with respect to the incidence of streptococcus carriers and their relation to the development of secondary streptococcus complications. Only the report of Levy and Alexander¹⁵ from Camp Taylor will be considered since this is fairly representative of conditions as they existed at that time and has been widely quoted in support of the theory of the wide prevalence of streptococcus carriers and of autogenous infection. It will be recalled that in a group of 95 normal men who had been in camp for approximately six months 83.2

per cent were found to be carriers of hemolytic streptococci. A similar high incidence of streptococcus carriers, 77.1 per cent, was found among 388 cases of measles at time of admission to the hospital. Streptococcus complications which were fairly frequent occurred almost exclusively among these men who were carriers at time of admission. In contrast with this high incidence of carriers among men resident in camp for six months, the incidence of carriers among 489 new recruits cultured upon arrival at camp was but 14.8 per cent. In analyzing these results it is necessary to point out that at the time the studies of Levy and Alexander were made a very extensive epidemic of secondary streptococcus infections had existed at Camp Taylor for some time and was still unabated. In view of this fact it would seem highly probable that a very large proportion of the carriers among normal men and among measles patients were temporary or contact carriers who had acquired the carrier state coincident with the widespread dissemination of hemolytic streptococci that must occur in the presence of an extensive streptococcus epidemic. This is very clearly so in view of the relatively low incidence of carriers among recruits who had not been in contact with the epidemic. With these points in mind it will be seen that the results obtained by Levy and Alexander are not out of harmony with those obtained at Camp Pike.

Summary

In summary it may be said that the available evidence would seem to indicate that the widespread streptococcus infections that have occurred in the army have in very large part been due to invasion of virulent streptococci in individuals rendered susceptible by predisposing diseases, chiefly measles, influenza, and pneumococcus pneumonia through contact infection, either direct or indirect, and that auto-genous infection has played an insignificant role in the production of these streptococcus infections. Their truly epidemic character and their strikingly selective incidence would seem to admit of no other interpretation. Even

should it be granted that a large proportion of the population innocently harbor hemolytic streptococci in their tonsils as chronic carriers it is difficult to maintain the theory of autogenous infection, since it predicates an equal incidence of streptococcus complications of measles and pneumonia at all times.

The relation of chronic carriers to the development of streptococcus epidemics is uncertain and must remain so until means are available for showing whether the hemolytic streptococci harbored by them are immunologically identical with those responsible for the epidemics. It is not impossible that they may be the initial source of these epidemics which arise when an opportunity for the dissemination of the streptococci which they carry is provided by the assembling of large groups of men in intimate association. From the point of view of prevention it would seem wise to consider this assumption as true until it is disproved or otherwise. It must not be overlooked, however, that the starting point may equally well be found among a number of acute carriers represented by cases of streptococcus tonsillitis which are probably not infrequently present among large groups of drafted men at the time of their arrival in camp.

The role played by contact or temporary carriers in the development of a streptococcus epidemic, likewise, cannot be finally established until we are possessed of methods for the immunological identification of hemolytic streptococci. Sufficient evidence is available, however, to show that they bear an intimate relation to the streptococcus epidemics of the army, even if only a time relation. It seems not improbable that they represent to a considerable extent the intermediate hosts, if we may use the term, which serve to disseminate widely the streptococci and assist in increasing the virulence of the organism by frequent passage. They should at least be regarded as a potential source of danger until negative evidence has been produced. It is possible, however, that contact carriers play only a passive role, except in so far as they become acute carriers, and occur

merely coincidentally with the dissemination of hemolytic streptococci that takes place during a streptococcus epidemic.

The part played by the acute carrier of hemolytic streptococci in the spread of streptococcus infections cannot be too strongly emphasized. It has been clearly shown that he is an actual source of great danger. The introduction of an acute carrier into a ward devoted to the care of respiratory diseases may be followed by a rapidly spreading and highly fatal epidemic of streptococcus pneumonia which is comparable in all respects to the old time hospital epidemics of puerperal sepsis. Rigid isolation of every such case, whether it be a mild streptococcus tonsillitis or a severe streptococcus pneumonia, is the clear indication.

Recommendations

The medical officers who have taken part in this symposium have agreed on the following recommendations in regard to the streptococcus haemolyticus carrier problem in the army.

I. Our knowledge of hemolytic streptococcus carriers is incomplete and every effort should be made to answer the following questions:

(a) Are streptococci found in carriers all of equal importance or are there different groups which differ in clinical significance?

(b) Is the chronic carrier dangerous to himself?

(c) Is the chronic carrier dangerous to others or is the disease spread chiefly by cases or by case contact carriers?

II. In the absence of knowledge on these points no final program for handling the problem can be stated but a tentative program should be adopted which in case of doubt should err on the safe side.

III. When no streptococcus disease is present and in off seasons.

A. For soldiers in hospitals. Incoming patients with throat infections should be cultured for hemolytic streptococci. Any positive case with diseased tonsils should be a

tonsillectomy. Clean and infected measles wards should be maintained for practice in ward technique.

B. For soldiers in barracks. Clinical and cultural surveys should be made for the detection of chronic streptococcus infections such as tonsillitis and otitis media which when discovered should be treated to remove possible foci of future epidemics.

IV. In the presence of streptococcus complications and during the streptococcus season.

A. In the Hospital.

(1) No carriers among attendants should be allowed in surgical wards or in wards with respiratory diseases.

(2) A streptococcus isolation ward should be established to handle special cases.

(3) Positive and negative measles, pneumonia and nose and throat wards should be maintained with strict technique.

(4) All admissions should be isolated until distributed to wards.

(5) Throat cultures for hemolytic streptococci should be made on all admissions with respiratory diseases for record.

B. In Barracks.

(1) Recruits should be held for observation and cultured. Positive cases should be separated from negative as far as possible.

(2) Clinical and cultural surveys should be made to pick out cases of tonsillitis, otitis media, sore throat which should be sent to hospital.

V. In the absence of exact knowledge and with due regard to military necessity, no attempt to isolate all streptococcus carriers is advocated at present.

DISCUSSION

The President: The discussion on these four very valuable papers will be opened by Colonel F. F. Russell of the Medical Corps of the United States Army.

Colonel Russell: Mr. President, last night in Dr. Flexner's address he drew attention to the question of Epidemiology in recent epidemics, and in tracing the history of influenza showed that it probably had a home at some place on the Russian-Turkestan frontier and that from that home it spread over the world from time to time; that anterior poliomyelitis spread over the world from time to time from its home in northwestern Europe and Scandinavia. Our streptococcus problem that we have heard about just now, represents in a somewhat different way the same condition.

We have had from time to time epidemics of streptococcus and the papers that we have heard represent the last work, the best work, that has been done on tracing back the epidemics of streptococcus to the home of the epidemic, which is in this case a widespread endemic home. We apparently have the seeds of an epidemic streptococcus with us, always, ready to break out when the conditions are favorable, as they were during the war. During the first part of the war measles was the primary disease which so altered the respiratory mucous membrane that the hemolytic streptococcus was enabled to invade the respiratory organs and produce this terrific epidemic of bronchial pneumonia with which you are all familiar.

Of course, the epidemics of streptococcus are among the oldest problems with which the medical profession has had to deal. It has cropped out in various fields of medicine from time to time and each group of medical men have solved it in their own way for their own purposes. We all recognize that the epidemics that we have had recently of streptococcus infection are quite comparable to the older epidemic of puerperal fever, of erysipelas, of wound infection which medical history tells us about. The obstetricians found out a way of protecting themselves and their patients against this epidemic of puerperal fever. They elaborated a technique which is successful. In the surgical field the same thing has been done so that streptococcus infection in surgical wards is almost a thing of the past.

The experience of last year which Dr. Blake has described he observed at Camp Pike, where he and Dr. Opie worked, shows that the conditions surrounding streptococcus pneumonia are practically the same as those surrounding erysipelas and puerperal fever and that one ought not to admit into a ward full of patients of pneumonia or respiratory disease of any kind, a case of streptococcus pneumonia any

more than he would think of admitting a puerperal fever case into a ward full of pregnant women.

Now we have gone here, in these papers which we have been so fortunate as to have, a good step further and gotten down to cases that are on the border line. There is no doubt, I think, that we can all accept Captain Blake's point of view that the case of acute virulent streptococcus disease is the source of danger to everyone with whom it comes in contact especially in the ward. That, I think, you can all accept.

Whether the chronic carrier of the streptococcus is dangerous is the thing which we have to decide in the future. The acute streptococcus case of tonsillitis, say, the mild but acute tonsillitis case is fairly clear. Unless future work along the lines that Dr. Dochez has indicated, show that we can differentiate between the streptococcus found in the case of mild but acute tonsillitis is different from the streptococcus causing bronchial pneumonia and otitis and mastoiditis and severe streptococcus infections, until we can differentiate between them, the only safe thing to do is to consider that the case of acute follicular tonsillitis, no matter how mild, is a source of danger to other persons in the ward. Whether the chronic carrier is also a source of danger, is, I say, the problem that we have to work out for the future and that is where the cooperation between the laryngologist and the laboratory men must play a part in the future.

I think these papers show quite clearly what our work is to be. We must study the prevalence of a chronic streptococcus carrier. Whether we will find in civil life in times of peace when things are settled that the streptococcus carrier during the winter season is as common as it was in the camps or not, is a thing to find out.

The few surveys we have at the present time seem to show that the chronic streptococcus carrier is not so very numerous, but the work which has been done is inadequate. We must combine and work together and find out the prevalence of the chronic streptococcus carrier and also its significance, that is, we must have the histories extending throughout the year of the chronic streptococcus carrier, possibly for more than one year. We want to know what is the duration of the disease, whether the associates of the chronic carrier remained healthy or developed disease. There is a good deal of survey work to be done.

Then along the lines which Dr. Dochez has started, we

can work on the bacteriological side and try to find out whether the streptococcus obtained from these chronic carriers are potentially able to cause epidemics of streptococcus diseases. The whole question of streptococcus from a bacteriological point of view has been most difficult and although it has been taken up from time to time to solve special problems, the work has languished from time to time and even gone backward, but I think this work which we have heard today represents an advance that is greater than anything that has happened in the last twenty or thirty years or more.

The older work on puerperal sepsis ceased when the question of the control of puerperal cases was decided upon. Not much more was done during the times of streptococcus infection in surgical wards, but when this widespread epidemic of bronchial pneumonia, due to streptococcus, broke out, we all had to start in again and reexamine the old ground and see what could be done for the future, and as I say, I think that a great deal has been done, the field has been narrowed.

So long as we were unable to differentiate clearly between different kinds of streptococcus, very little progress could be made. The field was too broad and it was impossible to work, but in the last couple of years the field has been narrowed, so now it is a proposition which can be handled.

We know that the streptococcus pyogenes or the hemolytic streptococcus is the cause of the severe infections. The other known hemolysin streptococci we can afford to completely disregard in this respect, that throws out an enormous number of streptococci which need not be further considered. Then we have a large number of hemolytic streptococci which are found in milk and cheese and bovine mastitis. We have also found methods and good reasons for now excluding those from consideration. They do not seem to be of any importance in human pathology, so that narrows the field very greatly until we now have a hemolytic streptococcus which comes from human sources and which is found in these epidemics and also in the acute and chronic tonsillitis and in the chronic tonsil.

Those are all we have to study and Dr. Dochez has shown how it is possible to split them up into four groups which can be further studied. We have got to find out now some way of telling whether they are virulent or not and whether they are pathogenic or not to human beings. Those are two difficult things but perhaps are not insuperable.

The question of acute tonsillitis we have always accepted as a disease due to the streptococcus. There is this curious thing about the streptococcus which has been emphasized in the papers we have heard, that the streptococcus plays the role of a secondary invader in every situation, it does not produce a primary disease in any place. We have tonsillitis in the human being and strangles in the horse which are apparently primary streptococcus infections. It might be well, however, to reexamine those things, those two diseases with the possibility in view that they are not primarily streptococcus diseases, but that streptococcus is a secondary invader there just as in the other known streptococcus infections.

We have long known that the minute we bring a lot of recruits together whether in time of war or in time of peace we immediately have a small or large epidemic of acute follicular tonsillitis. We have tried in various ways to prevent the extension of that epidemic, to limit it. The only way which has offered any reasonable success is separating the men as far as possible; in fact we have done exactly what was done in puerperal fever and erysipelas and in measles, pneumonia, we have kept our patients as far apart from one another as possible and that has limited the spread. That has been about the only thing that was effective.

The experience of pediatricians in the treatment of measles in children is practically the same. I am informed it is customary in children's hospitals to refuse admission to patients with measles whenever possible, because all their experience has shown that every time they are brought together in a hospital, the mortality is high, that the best way of keeping down the mortality is to leave the measles patients at home, no matter how poor their home is, in order to protect them against cross-infections.

Of course that solution for our difficulty during the war was not possible. We couldn't very well break up our camps and send the men home. That was done, however, in the Civil War, some regiments of Southern troops came down with measles to such an extent that they were unable to take care of them and they disbanded them and sent them home. Now we have got to work out some more satisfactory solution for taking care of streptococcus cases in a hospital than by refusing to take them in; that can be done, I think it is reasonable to believe and by following out the recommendations which have been read here, we will go a

long step toward preventing cross-infections in hospitals due to streptococcus.

We have got to work out, in other words, in the medical wards, in the contagious disease wards, some method of isolation of patients from one another so that cross-infections cannot occur. That has been done on the surgical side. It has been pretty easy to seal up a wound or to keep puerperal cases well separated, to keep clean wards, septic wards, and we have got to apply that same thing throughout the hospitals, on the medical side and respiratory disease side of the ward, and work out a complete ward technique for the protection of each patient against every other patient. Until we know whether a carrier who has a chronic tonsil is dangerous or not, we have got to protect every one else in the ward against that man.

Just how it is going to be done is easy to picture, but I can see that it will be surrounded by a good many difficulties. In the first place, it will cost more, it will take more room. We cannot crowd patients in hospitals without getting cross-infections. We must have abundant floor space, good ventilation, and above all a trained personnel and trained nurses.

In the meantime, the bacteriological examinations of these cases may show that some of them are unimportant and can be disregarded, but until that time comes the only thing we can do is to protect each man against every other man in the same ward.

We will have opportunities, I think, in the civil life just as well as in the army during the war to study out these problems, perhaps better opportunities because we were so swamped with the enormous number of cases that not everything that we wanted to do could be done, but we have at least gotten some general principles to work upon and in our children's hospitals, especially in the nose and throat wards, this subject can be followed out. We can trace the natural history of streptococcus infection of the tonsil from month to month and from year to year. If we can find each of us, a couple of chronic streptococcus carriers, study them as long as they remain carriers without any treatment just to see what will be the duration of the disease, whether secondary cases arise from those primary foci or not, that is a problem which must be solved before we will know just exactly where we stand and that can be done much better in our hospitals in time of peace than it could be done during the war.

I think that nothing which has come out of the war has been any better than this work on streptococcus infections. I think that now the field is pretty clear. We know what we are dealing with, we know what the problem is and there is nothing to prevent us getting together and making a program and working it out through as many years as may be necessary to bring it to some satisfactory solution.

Dr. Friedberg: Mr. President, there is very little that I can add. I will admit that my mind was very confused in regard to the whole problem but a good many things are clearer now. One of the causes of confusion, for instance, was the lack of agreement in the various statistics that we have had. One of the readers made the statement that it is pretty well agreed that hemolytic streptococcus are not very often found in the throat, in the absence of epidemics. Now my experience of examination of tonsils, while I was engaged in some focal infection work showed us that quite a number of tonsils, perhaps sixty per cent of them, contained hemolytic streptococci in the depth of the tonsil.

We are handicapped, of course, to a great extent by the fact that we haven't the same possibility of obtaining aid in regard to the virulence of the organism that we have in the case of other carrier diseases. The laboratory work is progressing along this line and no doubt before long it will be of considerable aid and that will settle one factor.

While at Doniphon (I am bringing this in to see if it isn't possible that a comparison will be possible between carrier conditions of various sorts) we had a rather extensive case of diphtheria carrier epidemic. We discovered that in every instance of a chronic carrier there was an underlying pathological condition at fault and when this was corrected then the carrier condition disappeared. In some instances there was nothing we could do to clear up the condition and these patients remained carriers and a menace to society. We had to S. C. D. some of them to get rid of them.

Emphasis has been made particularly upon the condition in the tonsils. We ran up against that same proposition there, to some extent, until we found out that there were other sources responsible for the dissemination of infection than the tonsil and that led to a more careful examination of the nose, and we found quite a large number of cases where sinus disease was just as potent a factor of dissemination as the tonsil alone. That part has been neglected. You can take out the tonsils and the sinus condition will go on just the same. I think if we follow along the lines that

we have found to be efficient in other conditions that then we are going to progress from a clinical standpoint. We will have to do that until we can get more definite aid from the laboratory.

From a clinical standpoint, when we find a chronic carrier with a pathological process present then I think even though we are not able to determine the virulence of the organism, we are justified in correcting the pathological condition any way and I think in that way we will be able to advance a little.

The President: We have a distinguished visitor who has done a great deal of work in straightening out bacteriological problems, Dr. Swift. We will be glad to hear from Dr. Homer F. Swift.

Dr. Swift: Mr. Chairman, I came down here to learn today and I have learned a great deal. Perhaps we recall that practically all the patients are streptococcus carriers. The title of the symposium this morning was "Streptococcus Carriers." We have not touched upon the other broad field of the non-hemolytic streptococcus and their relation to focal infection, a much more difficult field probably than the one we have heard discussed this morning.

The conditions of the war have brought out this other phase of the problem, hemolytic streptococcus, and you can readily see from the discussion this morning in what an early stage of the problem we are at present, and I think it is well to keep in mind the relation of our present state of knowledge to the total solution of the problem.

We are now probably going back to a more or less peace-time basis and the relation of the carrier to the general problem will be that of a peace-time basis. In the subject of chronic carriers such as diphtheria and meningococcus, the experience in the Expeditionary Forces, not only in our own but in the British Army, show that the simple determination of carriers by the laboratory was not the whole problem in controlling the spread of disease, and that is the part of the problem that I think we ought to bear in mind—that the average medical officer was liable to cast all of the responsibility up to the laboratory man in controlling the spread of infection. If there was an outbreak of diphtheria or one or two cases, he would think that the determination of a carrier in his company was sufficient to stop the spread of that infection.

We finally came to the conclusion that the examination of

the throat twice a day, the use of the stick of wood in depressing the tongue and looking at the throat, was as important a factor in stopping the spread of infection, as was the mere culturing of the throat and I think that that just brings up the problem that the clinician, the man who is examining the throat every day, is going to help as much, maybe not as much in adding new knowledge, but in the practical control as any other person.

The President: Sir St. Clair Thomson, have you any remarks?

Sir St. Clair Thomson: Mr. President and gentlemen: I would only say that the few remarks that I have to make shall be limited to praise and platitudes. This is the most interesting symposium that I remember to have heard. I am not in a position to judge it, but it strikes me that it may be true of what Carlyle said of nations. He said, "that no nation which thought itself doing a great deed was doing a great deed, that the great deeds were done by people who were not aware of it." And this symposium which we have listened to this morning, I think, without exaggeration may possibly turn out epoch-marking.

I think, sir, although as I say I am not able to appraise the value of the symposium, but I think I am able to appraise the temper in which it has been produced, and that is the thorough scientific spirit. The few points that I wish to ask about have been entirely settled by Captain Blake's summary which shows the difficulties, which, as I say, is the true scientific spirit. I hope this symposium will go forth to those who are able to appraise its value. It is of interest to me as focusing once more our attention on the mouth and it is interesting to think how just as Lucretius and Greek and Roman philosophers and poets anticipated the atomic theory and the Darwinian theory, so thinkers have anticipated this.

I remember that though toothbrushes were not used according to record by any British Monarch before George III, (I believe he is known in this country, in fact some people in this country think he was a damn bad king, but in other respects he was a damned worse man.) Well, we have in a museum in London his toothbrush, and it is curious. It is almost certain that Queen Elizabeth never used a toothbrush, and yet Herbert, who a poet contemporary of Shakespeare, says, "See to thy mouth; disease enters there." And Shakespeare, himself, who was no democrat,

because he rather disliked the hoipolloi, made Coriolanus send a message to the people of Rome to this effect, "Tell them to wash their faces and keep their teeth clean."

But, coming down to still more modern times, I am glad to be able to quote one of your own,—perhaps your greatest poet, and that is Walt Whitman, who in his praise of woman said, "Give me a sweet-breathed woman."

Dr. Pierce: In speaking of the paper that was read, one of the queries, "Is the chronic carrier dangerous to himself?" After returning from service, I selected approximately twenty-five patients, private patients, who were living under the very best conditions and they came to me complaining of various pains and aches. Their ages ranged from we will say, thirty to forty-five, to perhaps fifty. They had been referred to me for advice as to tonsillar excision. I made cultures from these tonsils, extending over three weeks to a month in each one. It may be important to state just the technique of taking these cultures. The tonsils were everted, a good deal of force being exerted and a platinum loupe was passed into the fluid which can invariably be expressed from every tonsil in greater or less quantity. And this was inoculated on blood agar. In all these cases we received a report from the laboratory that the cultures resulted among other germs, invariably in streptococcus hemolyticus. Ten other cases of my friends who had nothing whatever the matter with them, were as healthy as possible, were treated in the same way, cultures taken in the same way and invariably the same report came from the laboratory. This extended over three weeks to a month, a culture being taken at least once a week from the throats, so that I came to the conclusion that very little help could be gained in forming an opinion as to whether the tonsils should be removed or not.

I rather accidentally hit upon something that may be of value in deciding as to which of the tonsils should be removed, and that is this: We may divide these cases into two classes, the subfebrile type of case, and these cases invariably display what may be called a sub-leukocytosis, leukocytosis of nine to twelve thousand and sometimes above that. The other, cases with slight inflammatory symptoms, neuralgic pains, stiffness of joints, not swelling, not acute progressive inflammation, but a low type of inflammation.

Now comes the point that I am trying to make, is the chronic carrier dangerous to himself? In a few of these cases (by few I mean perhaps five, the highest number I

can think of) we found that by carefully disinfecting those tonsils after washing their mouths as thoroughly as possible and treating with nitrate of silver fused on a probe and this being passed down to the lowest depths of the crypts in each one, we found that the fever disappeared, and together with the fever the leukocytosis. I think that that is proof that a chronic carrier is probably in some cases dangerous to himself and in those cases I recommend the removal of the tonsils. But, I am loathe to recommend the removal of tonsils if we merely find streptococci.

Dr. Delavan: Mr. Chairman, I think the Association and the world at large owes a debt of gratitude to Dr. Bryan for having brought together this remarkable symposium. And if that be the case, it owes a far greater debt to the gentlemen who have furnished the information that we have been benefited by today. Oliver Wendell Holmes in a similar voice taught us the danger of puerperal fever and today we have learned some very definite things about the streptococcus. The disinfection of carriers has engaged my attention for the past two years very earnestly. I cannot go into the scientific side, that is far beyond most of us and must be left to the gentlemen who have been working the matter out, but there are one or two practical points which seem to me to need a little clearer understanding and one of those is brought out by my friend, Dr. Friedberg who has done such splendid work in this same direction.

At the Willard Parker Hospital I understand that all diphtheria carriers, children, have their tonsils removed. Now in my own experience, and in two words I can illustrate what I want to say, the tonsil is not by any means the only focus of infection. Here is a series of twelve cases of diphtheria carriers. In all, treatment have been carried out. They were all adults, all young women, nurses, have been treated with waters and various gargles of disinfectant character and all had remained with positive cultures. Under the use of the diphthomeningococcus solution, applied after the nasal cavities, upper pharynx and the tonsil had been thoroughly prepared, as I have already described before the Association, and the surfaces cleansed of secretion, the cultures in these cases became and remained negative in three cases after one treatment, in two cases after two treatments, in four cases after three treatments, in two cases after four treatments, and in one case after eight treatments, and in not one case did the tonsils have to be removed. There was no tonsillectomy in any one of these cases.

I am not as familiar with the study of the streptococcus, as I haven't experimented with that as I have with the meningococcus and with the diphtheria bacillus, but I don't see why any micro-organism should show such an exclusive predelection for the tonsil as to exclude the possibility of its being found in the nasal cavities especially in the case of some patients whose nasal cavities are misformed and not well ventilated. I think, therefore, that we should pay more attention to this thought of the subject.

I brought this matter before the Director of one of the most important scientific institutions in the country, a very important scientific institution and met from him a very cold reception. He began at once to object to the method of first closing the cavities of the nose and then dilating them with adrenalin, preparing them for the application of a disinfectant and his objections were two-fold: It takes considerable time to carry out that treatment and in a large army hospital the number of patients to be treated and the small personnel it would be impossible. In the second place, it takes a certain amount of technical skill and that may not be at hand. Therefore, my proposition, he thought, was apparently of very little use. I don't think so. I think it is a very good thing, even if it does take a certain amount of time and even if it takes a little skill, but it doesn't require much skill to do this and the results are, in the cases that I have had, so thoroughly satisfactory, so far more satisfactory than by any other method of disinfection, that I wish to insist upon the importance of its value.

Of course, as Dr. Friedberg has told you, where the lymphoid adenoid, either of the tonsil or upper pharynx or any part of the lymphoid circle of the throat are invaded deeply, they must of necessity be removed, but in the ordinary case I think the treatment without removal will cure a large number of cases. At least it is worth while to apply that treatment to test it and not to remove the tonsils in every case, but to use the treatment for a few trials and if unsuccessful then operate.

Dr. Berens: Mr. President, confirming the most beautiful photograph that Dr. Bryan showed us, these cases even in small tonsils showed deep crypts next to the capsule, infected. In regard to other streptococcus carriers we all recognize the sinuses are carriers, but the hour is so late that it would be impossible to go into that. Dr. Bryan tells me that all of the upper air tract is liable to become infected and cause chronic or acute carriers.

Dr. Goodale: I wish to take merely a moment to express my agreement with Dr. Bryan in what he says as to the value of silver nitrate in the treatment on these conditions, but if I may be allowed to particularize in the endeavor to define with a little more precision, I would say that we should choose the time for its application. In the first place, during the stage when in the system there is proceeding the formation of antitoxin, we should do nothing in the way of sterilizing or endeavoring to sterilize the tonsils because the natural process through which the system throws off the disease is the formation of toxin and the rendering of the tissues less favorable for the further enlargement of the organism.

On the other hand, I think that we find, at least I have found this last year, a certain condition where the silver nitrate has been of very great value, and that is, after the height of disease is passed and the individual is still suffering with debility and perhaps occasional exacerbations of his fever, if we find under those circumstances certain of these crypts which are more or less inflamed, if we find in those crypts white pus and we allowed the material to come out, if we apply the silver nitrate, or if we are able to enter the crypts and inject gently into them through the cannula some silver nitrate solution, I believe that the individual in the majority of cases will promptly experience a distinct sensation of relief from the pressure. That has been my own experience in my own attack of streptococcus this year and I have found that repeated in a large number of cases. But in making this introduction of the silver nitrate, I think we should avoid severe trauma. I should say we should avoid anything simulating a direct wound of the crypts, we should endeavor to go in and out again with the least damage to the parts possible. We should not apply that treatment in the stage when the individual is still making his antitoxin but only after he may be conceived to have manufactured all which he is capable of in that particular attack.

In Dr. Bryan's reply to the other speakers, I should be glad if they will give us a statement regarding this point as to the desirability of excising tonsils in the epidemic, whether the cases just in for tonsillectomy should be kept under any special mode of treatment, and if they use general or local anaesthesia, whether the use of the general anaesthetic in those conditions is in their opinion, detrimental.

Dr. Mosher: Dr. Delavan expressed the obligations of the society to Dr. Bryan for the inception of this sympo-

sium. I share with Dr. Delavan that feeling of gratitude, but I have a greater feeling of gratitude, if Dr. Bryan will allow me, to the army men who have come down here and given us these papers. They have carried us into rather thin air, but that is not their fault, that is our fault. I feel that a very great benefit should come to civil medicine from what has been going on in the army and I hope that a symposium of this kind will become frequent, because it is through symposia of this kind that the results of what has been going on in the army ought to come to the civil practice.

Col. Russell and I have had a few discussions, most of them friendly, bearing on the nose and throat topics in the army. I was very much interested in the recommendations which were quietly slipped in, at his suggestion I think, at the end of one of the papers. I think I can make those recommendations from the standpoint of the otolaryngologist, a little more crisp. In other words, I feel that no recruit should enter the army without a normal nose and throat. If the recruit is found in the army without the normal nose and throat, his throat, if possible, should be made normal. There, I feel, that every case of acute tonsillitis should be isolated in spite of the difficulty to bring that about. None of these three things which I consider essential were accomplished during the war just passed.

One further thing; I hope a symposium will soon be staged by these same gentlemen if they can spare the time from this subject, that symposium being on the subject of the laws governing the changes in the virulence of bacteria.

Dr. Sluder: A question simply: In the observations upon the tonsils delineated here this morning, it seems to me it would be interesting to know if there was any observations carried out upon the lingual tonsil. It seems to me that these observations have all referred to the faucial tonsil.

Dr. Bryan: Mr. President, it was not our intention to maintain that the tonsils were alone the carrier, but the tonsil evidently is a principal source of infection. The upper air passages may become involved secondarily from an ascending infection just as the pneumonia is a descending infection. Now after the tonsils are enucleated and the fauces are perfectly normal, there may be still infectious conditions in the naso-pharynx or in the sinuses, but I believe that those cases are generally of a secondary nature and will clear up under local treatment.

In regard to the lingual tonsil, I don't believe that we carried that out, but if there had been any secondary involvement of the lingual tonsil after the faucial tonsil had been removed and the cultures had been made there would have been evidence of a positive culture from that region.

With regard to the enucleation of the tonsil during the height of the epidemic, the object is to get rid of this source of infection and other conditions being equal, it is often necessary to remove the tonsil even in the height of an epidemic.

In regard to the use of anaesthesia, we removed the tonsils both under general and local anaesthesia. Personally, my preference is for general anaesthesia, other conditions being favorable. There should be no acute condition, no acute inflammation of the upper respiratory tract, or any heart or kidney involvement. The enucleation of the tonsils under local anaesthesia has many advantages and I think many disadvantages, particularly when you have a hemorrhage.

Dr. Nichols: In regard to the importance of the tonsil as a focus of infection, I feel a little responsible for committing Dr. Bryan to that, possibly, because I made a number of cultures of different areas of the nose and throat, both sides of the nose, the saliva, as many different areas as we could pick out and almost always the tonsil gave the strongest culture and then when we removed those tonsils the rest of the area became free of streptococci, so that I think along the line of Colonel Russell's suggestion, that the laryngologist should take up some of these problems, that if some of the laryngologists would find it convenient to study cases who had had their tonsils previously removed from the point of view of carriers, that it would throw some light on this subject. And my impression is that you will find very few carriers among such cases. You will find carriers among men who have had their tonsils improperly removed, a very small shred of tonsil tissue apparently has been left but that is a problem still open for solution.

My experience has been that it is very difficult to find streptococci in the upper air passages except in case of tonsillitis.

I would like to say one other thing of a sort of general nature, that those of us who are working from a laboratory point of view sometimes get a one-sided view of our own importance, simply because we don't always go along hand in hand with the clinical workers as we should. I know of a case of syphilis where it got to be so that the practical question of the treatment of the patient would be referred

to a laboratory man who didn't know a thing about it rather than to a clinician who ought to know all about it, and while I am greatly obliged for the invitation I think also that the Society should be congratulated that Dr. Bryan has tried to develop the laboratory and the clinical side of this problem hand in hand instead of one pushing the other. We like to think that we take the initiative in things and lead the clinicians in the way they should go, but I don't think that is at all so. We have to work hand in hand, and it seems to me very important that this Society of practical laryngologists take enough interest in the subject to want to be the leaders rather than to be drawn along later on.

Major Dochez: Mr. President, I should like to draw attention to one point in which our knowledge is still very defective, and on which I think it is most important that statistics should be collected. You may remember that some time ago Smiley studied the hemolytic streptococcus among normal individuals and his report showed that it was present in approximately one per cent of cases. Now these cultures presumably were made by swabbing the throat, or swabbing the tonsils, and it seems important at the present time to determine whether these statistics would be materially varied if careful cultures were made from the tonsils, preferably making cultures from the deep portions of the tonsils, and to find out whether there is a great difference between the incidence of hemolytic streptococcus in the normal individual when cultures are made simply by swabbing the throat, and whether there is any material difference when these cultures are made when the deeper parts of the tonsils are reached. This is important in order to find out the facts.

These cultures from the tonsil, of course, should preferably be made from individuals who have relatively normal tonsils and it is very important to find out whether there is a greater incidence of hemolytic streptococcus down in the tonsil than there is on the surface in order to approximate the danger of this organism among carriers.

Captain Blake: As I remarked in my paper, it seemed to me that indication is clear for the complete isolation of the acute carrier, and I am very glad to hear Dr. Mosher's remark that the ordinary case of tonsillitis should be absolutely isolated. I think that should be considered as essential as the isolation of cases of more severe streptococcus infection.

THE REMOVAL OF FOREIGN BODIES FROM THE DEEP PORTIONS OF THE FACE

MAJOR FERNAND LEMAITRE,

Paris, France

Major Lemaitre: Mr. Chairman and Gentlemen: I appreciate very much the privilege and honor of presenting a paper before this Society. I shall try to be very brief, and tell you of my experiences in the removal of foreign bodies from the deep portions of the face, or speaking more exactly, from the deep lesions of the face.

I think it is better to select a limited subject, and I shall speak very briefly of the removal of the foreign bodies from the maxillo-pteregoid fossa. I removed, I do not recall the exact number, but about forty-two or forty-three foreign bodies from the maxillo-pteregoid fossa. I adopt a special technique which is quite different from the technique which is usually used. Generally, after having made an incision in the skin, the foreign body is removed through the skin incision, and I may show to you among many others, one case in which a general surgeon had tried to remove the foreign body in that way, but this makes an incision which is always annoying. However, what is more annoying is the fact that here the facial nerve, the zygomatic process and the ascending ramus necessitate a long and difficult operation.

Instead of cutting through the skin, I tried in every case in operating through the mucous membrane of the vestibulum of the mouth, through the natural route. For instance, in the case in which you have seen the photograph (and here is the radiograph) it was very easy to remove the foreign body, which a good surgeon might be able to remove by the classic external route.

I should like to say a word now about the technique I use.

The incision is made in about the same manner as an incision made when we wish to open the maxillary sinus, but this incision is a little back of that. This enables us to reach a region between the ascending ramus, which is outside, and the maxillary sinus, which is inside, through this canal; the mucous membrane of course being incised, it is possible to go very far, very deep, and remove the foreign body.

I think the help of the radiograph is very important, and it can be used in three different ways. First, the classical radiograph, which gives an idea of the location of the foreign body and enables one to choose the route and, in that case choose the natural way. But I certainly think it is very important to put a probe in the mouth at the place where we intend to incise the mucous membrane in order to have some idea of the location of the foreign body.

But more important than that is the advantageous manner in which we may work in cooperation with the radiographer. It is not always the same radiographer. I worked with one man during three months, one time, and I must remark on the great difference in the way we were able to work together at the beginning and at the end of the time. At the beginning it is very difficult to do this kind of work. I proceed in the following way.

When the mucous membrane is incised I insert a forceps in the place in which I presume the foreign body lies and at the same time I ask the radiographer to tell me at what place the forceps are in contact with the foreign body. He tells me, for instance, half a centimeter below or half a centimeter above, and I change my forceps accordingly. Sometimes I, myself, am able to discover where the foreign body is. Sometimes it is not possible and the foreign body is sought with the help of the radiographer.

In some cases I was obliged to go through the sinus itself. If the sinus is involved, as it is easy to see in some radiographs, of course it is better to follow the route that the foreign body itself has followed, but generally except in cases where the frontal sinus is involved, I prefer to go outside of the sinus.

Sometimes the foreign body is very deeply seated, very close to the lateral wall of the pharynx and it is very difficult to remove it because the external area of the sub-pteregoid fossa is like a well between the foreign body and the forceps. In that case it is possible (and I have done it) to remove the foreign body by excision of the external area which is a difficult way to approach the foreign body.

Now I should like to say a word about the danger of this operation. I may say that there is no danger at all. I have no hemorrhage during operation and yet if it happened, it is possible to always control the hemorrhage. But I had in the forty-two or three cases practically no annoyance from bleeding.

Secondly, there is the question of nerve injury. On a superficial examination, I thought there was no trouble with the nerves but when I examined systematically and thoroughly the patient, I saw that the nerve sensibilities for a few days were interfered with, in correlation with the amount of injury.

I had also some annoyance from the muscles, and I may state that on the first day a certain degree of muscular tremor was seen, but this tremor disappeared in a few days and I may say that sometimes the operation enabled me to overcome some adhesions and in some cases to suppress some tremors which existed before the operation.

I hope we shall not frequently have such cases after this. It is mainly wartime surgery, but I think that we may take some lessons from the surgery of war and try to apply them to the surgery of peace.

Here is a case in which it is easy, by cooperation between the radiographer and surgeon, to see that the large condyloid process of the inferior maxilla was the cause of ankylosis, with no possibility of opening the mouth. In that case it was possible for me to remove the condyloid process in the same way through the vestibulum, through the natural route, instead of making the classic operation, and meeting its difficulties. And I think that the maxillo-pteregoid fossa must be reached and treated by the method of the

laryngologist. We shall find surely in peace time some application of this method.

In conclusion, I wish to say that the pteregoid fossa, in the same way as the maxillary sinus, is in the province of the laryngologist and rhinologist because the best surgeons for that work are laryngologists and rhinologists.

DISCUSSION

The President: The very interesting paper of Dr. Lemaitre is before you for discussion.

Dr. Mosher: I was exceedingly interested in the paper of Professor Lemaitre because in 1915 when I served a short time with the British I had a few of these cases and extracted them by the only route known to me, the external route, and my troubles were many. I am very much interested in this route, and if it should become my fortune to have any cases of this kind I will certainly resort to it. I do not quite see the advantage gained, however, in ankylosis of the jaw in working through the mouth. It seems to me you want a pretty wide incision in many of these cases to get all of the bone out that you need to get out and for the present, although I would like to follow Professor Lemaitre, and I will follow him as far as I can, I think I shall stick to the external route.

Dr. Pierce: I have had the pleasure of being in the same beautiful city as Dr. Lemaitre through some months and I availed myself of the opportunity of seeing him operate on these cases. I have also had the misfortune of attempting to remove some of these foreign bodies that apparently were rather easy to extract and been very much disappointed. The one thing that struck me with especial force was the necessity of having a trained radiographer to work along with you. Of course the observer uses his instrument while you are working and watches the approach or the divergence, as it may occur, during the operation.

Unfortunately, at our head hospital we didn't get our apparatus until we became a well-organized general hospital, but we had the opportunity of using this method after a while and we were very greatly aided in discovering these bodies largely in the deeper regions of the face. It is a very important addition to our procedure of extracting the foreign bodies. For one, I congratulate Dr. Lemaitre on the advancement he has made along these lines.

The President: This paper to me has been a very timely one, because at Bellevue Hospital, with which I am connected, we get a great many gunshot wounds, perhaps ten or twelve a year, which formerly before the Head Surgery was established, were taken care of by the General Surgeon, but latterly they have preferred that we take care of them and they have been most bothersome. They are pistol wounds usually, attempted homicide or murder and they have given us considerable trouble. We have usually tried the external route and it has been puzzling. We have not in our operating room the facilities for working with the radiograph or the photoscopic screen so it has been a puzzle many times to get these out. We have succeeded usually pretty well, but at the expense of considerable time, loss of blood and not always with the saving of the patient in bad cases.

I recall one case where one of my surgeons had been operating for an hour and a half to remove a bullet that had lodged in the inferior maxillary fossa. He thought he could get it by the external route. Finally the House Surgeon put his finger in the patient's mouth after the surgeon had been operating an hour and a half and there was the bullet right under the mucous membrane and easily shelled out from the large hematoma surrounding it. It would have been much easier to have located that with the radiograph. The radiograph would not show exactly where it was, of course, but if we had had a fluoroscope and a probe it would have simplified matters, I am sure, very much.

Have you any further remarks to make, Major Lemaitre?

Major Lemaitre: Only to thank the members of this society and to say that this route may be used not only for the removal of foreign bodies, which I have mentioned for example, but may be used to approach all deep regions of the face.

AN UNUSUAL MANIFESTATION OF SYPHILIS *

CHARLES W. RICHARDSON, M.D.

Washington, D. C.

At various times during our professional careers we all meet with unusual types and manifestations of this interesting infection. Most of us seem inclined to offer an excuse or make an apology for the presentation of such conditions. I shall, therefore, not make any excuse as I think we too frequently err in not presenting these unusual types more frequently as aids in diagnosis.

The case which I offer by this paper is rather an unusual type of syphilitic lesion affecting the face in the neighborhood of the nasal orifice.

On January 19, 1919, a married woman of fifty years of age presented herself at my office with the following history:

She had been of good health until about two years ago when she began to have a catarrh, affecting the left side of her nose. The catarrh was attended with crust formation, odor and some acrid muco-purulent discharge. The nasal condition continued to grow worse in spite of almost continuous treatment. Her general health began to be impaired, as indicated by loss of flesh, palor and weakness, attended by impairment of appetite. From time to time she had a considerable amount of pain of a neuralgic character in the left side of the face which was always more pronounced at night. In June, 1918, a small growth began to develop at the lower portion of the left nasal orifice, which gradually increased in size to its present dimensions.

On presentation the patient had the appearance of a woman prematurely old. She was very palid, somewhat emaciated, and very timid. Protruding from the lower margin of the left nasal orifice and extending down to mid-

* Read before the American Laryngological Association, Atlantic City, June, 1919.

way between the nose and the border of the upper lip, with its base directed upward, and its apex downward, was a rather prominent grayish white, slightly lobulated, warty excretion. The mass did not extend into the vestibule of the nose. Examination of the left nasal cavity demonstrated that the passage was filled with a firm crust of debris. After removal of the crust a perforation about a centimeter in diameter was noted in the cartilagenous septum. The inferior turbinate appeared shrunk and in a granulose condition. Probing gently in this region resulted in the uncovering of a sequestrum of bone, which appeared to be the downward curve of the inferior turbinate. It was readily removed.

Examination of pharynx—uvula gone; edge of soft palate irregular, and a cicatrix was observed running from the base of the uvula on the left side downward towards the hard palate. Without attempting to obtain a specific history from the patient the lesion was diagnosed as syphilitic, and the new growth presenting on the face as a condylomata. The patient was placed upon specific treatment; directed to have a Wassermann test; and reassured as to the result.

In due time a report was received that the result of the Wassermann was double plus. The patient was given four doses of salvarsan by Dr. Frank R. Hagner, at appropriate intervals. After the administration of the second dose of salvarsan there was a notable shrinkage of the new growth. At the end of four weeks it had entirely disappeared, without scar or other evidences of its disappearance, excepting that the skin over the former site of the growth appeared slightly paler than the neighboring skin. At this writing, two months since its disappearance, the skin has assumed its normal appearance.

The presence of condylomata about the facial orifices is not a frequent manifestation of syphilis. In quite a large experience in the observation of the manifestation of syphilis about the face, I have only observed three such lesions of this type. In one of these cases the condylomata formed

at the external auditory meatus, in two others at the angle of the lips.

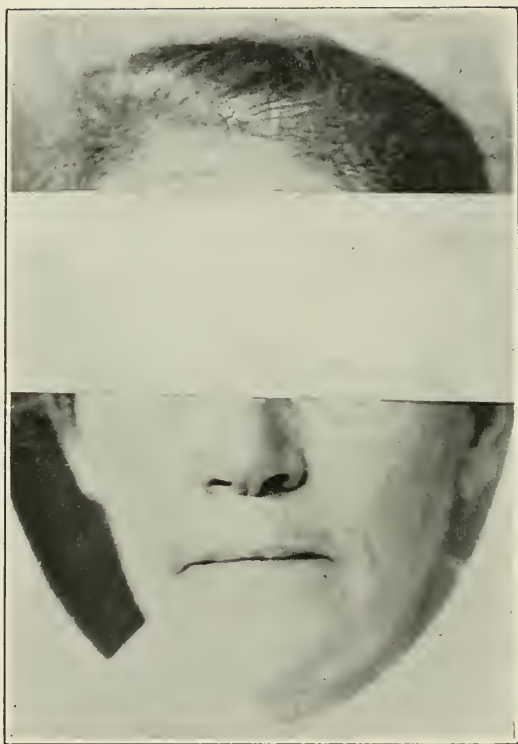
Treatment—We all know and realize how difficult it is to maintain patients under appropriate treatment after the local lesion has been relieved, and the general well-being has been apparently restored to the normal. Under the old method of treatment, which consisted in the administration of unpalatable drugs and inunctions, this was rendered doubly difficult, through the repugnance of the patient to the method, the slowness of the result and the effort on our part to keep up the medical morale of the treatment. Under these circumstances, there was some excuse for permitting our patients to pass too early from our observation. Today with the rapidity with which the initial results are obtained, and with the more satisfactory methods employed, we have no excuse for permitting these patients to pass from our medical care until they are nearly or completely assured of a complete result.



No. 1



No. 2



No. 3

DISCUSSION

The President: That is surely a paper of an unusual manifestation of syphilis. It is now before you for discussion.

Dr. Clark: I think syphilis of the nose is a very interesting condition for three reasons: One is, that the condition so often fails to be diagnosed by the general practitioner. Another is, that the lesion is usually a very late one, coming a number of years after the initial lesion, and third, it occurs often in cases where there is no history of any previous manifestation of syphilis. That has been my experience.

I have seen a good many cases of syphilis of the nose and those three points I want to especially emphasize. I have made some notes of several cases of syphilis of the nose, which I have seen, but I will just read a few notes of the last case that I saw illustrating these points. A man, H. P. R., 41 years of age, married in 1903. He has a girl 14 years old and a boy 9 years old. He gave a history of having a cold last July. I saw him in October, 1918. He said his nose had troubled him and was stopped at night. His physician had been treating him for hay fever all through the summer, but without any benefit in the symptoms. He had a purulent discharge from the nose. On the forehead was a symmetrically rounded swelling, about five centimeters in diameter at the upper central part of the forehead. Tenderness on pressure over this tumor and at root of nose. Patient weighed 119 pounds. There was a marked swelling of the septum almost obstructing the right nostril. Membrane very red, with small ulcers on septum, dry crusts in both nostrils. A Wassermann test was weakly positive. He was referred for general syphilitic treatment and was seen again in April, 1919, and weighed 129 pounds, had good color, and all local signs of syphilis had disappeared. There was no history whatever of the primary lesion. He had been a student in Paris before he was married in the early 1900's, (he was married in 1903) and had been exposed, but had never had any other lesion of syphilis.

The President: I am inclined to entirely agree with Dr. Clark as to the difficulty of diagnosing nasal syphilis, and the fact that it is often not recognized. Especially is that the case where there is such a degree of obstruction as Dr. Clark has found in one of his cases, and we have seen a

number of cases where submucous resection has been advised, in such cases, with most disastrous results. The man who hastily operates on thickened, swollen septum without investigating beforehand the presence of syphilis is apt to get into trouble.

“SOME CONSIDERATIONS UPON THE PRESENT
STATUS OF THE ETIOLOGY AND TREATMENT
OF CANCER, WITH A REPORT OF FOUR
CASES OF CANCER OF THE LARYNX
SUCCESSFULLY TREATED WITH
RADIUM”

D. BRYSON DELAVAN, M.D.

New York

Many years ago Dr. J. Solis Cohen performed what has proved to be one of the most remarkable laryngeotomies on record. Among the distinguished surgeons present at the operation was Prof. Gross who, in the midst of the dissection whispered in the ear of the operator, “Cohen, be sure that you remove the very *atmosphere* of the damned thing.” No better text could be chosen for the purpose of this paper, which is to call attention to various necessities which confront us in the general appreciation of cancer and to set forth certain possibilities of prophylaxis against the recurrence of malignant disease. It has for generations been evident that surgery alone, even in patients treated by the best available surgical methods, is in many instances not sufficient to meet the possible demands of the case. The very *atmosphere* of the disease must be attacked, no matter upon what theory the general view of it may be based, namely, whether it be regarded as a purely local matter or whether as a local expression of some obscure, deeply seated general cause, of which the local manifestation is merely an effect.

Plainly speaking, too long have the energies of the profession been devoted to the relief of the *effects* of cancer, with anything but encouraging results.

Without question, in the treatment of cancer in general, early diagnosis and skilled surgery have greatly prolonged,

and in many instances saved human life. But in some cases early diagnosis may be extremely difficult, if not impossible, even when the growth is superficial and within the view of the observer, not to mention cases where it is concealed. By the time it has declared itself sufficiently for positive diagnosis, the favorable opportunity for successful operation has passed. Some means of early diagnosis other than the study of the growth itself, are frequently demanded. As tending in this direction, it is gratifying to call attention to the experiments upon the blood now being carried on at the Lenox Hill Hospital, New York.

Who can tell but that this observation may lead to others through which the present unfortunate conditions of uncertainty may favorably be overcome.

The best so-called statistics given out by writers of the present time offer little accurate idea of the actual facts and even less encouragement. For example, certain prominent surgeons, in speaking of mammary cancer, report that they have "cured" so many per cent of their cases "for three years." Others, and among them the very best, claim to have likewise "cured 30 per cent for five years," from which it must be inferred that all the rest have died within that time, while in a certain number of those remaining at the end of five years recurrence has taken, or will take place. The word "cured" can only be truthfully applied when such a disease as cancer, or lepra or tuberculosis, has been absolutely and permanently eradicated. In like manner, speaking of the treatment of the disease in our own special department, of the actual results of the surgical treatment of laryngeal cancer we know next to nothing, although the operation has been performed upon many patients, by many operators, in many parts of the world for forty years. Nor shall we ever know anything reliable and satisfactory about it until statistics are given which approach something like scientific accuracy and truth, such statistics including not only the end results from the surgical viewpoint, but having something to say also as to the effect upon the general condition of happiness, efficiency and morale of the patient.

What is urgently demanded at the present time is the successful investigation of the etiology of cancer. Without the knowledge of its causes and basal activities, the study of the means for its local relief must remain, as for many years past, disappointing. But while many able men are engaged in this quest under the best conditions that intelligence and generous outlay can afford, their efforts are largely unco-ordinated with each other, and in some cases, at least, their views are overtheoretical and not sufficiently broad in themselves, if not actually antagonistic to those of others. Any day some great discovery may relieve us of the present deadly situation. Meanwhile, that event might possibly be hastened by the proper selection of the men best qualified for investigative work, by the elimination of unproductive investigators and by a better harmony and concert of action among investigators. An important step has been taken in that direction by the organization of the Lennox Hill Hospital.

Turning back to a consideration of the means of possible prevention and of relief which should be studied, there are several which relate to the general care of the patient and which not seldom escape the attention of the physician or surgeon in charge. Among these may be mentioned the influence of heredity and environment, the effect of increased blood pressure upon the development and stimulation of cell growth, the possible influence of the nervous system in connection with it, the proper selection of food elements as affecting the blood pressure and the chemistry of the body, the effect of certain drugs or of methods of general treatment upon the disease, and the many other contributory causes and means of prevention or palliation. It is certain that a wide field is opened for intelligent, co-operative work.

In cases operated upon the general care of the patient, both before and after treatment, must be carefully studied and more regard than is usually exercised must be paid to the period of convalescence and to that complete recovery from the effects of operation which can only be attained

after much longer periods of time than many surgeons are accustomed to allow. Surely, the conditions which influence the development and growth of cancer must be successfully investigated and understood. When the widespread suffering and destruction of life which it causes on every hand are realized, help cannot come too soon. Meanwhile, awaiting better things, the local treatment of cancer is being carried on with earnest diligence and in some directions at least, with increasing success.

Among recent methods of local treatment, none are receiving more deserved attention than the use of radium and the X-ray. The four cases herein reported differ widely in type but together, fairly illustrate the subject.

The first case was thoroughly treated with radium before operation, the second case was treated with radium both before and after operation, the third and fourth cases were treated with radium alone.

Case No. 1. Miss V. D., a young lady, single. U. S. Carcinoma of Larynx. In 1916 this patient applied for treatment and was seen by me at St. Lukes Hospital. At this time there was distinct swelling over the left arytenoid and to some extent over the right. The appearance was distinctly that of tubercular laryngitis, the color of the mucous membrane over this area being grayish and the subjacent tissue edematous. There was no evidence whatever of tuberculosis in the lungs and no bacilli were found in the sputum or from secretion taken directly from the larynx. Later, a superficial growth developed within the larynx which was removed by another physician under suspension laryngoscopy. This growth redeveloped and the patient was admitted to the Memorial Hospital, March 19th, 1917. March 24th, radium was applied: 4x25 mc. platinum filter, 1 mm. rubber tube inserted in larynx for 2 hours, the disease having involved the whole interior of the larynx and the anterior wall of the esophagus.

June 7th, 1917, Dr. H. H. Janeway performed a complete laryngectomy, after the method of Dr. Solis Cohen.

The patient was discharged August 20th, in good condi-

tion and continued to improve steadily in general health. Under constant observation to date, June 1, 1919, she had shown no sign whatever of recurrence, and the condition of the pharynx and trachea has been excellent. She is still wearing a tracheotomy tube. For the past year and a half she has been self supporting. By intelligent and diligent effort, she has acquired to a remarkable degree the power of speech, the tone being of excellent clearness and carrying power. Incidentally, she has become fairly expert in lip-reading, as the result of her own studies in the formation of sounds.

Case No. 2. J. R.; 62; Italy. Extensive carcinoma of interior of larynx. This patient first received radium treatment at the Memorial Hospital, New York City, in August, 1918, at the hands of Dr. H. H. Janeway, who performed a radical extirpation of the larynx, as in case No. 2, on January 22, 1919. When the patient first applied for treatment, the growth within the larynx was so extensive as to require an immediate tracheotomy. The microscope revealed epithelial carcinoma. The operation was followed by a good recovery. The patient was examined by the writer in June, 1919, who found the final result in every way excellent, with the exception of a small area of enlargement in a portion of the external scar tissue at the left side of the neck. This was rapidly subsiding under the application of radium.

This patient is making slow but satisfactory progress in the development of speech.

Case No. 3. W. H.; aged 64; U. S. Laryngeal Carcinoma. In January, 1918, I was called by Dr. Chas. L. Gibson to see this patient in consultation with him at the New York Hospital and found him suffering from a new growth which evidently having originated within the larynx, involved two-thirds of its interior and, outside, had attacked the left side of the base of the tongue and to some extent, the left lateral wall of the pharynx. The lumen of the larynx was practically obliterated, dyspnoea was urgent, and a tracheotomy was at once performed. All microscopic findings had agreed upon the diagnosis, epithelioma. In view of the widespread

extension of the growth and of the age and condition of the patient, radical operation was not advised. Following the tracheotomy, there was a temporary arrest in the activity of the disease. This soon reasserted itself, however, and in May the patient was sent to the Memorial Hospital for treatment by radium. On May 23rd, three tubes, 9.8 mc. were embedded in the growth for 132 hours.

On June 26th, one tube, 4.9 mc. was embedded for the same length of time. Ten days following this there was considerable edema over the area last treated. Otherwise the conditions were favorable. July 12th, pack treatment was applied and on July 21st the radium treatment was resumed, a pack being placed over the left side of the neck, 1222 mc. for four and three-fourths hours. July 27th, pack over right side of neck, 1456 mc. for five and one-half hours. Marked improvement followed these treatments. March 1, 1919, under chloroform, the tracheotomy tube was removed and a foreign body and several small masses of redundant tissue were removed, after which the tube was reinserted.

This patient has continued in the hospital as an observation case up to the present time, when all activity of the growth seems to have ceased, the microscopical findings showing no trace of malignancy.

Case No. 4. S. M.; aged 80; Russia. Epithelioma left vocal band. Applied for treatment at Memorial Hospital, September, 1918. Previous health good; no evidence of syphilis. Has long smoked tobacco to excess. Two months before applying for treatment first noticed voice becoming weak. Later it became decidedly hoarse. No pain; no dyspnoea; no dysphagia.

Examination: Nothing abnormal but the larynx. Examination of the larynx showed that the surface of the left vocal cord was destroyed by an ulcerated tumor which appeared to have infiltrated the substance of the cord to only a slight depth. The ulcer involved about two-thirds of the posterior extremity of the cord. The surface was ridged and showed an eaten out, nodular appearance typical of epithelioma. No enlarged glands in the neck.

Treatment was administered September 15, 1918, 880 mc. filtered through 2 mm. of lead, applied externally on each side of the neck over the larynx at a distance of 5 cm. from the skin for five and three-fourths hours on each side. The area of the applicator measured $6\frac{1}{2}$ cm.

Complete retrogression promptly followed this treatment so that on October 25th, 1918, no evidence of disease was present, and, aside from the formation of some cicatricial tissue to which his hoarseness is now due, the retrogression still appeared to remain complete.

My own examination of the case, in June, 1919, was absolutely confirmatory of the above statement.

THE DISINFECTION OF THE UPPER AIR PASSAGES IN THE CASES OF CARRIERS

D. BRYSON DELAVAN, M.D., NEW YORK

The subject of the disinfection of carriers so prominently brought before us of late years by reason of the aggregating of large bodies of men in camps, barracks, and on shipboard, should not be allowed to lose its interest because of the cessation of the war. On the contrary, the medical public has not yet begun to realize its importance in the prevention of infection nor the relative ease by which under intelligent management, it may be controlled. I therefore make no apology for again bringing the subject before this Association and calling attention to a few points of evidence corroborative of what I have already said,—namely, that for the complete and thorough disinfection of the infected areas it is absolutely essential that the disinfectant be brought into intimate contact with the germs themselves.

The cases of diphtheria carriers referred to later in this article were all treated in the manner described in my paper of last year.* In no case was the removal of the tonsils necessary.

Every case yielded to our treatment. Four had suffered undoubted attacks of diphtheria, the rest had not. All had been under treatment for periods varying from two months to three weeks, the treatment consisting of the use of various disinfectant solutions sprayed into the nose and throat and used as mouth washes or gargles. In all it had been ineffective. Under the use of the di-chloramine-T chlorococaine solution, applied after the nasal cavities, the upper pharynx, and the tonsils had been thoroughly prepared by the preliminary application of adrenalin and thus thoroughly exposed and the surfaces then cleansed of secretion,—the cultures became and remained negative; in 3 after 1

* N. Y. Medical Record, July 20, 1918

treatment; in 2 after 2 treatments; in 4 after 3 treatments; in 2 after 4 treatments; and in 1 after 8 treatments.

I have presented this group because of the general similarity of the individuals composing it; all were young women otherwise in excellent health but showing considerable variety as to the general conformation and condition of the upper air passages. All had been exposed to diphtheria and had been placed under the usual treatment without effect. In all the bacteriological examinations were carefully carried out by particularly competent examiners. Many other cases suffering from different forms of infection might be cited in which the success of the dichloramine-T treatment has been as marked as in these.

Quite recently there have been some who, in treating such cases, advocate the removal of all tonsils. My cases of diphtheria described above prove that this is not always necessary, while neglect of the nasal region must of necessity condemn the patient to the possibility of continued infection. Dr. Stanton A. Friedberg, in his admirable theses, has shown that the lymphoid tissue of the vault of the pharynx may be invaded as well as that of the tonsil. It has also been proved beyond question that in cases where lymphoid tissue is deeply involved surface disinfection must of necessity be ineffective. There is no reason, however, why preliminary effort should not be made to secure disinfection without operation, especially in cases where the lymphoid elements are not greatly in evidence. Failing at success after a reasonable number of treatments, redundant lymphoid tissue should be removed.

From observations already made on this subject it would appear that not all varieties of germs show a predelection for the same localities of the upper air passages. Thus the Klebs-Löffler bacillus, the Meningococcus and possibly others seems to show a willingness, if not a preference, for the invasion of the upper nasal region. While the streptococcus, whatever may be its wanderings in the otonasal realms appears to elect the tonsil as its chief center of action. The removal of a tonsil thoroughly and deeply infected with

the streptococcus becomes, therefore, a matter of necessity. While, on the other hand, the mere removal of tonsillar tissue in any of the 12 cases of diphtheria quoted above would have been useless.

Whether the tonsils require removal or not the presence of dangerous bacteria in the upper nasal region is sufficient in itself to constitute the subject a carrier, and a carrier he will remain as long as the nasal region remains infected. The proper cleansing and dilatation of this area together with the efficient application of the disinfectant does not require an excessive amount of time and it can be carried out by anyone possessed of a reasonable measure of skill and common sense.

DISCUSSION

The President: This very interesting paper of Dr. Delavan is open for discussion.

Dr. Green: It has been my privilege to see a good many of these inoperable cases of carcinoma of the larynx at the Huntington Memorial Hospital in Boston, and within the past few months, since returning from the service, I have had charge of making applications in the laryngeal cases by a method which I think is promising. We speak of treating carcinoma by radium in a rather indefinite way. The results of treatment of carcinoma of the larynx have been in certain cases so beneficial, although the majority without any permanent beneficial effect, that we are impressed with the fact that there is something in it. The great obstacle in the application of radium in the lower respiratory tract is the difficulty of making accurate and proper doses in the individual case.

For sometime we have been adopting always the principle of doing a tracheotomy first before attempting to make applications in the larynx, and I think still that that is the proper method to approach, the proper preliminary treatment.

Recently, however, we have been using the method of insertion by means of glass tubes, with, I think, very promising results. The radium is applied at our hospital by the method of Curé of Paris, who, as you know, was the first to discover the method of preserving the emanations of radium in tubes for the purposes of application. The great

advantage of this method is that a given amount of radium may be kept working all the time. When radium is not being applied to a patient, it is immediately put into a proper apparatus for conserving the rays and we therefore have always the rays of radium being preserved for us.

Radium, in other words, is thus made to work all the time. There is no waste or very little waste of the rays. Now, by means of these small glass tubes in which the radium rays are preserved, we are able to keep a very good control of the dosage. It is probably true that small doses of radium applied over a considerable length of time have a more beneficial effect than large doses applied for a short time, and using that principle we take a number in attacking a large growth in the throat, take a large number or several of these small tubes and insert them by means of a trocar deeply into the substance of the tumor at different localities. In that way a cross fire, so to speak, between the different points of insertion is obtained and we believe a much more thorough application of the rays of radium is obtained.

The difficulty of making the application of radium in the larynx, of course, is the difficulty of not only seeing but making the applications. The patient with a carcinoma in that situation is not a good subject for accurate applications of radium, and recently I have tried the method of applying these tubes under a general anesthesia, and that has proved a very satisfactory method.

Under suspension, a very accurate view can be obtained of the growth and a very accurate application and insertion of these tubes can be made.

The stronger rays of radium, the beta rays, I believe they are called, the stronger rays are very destructive to normal tissue, and for that reason one has to be careful to avoid placing the tubes of radium within a certain limit of the normal tissues surrounding the radium. For example, if you put a very heavy dosage of radium for any length of time in the vicinity of a large vessel, there is a great danger of the wall of the vessel being attacked and a fatal hemorrhage resulting, as it did in a case which I recently saw. The patient was a case of carcinoma of the upper end of the esophagus and posterior wall of the larynx in which I inserted radium under suspension, in which I got a good application and a fairly good result, but two weeks after the application of the radium the patient had a fatal hemorrhage and died.

The point to be brought out, I think, is the effectiveness

of radium when inserted in this manner, the advantage of small doses properly distributed and the necessity of being careful in avoiding large doses of radium in the vicinity of important vessels and structures.

Dr. Delavan: May I say, Mr. Chairman, that the object of my paper was to bring out a discussion on the use of radium and any other good means as a post operative treatment, more especially of these cases.

The President: I think there is no question but that radium can destroy, does destroy in certain cases every vestige of malignant manifestation wherever it may be. I think it is a question of dosage. I think it is a difficult dosage to manage. I think that those who are now using radium do not know just what dosage to use. Too small a dosage results in marked diminution of the mass for a time and in my experience at the end of a very few months the mass starts up to recur and grow at a perfectly terrific rate and the end comes as soon as it probably would have come or even sooner than if nothing had been done.

Too large a dose results in destruction, not only of the involved area, but of much of the healthy tissue around it and in certain regions, as for example, in the neck, in the larynx, is very apt to be followed by disastrous results. These results do not manifest themselves always early, but manifest themselves weeks, months and years after its application.

In a case of epithelioma of the larynx which I have referred to here once or twice, an elderly man refused operation, the application was given on the outside of the neck with marked recession in the laryngeal appearance, but with some thickening. And a year later, to satisfy ourselves what that thickening was we took a piece of it out and submitted it to the same pathologist, who reported there was still epithelioma present and it remained in that condition of thickening; more radium was applied, there was still some thickening.

The man a year after the second radium was applied, which was two and a half years after the radium was first applied had a sluffing of all of the tissues in the anterior part of the neck, the trachea was completely ulcerated through, so that the lower end of the trachea simply stood up in his neck there. The sternocleido-mastoid was nearly all eaten away, there was even evidence in that sluffing area that there was a malignant growth, the man died last sum-

mer from drowning in the secretion, septic secretions got down in those wounds. We took out his larynx and we submitted it to Francis Cotter Wood, who had made the previous examination. The Crocker Institute and Dr. Wood made over 4,000 sections of the interior of that man's larynx of the cord that was involved and all the surrounding area, and told me that there wasn't one evidence of epithelioma in that man's larynx, and moreover, that the epithelioma over the surface of that cord was a perfectly normal epithelium. It was astonishing to me. In areas where I had previously removed tissues he has that all on record, the man was cured of his epithelioma of the larynx at the expense of those terrible ulcerations resulting from fibrosis and obliteration of the blood vessels and sluff, necrosis in the soft parts.

I think it is unwise and unsafe to introduce into the larynx any radium emanation tube without first performing a tracheotomy. If you examine those cases where we have put any in the nose, I think you will see that the amount of swelling which must occur in the larynx, as it does in the nose or in the tonsils or tongue, is such as to render the patient very liable to such a stenosis as to need an urgent tracheotomy. I think all those cases should be tracheotomatized before the radium is used.

I know of another case where radium was used in the sphenoid in a malignant case that was also treated at the Huntington Memorial Hospital over two years ago, and some three or four months ago I heard this patient was entirely well without any recurrence. It was an absolutely inoperable case and radium apparently had done the work there.

Dr. Delavan: Mr. Chairman, I agree in the main with the last speaker. He has outlined our principles of treatment at Memorial Hospital, as I suppose at other institutions where the radium treatment is carried on. I cannot quite accept Dr. Green's remark with regard to the use of small doses and his objection to the use of large doses. All of this, that is, the question of dosage depends upon the case. It requires experience, it requires knowledge, it requires a large amount of good judgment to estimate just what the dosage should be in a given case. There is no doubt that many cases that I have seen have been distinctly hurt. The progress of the disease has been accelerated and the condition of the patient rendered rapidly worse through the ad-

ministration of radium, but on the other hand there are many cases which appear to show great benefit.

It is surely worth while to continue trying to find out what is the scientific way of applying radium and to apply it in that way, but after all that is not the point of my paper. We are treating the effect, no matter what we do, whether we use surgery or radium or any other such means locally. We are simply treating the effect of some cause, the nature of which we don't yet know. The sooner we find it out the sooner we stop speculating, the sooner we stop making mistakes and giving up, allowing the next man who comes along to take up the matter, go over the same grounds and make these same mistakes all over again as has been the habit of the world for generations the better it will be.

We want to know, it may be a difficult thing to find out, but we want to know and we have got to know what the underlying causes of this condition may be and until we do, we are entirely in the air, we are acting at cross purposes most of the time, one with the other, we are theorizing and our patients are dying at the rate of many thousands a year just in the United States alone.

INJURIES OF THE NOSE AND THROAT, DUE TO BULLET AND SHELL WOUNDS

J.M. INGERSOLL, LIEUTENANT COLONEL, M.R.C.

Cleveland, Ohio

The division of Head Surgery in the Surgeon General's Office was under the direction of Colonel W. R. Parker. The Oto-Laryngological Section of this division was under the supervision of Lt. Col. H. P. Mosher. The Section of Defects of Hearing and Speech was under the direction of Col. C. W. Richardson. The constant interest of these men and their wise direction contributed much to the success of the work of the Oto-Laryngological Department.

In January, 1918, the Medical Department of the Army leased a modern fire proof hotel at Cape May, N. J., and converted it into a hospital. In the army it was known as the U. S. A. General Hospital, No. 11, or the Hospital for Head Surgery. As fast as it could be secured the necessary equipment was installed in the hospital.

The work in the hospital was divided into the Section of Brain Surgery and Peripheral Nerve Injuries, the Ophthalmological Section, the Oro-Plastic Section, and the Section of Oto-Laryngology.

Practically all of the cases of war wounds of the head were of such a nature that their treatment necessitated work in two or more of the various departments, so that nearly all of the cases were seen in consultation and treated by the various departments. In all of the departments of the hospital there was a most cordial spirit of co-operation and team work, which added materially to the efficiency and interest in the work.

Associated with me in the Oto-Laryngological Department were the following men: Capt. Gordon Berry, Capt. H. F. Lampe, First Lieut. F. N. Bigelow, First Lieut. E. P.

Longaker, First Lieut. H. J. Beard. Capt H. P. Cahill was also a member of the Oto-Laryngological staff until August 10th, when he was assigned to Unit 115, and went to France. These men are all capable and well trained, and our work together was a constant source of pleasure to all of us.

On April 1st, 1918, twenty-six cases were transferred to the Oto-Laryngological Department and from this time the number of patients in the department constantly increased. On July 1st, 1918, the first patients from over-seas were received. The number of over-seas patients increased rapidly, and the average number of patients in the Oto-Laryngological Department varied between one hundred and one hundred and fifty.

The injuries to the nose and accessory sinuses and the surrounding tissues varied greatly in extent and character. In a number of cases a portion of the bridge of the nose high up, about on a level with the eyes, had been destroyed by machine gun bullets, leaving a depression which often involved the frontal sinuses. In one case both eyes had been destroyed and the anterior lobes of the brain exposed. In a few cases one eye had been destroyed. In three cases both eyes escaped with normal, or nearly normal, vision remaining. In several cases machine gun bullets had passed diagonally through one eye and the nose and mouth and out through the opposite side of the neck. As is usual in such cases the lesion at the point of entrance of the bullet was comparatively small, but at the point of exit the tissues were badly torn, leaving a large irregular scar. In all of these cases plastic operations were done to remove the scar tissue and remedy the deformities.

Pieces of shrapnel and high explosive shell were found in all portions of the head and face and neck. Shell fragments were found in all of the accessory cavities, more frequently in the maxillary sinus than in any other single place. These fragments usually entered through the cheek and a fistula persisted in the cheek until the maxillary sinus was opened and curetted and free drainage established into the nose. All of these cases were operated through the canine fossa

and as soon as the maxillary sinus was cleaned up and drainage established the fistula through the cheek healed, leaving a depressed scar which was later removed by a plastic operation. There were a number of cases in which a bullet or fragments of shell passed through one maxillary sinus, then through both nasal fossae and the opposite maxillary sinus and out through the cheek. In several of these cases, the communication between the sinuses and the nasal fossae, made by the shell fragments or bullet, remained open and thus established free drainage into the nose. In all of these cases in which the nose and the sinuses were injured there were, of course, numerous adhesions which were separated in the usual way.

One patient, an officer, was struck in the right cheek by a piece of high explosive shell about one centimeter square. The shell fragment entered a little below the external canthus of the right eye, passed under the orbit, through the posterior ethmoidal cells and lodged in the septum between the sphenoidal cavities. Following the injury the sight in the right eye was somewhat impaired, but gradually returned to normal. There were no signs of any infection in the sphenoidal sinuses, and the visual fields remained normal. He was kept under observation for two months, but in as much as the foreign body in the sphenoid was causing no symptoms he decided against an operation for its removal. There were a number of cases in which the radiographs showed small shell fragments in the ethmoidal cells which were causing no symptoms, and so were left in position. We saw a number of cases in which the principal injury was confined to the tip of the nose. In some of these cases only one side of the nose was injured, while in others there was considerable destruction of the soft tissues at the end of the nose. There were also a few cases in which practically the whole nose had been destroyed.

The cases in which the soft structures had been only partially destroyed were remedied by flaps turned in from the cheeks to replace the lost tissue. In those cases in which the whole nose had been destroyed the typical Indian

flap operation was done, turning down a flap from the forehead. In some of these cases a portion of a rib, consisting of both cartilage and bone, was implanted in the tissue of the forehead about ten days before the flap operation was done. The transplanted bone and cartilage was placed in such a position that it would form the bridge of the nose when the flap was brought down into its new position.

Most of these major operations were done by Col. V. P. Blair who had charge of all of the Oro-Plastic work in this country. Col. Blair told us that all of the problems in plastic surgery could be solved by three simple principles. Removal of all the scar tissue; determination of the amount of healthy tissue necessary to cover the denuded area, and then by means of a well nourished flap carry the healthy tissue over the denuded area. We found, however, that the execution of these principles was not always a simple matter. In the majority of cases, however, the plastic operations were successful, and the unsightly scars and deformities were removed.

The wounds involving the jaw and the teeth often involved the floor of the nose also. The work done by the Dental Department for these jaw cases was of the highest type and the skill of the men in this department in restoring these injured jaws to their normal position and contour was admired by all of the staff. The defects in the lips and face and palate were remedied by plastic operations.

In a general way the plastic work was under the direction of the Oro-Plastic Section, but the plastic operations on the eyes were done with the co-operation of the Ophthalmological Section. Those involving the mouth and the jaws with the Dental Department, and those involving the nose and throat with the Oto-Laryngological Department, so that all of the Sections had the opportunity of doing, or assisting in, the plastic work.

The laryngeal cases were in some respects the most difficult type of cases which we had to treat. There were a few cases in which the bullets or shell fragments destroyed only the superficial tissue along the side of the larynx, causing

complete paralysis on the affected side. These cases healed promptly, if the cartilage was not involved, and with the exception of a somewhat husky voice returned to civil life with practically no handicap. In those cases in which the shell fragments, or bullets, passed through the neck, the laryngeal cartilages and intra-laryngeal structures were more or less extensively destroyed, and adhesions formed causing laryngeal strictures, which necessitated a tracheotomy in nearly every case. Laryngeal fistulae existed in nearly all of these cases, and these fistulae failed to heal until all of the metallic fragments and all the necrotic tissue were removed and very free drainage established and even then they healed very slowly. The laryngeal obstruction, caused by the deformity and adhesions, was difficult to relieve, but in most cases persistent dilatation accompanied by, what Dr. Chevalier Jackson calls, the orthopedic treatment, eventually enabled us to remove the tracheotomy tube. The voice in these cases was much impaired, but in no case was it entirely destroyed. Dr. Jackson visited the hospital twice and saw these cases with us and gave us many valuable suggestions as to their treatment. The orthopedic treatment of stenosis of the larynx consisted in partially closing the tracheotomy tube with a cork and in this way inducing laryngeal respiration. The size of the cork was gradually increased so as to eventually cut off respiration through the tube and the normal respiratory action of the laryngeal structures was thus encouraged and the lumen of the larynx increased.

In one case a machine gun bullet entered the left side of the neck about two centimeters below the left auricle, passed through the pharyngeal wall and the base of the tongue, and out through the right side of the neck about six centimeters below the right auricle. There was a distinct bruit on the left side of the neck over the carotid artery with pulsation externally and also along the lateral pharyngeal wall. The bullet had evidently injured and weakened the wall of the carotid and thus caused an aneurism.

Another laryngeal case, in which there was a fistula,

coughed up and expectorated a shell fragment about two weeks after he had received the injury. Evidently this piece had perforated the larynx and had then been inspired and later expelled by coughing. This happened before he came under our observation.

We saw a few cases in which shell fragments were encapsulated in the lung tissue, and were causing no symptoms, but we had no cases in which there were any shell fragments lodged in the bronchi, which could be removed with the bronchoscope.

Col. C. W. Richardson secured for the Section of Defects of Hearing and Speech eleven of the most capable teachers that could be found in this country. In the cases of injury to the jaw, pharynx and larynx the instruction and vocal exercises which these teachers gave to the patients were exceedingly beneficial in re-establishing the vocal functions and stimulating the injured muscles. The skill in lip reading which the deaf patients acquired under the instruction of these teachers was remarkable, and the whole work of the Section of Defects of Hearing and Speech was most gratifying and pleasing to all of us.



No. 1

Plastic operation. A flap from the forehead was turned down so as to restore the contour of the bridge of the nose and also the inner portion of the right eye lid bringing it down into normal position. When this had healed a glass eye prosthesis was inserted.



No. 2

Bridge of nose and right eye and the inner portion of the right upper lid destroyed by a fragment of high explosive shell. This soldier said that his injury was received when the first break was made in the Hindenburg line. The right eye was entirely destroyed and the left eye was closed by the swelling of the lids and surrounding tissue so that he was totally blind for several days. The vision in the left eye, however, was not impaired except temporarily. He laid in a shell hole for three days before he was discovered and taken back to the first aid station.



No. 3

A fragment of a high explosive shell struck this soldier in the cheek just below the outer canthus of the right eye, passed thru the cheek and lodged in the right maxillary sinus. A fistula thru this wound into the maxillary sinus persisted until the foreign body was removed thru the canine fossa and nasal drainage established. The lower wound in the cheek was caused by a bullet which lodged in the tissue just below the external angle of the jaw. This bullet was removed at the first aid station. The scars from both injuries were removed by a plastic operation.



No. 4

Hit by two machine gun bullets and three fragments of a shell. One bullet passed thru the left frontal sinus, thru the superior portion of the nose and out thru the right mastoid. The second bullet lodged in the left orbit. The tip of the right orbit was partially severed by a shell fragment. The vision in the left eye was not injured. In the right eye the vision was totally destroyed. The right drum membrane and middle ear escaped injury but the right internal ear was destroyed. The scar and deformity over the left eye and also around the right eye were corrected by plastic operations. This soldier said that he could not see the scar behind his right ear and so would not have any plastic operation done to remove it.



No. 5

Right side of tip of nose destroyed by a shell fragment. A stent was inserted in the cheek to provide a skin lined flap which was used to replace the lost tissue at the tip of the nose. This flap did not take well and eventually become necrotic and was lost. Later a flap was turned down from the forehead and in this way restored the tissue at the tip of the nose.



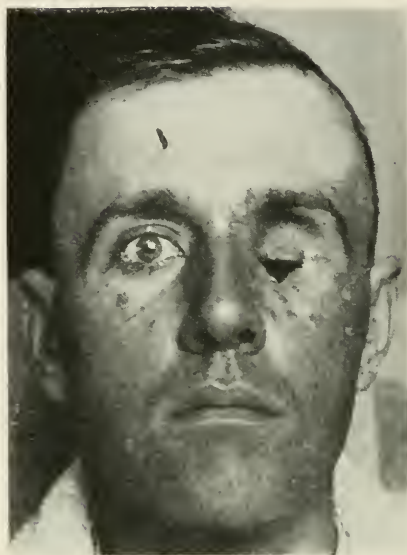
No. 6

Injury of the larynx due to high explosive shell. Some fragments of the shell passed directly thru the larynx, from left to right, and lodged in the soft tissue of the right side of the larynx externally. The X-ray showed two small metallic fragments, posterior to the larynx in the spinal cord and third cervical vertebra. The injury to the larynx was followed by an infection of the superficial tissue and a necrosis of the thyroid cartilage. A small fistula on the left side at the point of entrance of the shell fragment lead directly into the larynx. Both vocal cords and the intra-laryngeal structures were badly torn. The foreign bodies in the superficial tissue and the necrotic cartilage were removed and the fistula healed slowly. The laryngeal stenosis was overcome by dilatation and the voice was partially restored.



No. 7

A machine gun bullet passed thru the right eye, right ethmoidal and maxillary sinus, hard palate and mouth and out thru the left side of the neck about five centimeters below the level of the auditory canal. The bullet must have gone just behind the posterior portion of the tongue for the tongue was not injured. Some fragments of the bullet lodged in the mucous membrane of the maxillary sinus and caused suppuration. This sinus was opened thru the canine fossa, foreign bodies removed and free nasal drainage established. The perforation thru the palate healed spontaneously. The Ophthalmological Section did a plastic operation to restore both eye lids and then inserted a glass eye prosthesis.



No. 8

Fragment of a high explosive shell passed thru the brim of his helmet. One fragment went thru the left eye and lodged in the left maxillary sinus. Three small pieces lodged in the left ethmoidal region, one fair size piece passed thru left orbit and both nasal fossæ and lodged in the right maxillary sinus. The injury was followed by an infection in both maxillary sinuses and the foreign bodies in these sinuses were removed thru the canine fossa and intra-nasal drainage established. The fragments in the ethmoidal region apparently had caused no infection there and were not removed. After the foreign bodies had been removed from the maxillary sinus, the suppuration ceased and a plastic operation was then done to restore the left lower eye lid.

DISCUSSION

The President: Major Lemaitre, will you open the discussion of this paper.

Major Lemaitre: I was very much interested in the paper of Dr. Ingersoll and I shall say only a few words about rhinoplasty. I have made a study of these cases which has not yet been published, and my first ideas I have the honor to present to your Society.

First of all, I think that in every case of rhinoplasty we must be aided by prosthetic supports. These furnish support for the new bridge of the nose, the bridge which is recently formed, and keep it in place. Suppose this part of the nose (indicates on blackboard) is destroyed. We put a flap here and this flap has a tendency to push inside and it is easy to have an apparatus inside which keeps the bridge of the nose quite straight.

There is another apparatus which is not placed inside like this one, but outside. It is formed by two plates which maintain the contour of the nose and which results most satisfactorily from the plastic point of view.

I think rhinoplasty is a typical example of what may be done to demonstrate how important it is to have teamwork, co-operation, between surgery and prosthesis.

Now I shall say a word from the surgical viewpoint. First of all, I think that it is very important to have, where we perform an important rhinoplasty, a double flap, to have also a flap inside which will form a lining of the nose. Personally I have some cases in which I have modified the classical treatment of rhinoplasty. Suppose part of the nose is destroyed. Instead of taking from the forehead the classical flap which is done in the Indian method, I use generally a flap which is taken from the forehead, of course, but which is turned not in the middle of the face but outside. It is like the flap which the ophthalmologists use to do a lateral plastic operation.

I had a case in which I had to do a lateral plastic on both the under eyelid and the nose and instead of a small flap, I took a much bigger flap which I turned in the same way and I obtained at the same time the restoration of the lid and the restoration of the nose. The result was better than I had hoped and it was quite a departure from the general method of procedure.

But now, in order to have a frame work for the nose, I introduce through a button hole either a piece of cartilage or an osteoperiosteal flap taken from the tibia. I prefer an

osteo-periosteal flap. It is very easy to do this operation under local anaesthesia, and I learned that we have no subsequent absorption of the bone, and it is more easily incorporated with the flap. In fact, one, two or three months after I have implanted the osteo-periosteal flap I find a frame work which is really incorporated in the flap.

Then the question is how to obtain the lining for the deeper flap of the nose. Sometimes when there is no defective tissue here, I begin by taking a flap hinged like that (illustrates on blackboard) the hinge being here and I turn the flap in this way so that I have a skin lining on the inside, and my big flap covers not only the loss of tissue but also the part of the face from which I took my first flap.

At first I made this operation under general anaesthesia, but now I find I am quite able to do it under local anaesthesia.

I have made a further study of this, and sometimes when I find there is a large defect under the eye and nose, I obtain the lining in another way by taking a deep flap from the opposite side in the same way that I took the flap which I have just shown you. Then you have an identical flap from each side and then instead of leaving on the forehead a single pedicle, I have a flap with a double pedicle that furnishes better nourishment for the tissues because it is a double pedicle taken from a point where the temporal artery sends some branches, which gives a very good circulation.

Then, leaving the flap with a nose pedicle, I draw it down and that enables me to cover the defective tissue in the cheek, in the nose and the rest of the face in making the first flap. I have tried to evolve the same thing for total cases of rhinoplasty. I have treated about fifty or sixty cases of rhinoplasty and I hope that I shall be able to present some of those cases at the meeting next year of your excellent Society. It will give me much pleasure to do so.

The President: The paper is now open for discussion by the fellows of the Association. Dr. Mosher?

Dr. Mosher: I have nothing to say, sir, except to express my appreciation of the work at Cape May. Cape May was our flower in Oto-Laryngology.

The President: May I ask Major Lemaitre, whether in bringing down that flap he simply takes one piece of bone for his nasal bridge inserting it in the middle line or does he attempt to take two pieces so as to have a sort of a roof there? That part I may have missed.

Major Lemaitre: Sometimes I include only one piece of

bone, when it is a small defect, but sometimes I have two horizontal flaps which furnish in certain cases more extensive frame work and supports the tip of the nose. By this method I obtain a primary reunion instead of leaving a wound which we have in the case of the Indian method which takes longer to cure.

Dr. Skillern: I want to speak a word about the different degrees of injury that some of these, particularly machine gun bullets will cause. During the Argonne offensive I happened to see a number of cases of fresh machine gun wounds of the face and neck and I was struck particularly in some of the cases with the slight amount of traumatism that they caused.

I recollect particularly one young boy who three days after he was shot was brought to our center. He was shot through the neck, directly in front of the great vessels, the wound of exit being in the mid-line posteriorly. How in the world that missed those vessels I cannot see and yet at the end of a few days time the wound had perfectly healed. There was only a dimple in front here and I spoke to him and said, "Son, how do you feel?" He raised himself up off his pillow, and began to shake his neck and said, "I feel fine, just a little stiffness, that is all." It was most remarkable.

I remember another case of a machine gun bullet that transversed the neck from the side. It seemed to have gone through the esophagus, posteriorly to the trichoid cartilage, that boy has no disturbance whatever in speech, and he says only a little difficulty in taking nutrition.

There was another case that was extensively talked about that I didn't see, where a machine gun bullet had entered the temple and gone through the brain. After two or three weeks of very stormy symptoms, he seemed to recover, but recovered with a nasal discharge, and on examining the nose they found some trouble up in the sphenoid region and on probing around found something hard there, and finally with a pair of forceps extracted the machine gun bullet from the left sphenoid sinus. A most remarkable case, the patient recovering entirely.

Dr. Coates: Colonel Skillern's talk brought to my mind the same thing, the same experience that he had, and that is, that it is wonderful how often these machine gun bullets, particularly high explosive fragments went through, apparently through or near vital structures without causing death or permanent injury.

We saw quite a good many cases in my center that came to us anywhere from twenty-four to seventy-two hours after the injury. I only recall a few, but we had a number of injuries to the cheek, where the machine gun bullet went through the maxillary sinus, and the ethmoids probably on both sides, the septum, of course, was injured, and the cheek.

In the two cases I remember, the machine gun bullet entered the mastoid and came out through the opposite orbit, completely exenterating the eye. These healed up without any symptoms other than facial paralysis. I suppose there is an explanation in this and that is, that we did not see the cases where the machine gun bullets hit the vital organs, and we saw only those that were missed, but it is remarkable that in so many cases that we did see, these injuries were not fatal.

Dr. Ingersoll: One of the photographs being passed around, is a picture of a man shot through the bridge of the nose. In that case we took a little of the outer prominence of the frontal sinus to replace the bridge which had been destroyed by the machine gun bullet.

Another one of those pictures shows a rather bad injury of the side of the face where a machine gun bullet had destroyed the whole orbit, uncovering the maxillary sinus and the ethmoidal cells and part of the nose. In that case, we used the flap which you spoke of, Major Lemaitre, bringing a flap down from the forehead to cover the orbit and make the inferior lid and cover the defect on the side of the nose. We did that quite frequently in the unilateral injuries. In none of the cases where the nose was completely destroyed did we use the two flaps. Your description of the double flap interested me very much. I don't see why it wouldn't be a very logical procedure. We tried various methods to provide a lining for the flap which covered the nose, that is, a lining on the inside of the nose. One of the things we did was to use what is called a stent, taking some sort of material and covering it completely with a skin graft, folding the graft right over it. Then we made an incision in the cheek, and inserted the stent. Later we took the flap with the skin graft attached to it and brought it over to cover the defect. The skin graft formed the lining of the flap.

Later, we changed our method of making a lining for the flap which covered the defect in the nose. The pedical flap from the forehead or the cheek was turned to cover the de-

fect and this flap was supported by aluminium splints which were covered with Tiersch grafts. These grafts of course formed the lining for the nasal flap. The splints were supported by attachments to the teeth, which the dental corps made for us. In this way the Tiersch grafts were held in position in the interior of the nose and the external nasal flap was also supported. These grafts almost invariably took and gave good results.

In the cases which had been injured by a machine gun bullet, passing through from one side of the head to the other, or entirely through the neck we often wondered, as you did, Dr. Coates, how they escaped with their lives. It seemed hardly possible that the bullets could pass through these structures and not injure the large arteries. We came to the same conclusion that Dr. Coates did, namely, that we only saw those cases in which the important blood vessels escaped injury and that the cases in which the blood vessels were injured did not survive.

In regard to the cases of injury of the mastoid which Dr. Coates mentioned, we had many similar cases and I mentioned some of them in my paper, presented to the American Otological Association. We had quite a number of cases of crossed wounds, in which the bullet entered the mastoid and came out on the other side of the head, or entered one side of the head and came out through the mastoid. Most of these cases had a facial paralysis and one of the very interesting things about them was that in the majority of these cases, the facial paralysis recovered after we operated on the mastoid and removed the foreign body and spiculae of bone over the facial canal, showing that the facial nerve had been injured but not severed. All of these cases of facial paralysis were treated with electricity and massage and we were convinced that this after treatment, when the irritation along the nerve had been removed, aided materially in their recovery.

THE OTOLARYNGOLOGICAL FEATURES OF THE
INFLUENZA EPIDEMIC AT CAMP HANCOCK,
AUGUSTA, GEORGIA, SEPTEMBER-
DECEMBER, 1918

GEORGE FETTEROLF, A.B., M.D., SC.D.

Major M.C., U. S. Army
Philadelphia, Pa.

AND

WILLIAM J. RIDEOUT, M.D.

Captain, M.C., U. S. Army
Freeport, Ill.

At an Officers' Meeting held immediately after dinner on Sunday, September 29th, 1918, it was announced by the Commanding Officer of the Hospital that telegrams had been received stating that in the course of the day two troop trains would arrive at Camp Hancock. On one of these trains were 50 sick soldiers and on the other 90. It was further announced that beds had been made available for these men and that the Hospital was in every way prepared to receive them.

Early in the evening the sick boys began to arrive and it was seen almost at once that the number would be far in excess of that indicated by the telegrams. From late afternoon till well into daylight next morning they came pouring in, brought from the railway station by ambulance and truck. When a count was made it was found that instead of 140 sick soldiers, the morbidity on the trains had increased with such speed and to such an extent that 770 men were brought to the Hospital directly from those trains.

While a few sporadic cases had developed in Camp Hancock, the real epidemic began, and in very stormy fashion,

with this influx from the troop trains from Camp Grant. And a very sick lot of boys they were.

Almost at once were the specialized services of the members of the Otolaryngological Department called for, the first complication requiring attention consisting of many cases of violent and persistent epistaxis. As the days passed other phases of the disease developed and had to be taken care of.

The main concern of the Department was the ear, especially in its suppurative and mastoid aspects. The writer was determined from the first to leave unattended to no detail which would promote the healing of acutely affected ears and prevent mastoid complications. In this he was ably and untiringly supported by the members of his Staff, by the Chief of the Medical Service and by the Ward Surgeons, by the former in ordering and carrying out the treatment decided upon, and by the others in co-operating in every way in carrying out the plans laid down.

In order that all such complications should receive prompt attention a request early was voiced at an Officers' Meeting that all cases of ear pain be reported at once to the Department of Otolaryngology. This was to be in force both during the day and at night. This request soon was found to be insufficiently broad, because in the first days of the epidemic it was noted that some middle ear cavities were found to be filled with pus, with the patient complaining, not of pain, but only a deafness and a sense of fulness in the ear. As a result of this observation it was requested that any patient complaining of any ear symptom whatsoever, even if only a sense of fulness, be immediately reported to the Otolaryngological Department. In order that no calls should go unanswered an orderly constantly was on duty in the Head Section Building, one orderly sleeping in the building near the telephone. It was hoped in this manner to secure prompt 24-hour service, and such in fact proved to be the outcome.

By this plan, nearly if not quite every patient who presented ear symptoms was seen by a specialist within half an

hour of the time notification of his condition was received by the Department. In a very few days the patient population of the Hospital jumped from 1500 to 4000.

In order to carry out the details of visiting the cases, the Hospital was divided into three equal parts, and to each part was assigned one junior member of the staff. These men started in at 8 o'clock in the morning and made rounds of the portions of the hospital assigned to them. At each ward or tent group the surgeon would see the cases which he knew required attention and would inquire as to whether or not there were any others. At 10:30 A. M. each man would telephone the clinic to find out if any emergency calls had been sent in from the portion of the Hospital under his care. The night calls were answered by the officer on emergency duty, and when there was more work than he could handle, a second, and sometimes a third member of the Department was called upon.

The Chief of the department remained throughout the day in the Head Section Building, treating the ambulating cases, receiving calls and distributing them, and seeing with the ward visiting surgeons those cases on which the latter desired the opinion of the Chief.

The main difficulty met with in examining and treating the patients was in securing adequate illumination. When it is realized that at least two-thirds of the sick boys were on porches or in tents the force of this statement will be more fully realized. Whenever possible, sunlight and diffuse daylight were used. Frequently the patient would be in such a position in ward, porch or tent that the rays of the sun could be focussed by the head mirror on the region being examined. This made an ideal light and was taken full advantage of. Diffuse daylight could be used in examining throats but of course was of no value in examining the nasal cavities and ears.

The usual source of illumination was oil, later electric lanterns, with which each ward and tent group was provided. This was very satisfactory in the wards, but on porches and in tents the presence of so much diffuse sun-

light rendered impossible clear illumination of the nasal chambers and of the external auditory canal and ear drum. This difficulty was overcome by having orderlies hold a blanket around the surgeon and patient, thus making a screen and forming a dark room, and cutting off sufficient daylight to allow the reflected light from the lantern wick to illuminate with all necessary clearness the parts being examined.

A second handicap was the impossibility, on account of relative shortage of nurses and orderlies, of carrying out in detail the routine ear treatment which was in force in the Hospital.

Otolaryngologists agree that in all cases of acute tubotympanic disease treatment of the nose and naso-pharynx is advisable, not to say imperative. Under the conditions in which the epidemic was handled, it was utterly impossible to administer such treatment. The nursing and orderly staffs were driven to the utmost in order to carry out the fundamental necessities of general treatment, and neither personnel nor appliances were available for nasal treatment. Almost to a man the cases of ear involvement went through the attack with no treatment except to the ear, and so successful was the outcome that one is tempted to question the vital necessity for nasal and naso-pharyngeal treatment as a routine measure in acute middle ear disease.

As stated above, the main concern of the Department was to minimize to the utmost the effects of involvement of the ear. For each case of acute otitis media, whether open or closed, it was endeavored to have administered the simple treatment described below. On account of the wide scattering throughout the entire hospital of these cases, the amount of time required to administer the treatment, the shortage of skilled nursing and the lack of paraphernalia, it was not possible in all cases to have it carried out. When it is realized that the number of patients in the hospital, as stated above, jumped in a few days from 1500 to 4000, the obviousness of these difficulties will be appreciated. In addition, three of the seven members of the Otolaryngological Staff

were victims of the influenza, none fatally however, but nevertheless throwing a very heavy burden on the rest. This routine treatment was as follows:

1. Absolute rest in bed.
2. Irrigation of the ear every 4 hours with 200 cc. of hot normal salt solution. The more severe cases received irrigations every 3, and even every 2 hours.
3. Filling of the ear with a hot solution of phenol (10%) and glycerin (90%).
4. Filling the ear loosely with absorbent cotton.
5. Covering the ear with a large wad of absorbent cotton, which was bandaged in place.
6. Keeping a hot water bottle constantly against the bandaged ear.

As the ear improved, first the heat, then the bandaging and finally the irrigations were dispensed with.

As a result of the system of prompt notification of the Department of all cases presenting ear symptoms, practically every case was seen in its earliest stages. If the ear drum was found to be normal in contour, the treatment just described was ordered. If the slightest amount of bulging was present the rule followed was to incise freely and at once. Each ward visiting surgeon carried with him the appliances for performing this little operation. There is no doubt that there may have been opened some middle ears which would have gone on to resolution without complications or sequelae, but it is certain that there were no ear drums needing an incision that did not have one.

When an anesthetic was used, it was the usual mixture of equal parts of cocaine, phenol and menthol. Sometimes it was effective and sometimes it was not. When the patient was very nervous and time would allow of it, an attempt was made to benumb the ear drum with this solution. Otherwise the drum was opened without an anesthetic.

The results of our plan of procedure can best be shown by reference to the figures for October, November and December. The real epidemic began, as stated above, with an influx of patients on Sunday, September 29th, 770 cases being

admitted to the hospital on that day and during the night following.

During October many hundreds of ear cases were seen in bed and in clinic. On account of the hectic conditions under which everyone was working it is impossible to give the exact number. During November the number was smaller and during December it was smaller still.

In the three months there were 322 cases requiring myringotomy. In a few instances a second incision had to be made, and on still fewer a third. Of these cases 202 required incision of the ear drum in October, 89 in November and 31 in December. Many of these developed tender mastoids. When the latter condition appeared a special endeavor was made to have the patient transferred to a ward where the routine treatment described above could be administered. The result was a most happy one, as not a single one of the October cases required a mastoid operation, the report for that month reading:

Myringotomies	202
Mastoidectomies	0

There were no cases of sinus thrombosis and none of otitic meningitis; in addition none of the acute suppurative middle ear cases became chronic, every one ending in a dry ear and a healed perforation.

By the following month (November) the epidemic was on the wane, and the work of the Department had lightened materially.

The November report read as follows:

Myringotomies	89
Mastoidectomies	4

Only two of these operations followed influenza, and both of them occurred in one soldier. This boy was a very septic specimen, with a negative Wassermann reaction. First (October 24th, 1918) he developed a large external perichondritic abscess of the thyroid cartilage, which was opened and drained. This was followed later (November 13th, 1918) by a mastoid abscess of the left side, and still later (November 16th, 1918) by the same condition on the

right. Both of the other November mastoids were cases in which the middle ear became involved in the course of an acute coryza.

In December there were five mastoid operations performed and two of these were post influenzal. Of the others two followed measles and one a coryza. The December report read as follows:

Myringotomies	31
Mastoidectomies	5

In this month the influenza incidence was very low, until about the middle of the month when there was a slight recrudescence of the disease. The great majority of the ear cases in December developed in connection with either a coryza, measles or scarlet fever.

These figures, in the minds of the writers of this report, constitute rather a notable showing. The total admissions of influenza cases to the Base Hospital for the month of September-October* were 6553. In November there were

HOSPITAL ADMISSIONS

Months	Influenza	Measles	Scarlet	Myringotomies	Mastoid Operations
*September-October	6553	145	6	206	0
November	1162	215	401	89	4
December	66	65	11	31	5
Total	7781	426	418	322	9

MASTOID OPERATIONS

Months	Post-Influenzal	Post-Measles	Post-Scarlet	Post-Coryza	Total
*Septebmer-October	0	0	0	0	0
November	2	0	0	2	4
December	2	2	0	1	5
Total	4	2	0	3	9

1162 and in December 66, making a total of 7781. In addition to this, during those three months there were 426 admissions for measles and 418 for scarlet fever. Added to these there were a large number of cases admitted on ac-

* Includes September 29th and 30th.

count of ear or throat or nose conditions alone. From this large number resulted only 8 cases requiring mastoid operation, one of these being bilateral, thus making 9 operations in all. It might be added that all of them healed in the usual 4 to 6 weeks, with no complications or threatened sequelae. One of them developed decided weakness of the facial muscles of the affected side, but shortly after the mastoid was cleared out the symmetry of the face returned to normal.

It is quite probable that during the fall and early winter of 1918 the organisms which attacked the upper air passages had a very slight selective affinity for the mastoid. The notable escape of the tympanic adnexa from serious trouble indeed tends to support this view. But as the season advanced and the acute exanthemata began to come in in increasing numbers, and still the mastoid incidence remained negligibly low, it seemed justifiable to assume that the prompt and careful treatment accorded all ear cases was a favorably contributing factor.

It is quite probable that this low percentage of mastoidectomies could hardly prevail in civil practice, because such immediate and painstaking treatment would not and could not be obtained. One element in this would be the well known fact that ear affections frequently are considered to be trivial matters by a certain element both of the medical and lay population. Furthermore it should be realized that the soldier patient is under orders, and is obliged to submit at once to whatever treatment is deemed best for him, with no opportunity afforded him of refusing or postponing the measures decided upon by his officer surgeon.

In the external ear there developed a few (17) cases of furunculosis and a large number of serous or sero-sanguineous blebs, the latter being the condition called by Politzer otitis externa hemorrhagica.

This latter condition was found almost exclusively in the influenza cases and always was confined to the osseous portion of the external meatus. Sometimes the blebs would be of a purplish hue and at others clear and watery, resembling

on the one hand a "blood" blister or, on the other hand, an ordinary blister. At first they were routinely incised, but later they were left alone unless they interfered with inspection of or drainage from the middle ear. Quite frequently they were found to be as sensitive as is the ear drum.

In view of the distinct clinical varieties of blebs found it might be more accurate to modify and enlarge the terminology of the condition as follows:

Otitis externa bullosa:

(a) Serosa.

(b) Memorrhagica.

EPISTAXIS. But one obtruding condition was found in the nose, and that was profuse and persistent epistaxis. In every case but one the bleeding point was located at the anterior part of the septum, the so-called locus Kieselbachii. In the one exception a spurting artery was observed on the lateral wall of the nose at the anterior end of the inferior turbinated body. The incidence of epistaxis was the greatest in the first influx of cases. These boys were brought in directly from the troop trains after 2 days or more of travel with limited bathing facilities, and it is believed that the irritation and excoriation of the nasal mucosa produced by the train dirt was an important causative factor. Epistaxis became much less frequent in the later days of the epidemic, when the cases were developing in those soldiers which had been in camp for several days.

SINUSITIS. The incidence of sinusitis was exceedingly low. Exact figures are not at hand nor are they obtainable. When a case of this sort developed, a routine spray of adrenalin chloride 1:7000 was given every hour, and when the pain was severe the middle meatus was packed for half an hour or more with cotton pledgets saturated in the same solution. All of these cases returned to normal and none required operation for their relief.

TONSILS. There were very few cases of tonsillitis and still fewer of peritonsillar abscess. During the months of

October, November and December there was but 13 cases requiring the evacuation of pus.

LARYNX. Laryngitis was present in quite a few cases and the manifestations in the larynx were of three different types: (1) Diffuse catarrhal laryngitis, with the usual appearance found in this condition, (2) Ulcerative laryngitis, with small, narrow, superficial ulcers running lengthwise of one or both cords and (3) what might be called "Asthenic laryngitis."

A section of ulcerated cord from a case of type (2) was submitted to the Pathologist who reported on the specimen as follows: "Section shows mucosa with an irregular loss of substance, with submucosa exposed, which with muscle tissues still deeper is infiltrated with polynuclear leucocytes. Diagnosis: Acute inflammation of vocal cords with ulceration."

The last form (3) deserves a more detailed description. It was found almost entirely in a group of cases which came from among the soldiers who had been in Camp Hancock for some time. It was characterized by a normal or slightly reddened mucosa, absence of ulcerative lesions and mainly by a marked weakness of the laryngeal musculature. An attempt at phonation would result in a feeble effort to approximate the vocal cords and an immediate discouraged return of the cords to the respiratory position. A similar condition of the palatal and pharyngeal and probably of the esophageal musculature usually was found to be associated with it. The muscular efficiency of the entire throat was very low and it was tested out in one patient by having him endeavor to swallow a large mouthful of water. The effort at deglutition immediately was followed by a gush of water from his nose and by cyanosis. It was evident that the muscles neither of his soft palate nor of his larynx had the strength to close off the entrances to the cavities which they guard. In a short while he was able by a few weak coughs to clear his larynx and trachea, but for the moment it looked as if he was in imminent danger of suffocation from the water which he was unable to prevent entering his

trachea and then was almost unable to expel from it.

The actual cause of this condition could not be determined. Possibly it was a toxic myositis, possible just a part of the general asthenia, possibly it was due to a toxemic poisoning of the centres in the medulla, really constituting an acute form of bulbar paralysis.

The members of the Otolaryngological Staff of the Base Hospital felt that they were in great good fortune to have been at Camp Hancock during the epidemic. Rarely does a physician or even a collaborating group of physicians have an opportunity of studying synchronously such a large series of cases, occurring in people of approximately identical age and living under uniform clothing, housing and dietary conditions. Usually observations on a large number of cases must extend over a long term of years, and under such conditions early impressions and conclusions are likely to grow hazy and later ones assume undue prominence and force. While necessarily conditions in this epidemic were such that accurate record of all phases of the influenza was impossible, still it is felt that so careful an estimate has been made where accurate records were not obtainable that conclusions drawn can fairly be considered as being based actually on numerical fact.

DISCUSSION

The President: This very valuable report on the influenza epidemic is before you for discussion.

Dr. Pierce: I congratulate the writer on his excellent results in the treatment of acute inflammations of the ear. His methods are founded on principles that have grown out of known pathology in these cases and represent the most modern ideas in the treatment of these diseases. There is no more definitely defined rule than that the occurrence of mastoid trouble necessitating operation is indirectly related to the period of time elapsing between the occurrence of an acute otitis media and the opening of the tympanic membrane. The tympanic membrane cannot be opened too early, it is infinitely safer to err on the side of opening the tympanic membrane in an acute case than allowing too much time to elapse. In fact, it is better to open the tympanic

membrane in an acute infectious disease, even when there is no sign of bulging or very little sign of hyperemia.

There is a curious difference in the reports of cases from the various camps as to the frequency of mastoid operation. In some camps, especially in the Southern states, it was quite the rule to have one or two entire wards full of operative mastoid cases. I cannot help believing that even in the presence of these very virulent infections which undoubtedly they suffered from, there were a great many mastoids opened unnecessarily.

In my own experience in this country and abroad, I have performed between thirty and forty mastoidectomies and in some of these the operation was performed in chronic suppurative processes. Of these cases, only one died from complications, that is, of all the cases of acute mastoid trouble that I saw in my experience in this country and abroad, but one death resulted from complications, and that was a case where on the fourth day after the admission to the hospital, thrombosis extended into the right arm, and I believed that nothing in the world except an operation might be able to save such a case.

Dr. Holmes: It has been interesting to read the reports from various camps as Dr. Pierce has just stated, and the variety that you encounter. The hemorrhage that the speaker mentioned, I presume was prevalent in all camps. It became so excessive at Camp Sherman that I detailed two men day and night for a while with especially equipped cases to respond because some of the hemorrhages seemed to be quite severe. Of course there was no seriousness about it, it was easily controlled because in practically all cases it came from Kieselbach's triangle.

We had at Camp Sherman, during the period that I was there, up to April 1st, 1918, from the beginning about eighty mastoid operations. Quite a number of those were in chronic mastoiditis, a condition which had been overlooked by the examining board. When we first found it necessary to operate, I suppose every camp had the same experience, there was opposition on the part of the soldier to an operation, but it wasn't long till they became familiar with the treatment they had, the good nursing they had, because we were favored with a good lot of nurses, and the attention they got, so that quite a number of them who were examined and recommended for discharge from the army, made no objection to remaining. They came and begged to

be operated upon for their chronic mastoid trouble before they were sent out.

Then, of course, we, like other camps, had an epidemic of measles, of scarlet fever, some diphtheria and of mumps. I detailed men especially to examine the ears of every case of scarlet fever, of measles, of mumps, and classified them so as to see the percentage of involvement in these different types of diseases. Strange to say, mumps gave us practically no trouble. I think there were several who had the mumps, but I cannot remember off-hand how many there were.

Measles and scarlet fever, as usual, gave us a large percentage and there were quite a number of mastoids that developed from these two diseases. The acute virulence of the influenza cases and the rapidity with which the milder cases became involved, changed from a very rapid course in the beginning of the onset to a much milder and in fact no mastoid involvements, as a rule, toward the latter part.

Before entering the army, for years I have been an advocate of very early operative interference; I mean the paracentesis and the proper aseptic precautions, but we must realize that the middle ear becomes involved through the nose and the pharynx and therefore you should begin there if possible. Of course, it wasn't possible to do it thoroughly, especially outside of the base hospital, but in the cases we got in the hospital we tried to attend to the nose and pharynx thoroughly from the very beginning, or as thoroughly as possible, and I am quite sure that a good many cases were arrested in their progress by this thorough attention to the real focus of infection. It didn't make so much difference what we used, as long as we did it thoroughly. We used almost every kind of treatment you can think of.

Then, the next thing to settle is, how early shall you interfere with the mastoid? Having a most excellent pathological laboratory at Camp Sherman, Major McCord with his splendid staff, we had no difficulty in getting prompt reports upon all our cases and the bacteriological investigations were carried on right along and reported promptly. Naturally we were governed by the white blood count as well as by other symptoms.

I opened one case where the onset was unusually violent, in order to demonstrate to the men under me there that you can see the changes in a very short time, between twenty-four and forty-eight hours, and opened the cell, the cortex, to see what changes had already taken place then. There is

certainly no danger in that, it is a simple operation, and it was a revelation to some of the men who thought you had to wait until the great symptoms had developed. There isn't any rule, three days, ten days, a week. I think you must use your judgment; you can't say that you shall wait so many days; it is an impossibility. You must go according to symptoms.

The one thing that we impressed upon the men who were there was that the symptoms of tenderness over the mastoid is a variable one and that the periostitis soon subsides on the fourth, fifth, sixth day and the young man would say, "Why, he hasn't any tenderness any more. Doctor, do you think we ought to operate on him now? He's getting better." I replied, "We will have you open his mastoid tomorrow morning and you will find it is full of pus." We found that very often in those cases of rapid onset.

The manner of treatment is probably the same, very much throughout the various camps, with slight variations. Here among ourselves, I think we can now freely express the opinion of why we have a great many serious cases that otherwise would never have developed. The young men that came in and received their triple typhoid and were ordered out and drilled on long hikes, with heavy packs when they had fever, when they were feeling far below par, and then exposed to inclement weather. I believe these things were responsible for a large number of our acute tonsillitis, sinusitis and mastoid troubles. It became so marked that it was necessary for the Medical Department to inform the Commanding General that we were having results directly from that and more time must be given to those men to recuperate from the results of their injections, and so it was changed to two days, and there were many cases that I know of that should have had an absolute rest of three days before they were fit to go on to full duty, and there isn't the slightest doubt that we lost many men because the regular army man did not see the necessity of taking care of these men for a sufficient length of time after they received their injections, and towards the last that was overcome, but in the beginning a great many fell the victims of this lack of foresight on the part of the military men.

Dr. Green: I would just like to add one observation that we had at Camp Sevier. Our experience was very much the same as Major Fetterolf's with one exception and that is with reference to sinus trouble. We had, it is true, very few cases of sinus disease. We had, unfortunately, very

few autopsies in the cases which finally died but we did have fifteen cases which came to autopsy in which the head was opened and the surprising thing was that of these fifteen cases, eight showed definite disease of the sinuses. In each of the eight the sphenoid was involved and in many, other sinuses also. It seems evident, therefore, that a great many cases of sinus disease must have escaped our attention because they didn't give clinical symptoms at the time.

Dr. Coates: We had an epidemic at a hospital center in France where I was stationed, and we observed many of the details Major Fetterolf has spoken about. In the cases that came to autopsy, in every case, we had a thorough examination made of all the sinuses and I think in something like ninety percent we found pus in the middle ears or one or more of the sinuses, the sphenoid more frequently than any of the others. These cases before death had given no symptoms whatever of either middle ear trouble or sinus trouble. At that time I was doing septic work and we had no throat men connected with the hospital, but I did see a great many cases which gave no symptoms. We noticed no symptoms whatever, but we did notice these asthenic laryngeal cases characterized chiefly by aphonia, and they bothered us a great deal, particularly because at that time we were having an epidemic of laryngeal diphtheria, and had a great many gas cases, and it was a hard question of diagnosing to determine what these aphonia cases were due to. Our laryngeal diphtheria cases came on very suddenly, and in one or two instances died without anybody having been called in to make a laryngeal examination.

It was very difficult to make a satisfactory laryngeal examination, because our hospital was so crowded. We had such very poor facilities for making them, but in a good many cases we were able to establish the identity of our cases, and in a great many cases tracheotomy saved the cases.

I want to congratulate Major Fetterolf on the organization he had at Camp Hancock. We attempted to develop an organization similar to the one he has just described. We were very much handicapped there because there were only two of us who could do the work; measles cases came in by hundreds, we had practically no instruments to work with, one set of laryngeal mirrors, one nasal specula, and one metal tongue depressor, no head lights, no illumination of any kind. We were forced to use whatever we could, the daylight, or depend on candles or lanterns when we could get

them, or electric flashlights. It was very difficult. Afterwards, when we got our system going better, got more help, we were able to see all these milder complications early, and yet, in spite of that, in spite of our utmost care we had many mastoids. These mastoids were all late cases, deliberately so, because of the very poor physique of the men we had to work on. If they were measles cases, they all had bronchitis, many pneumonia, almost all hookworm cases, wretched specimens to do any work on, and we attempted to carry them along as far as possible before bringing them to the operating table.

I think we had some pretty bad mastoids in the lot, but the only one that I remember, the only one we lost was a man who came in with brain abscess, and died in a few hours. That can hardly be blamed on us.

Dr. Berens: I wish to congratulate Dr. Fetterolf on his results. In General Hospital No. 1, during the epidemic of influenza in September and October, there were approximately 1200 cases of influenza brought in. There was no opportunity given to examine the upper air tracts. Of the cases that we were called on to treat the ear, there were only twenty requiring paracentesis. The instructions were to open on the first sign of any inflammatory change in the ear. Those cases all got well in approximately a week, without apparent mastoid involvement. There was only one case of influenza brought in which required a mastoid operation and that made a prompt recovery, post-operative.

There was a class of cases up there, however, where the mastoids had been operated on months before, many months before my arrival on the 5th day of June, some of them done in other hospitals, military hospitals, and transferred to us. There were about thirty unhealed, post-operative mastoid wounds. We had a very able roentgenologist, Major Cole. The X-ray pictures showed incomplete operations. It took months before I got operating facilities for following up those cases in an operative way, and to sum it up, I think, five or six recovered without operation. There were twenty-three or twenty-four mastoid operations that had been done, unhealed when I arrived and in all of those cases there had been simply what I might call a scratch operation, excepting that in many of the cases a mutilating operation had been done on the external auditory canal. In some of the cases the skin even was absent from the external auditory canal. It made the operations extremely difficult.

Results: Not a death, one passing partial paralysis.

As to the influenza we had in that vast number of cases, surely less than ten, I think only eight cases of epistaxis, there were three cases of hemorrhage myringitis.

HEMORRHAGE IN EPIDEMIC INFLUENZA

M. A. GOLDSTEIN, M.D.

St. Louis

In the recent influenza epidemic which has swept through the land from coast to coast and invaded the Military Hospitals with such intensity, there has been one factor of clinical evidence almost constantly present.

Early in the course of the epidemic at Camp Dodge Base Hospital, the attention of the Head Surgery Service was called to a violent, persistent and remarkably frequent epistaxis that seemed to occur almost as a pro-drome, or as an early symptom in the course of the attack. Patients admitted to the hospital invariably complained of a fullness in the head, and on inspection the mucosa of the upper respiratory tract, especially involving the nose, nasopharynx and fauces, presented a diffusely congested, slightly swollen and dark-red injected appearance. The site of this epistaxis was invariably in the septal mucous membrane, along the course of the septal artery and about the center of the quadrilateral cartilage. An occasional exception in this point of hemorrhage was found in the junction of the septum and the floor of the nose. In some fifteen or sixteen cases where the hemorrhage was observed promptly and bacteriological service was immediately available, blood cultures were made from this septal point during the epistaxis, and in five of these cases the definite presence of streptococcus hemolyticus was demonstrated. This was, perhaps, the earliest evidence of the presence of this specific micro-organism in blood cultures during the epidemic.

Over one hundred and fifty cases of this type of epistaxis have been reported in these investigations in the Service of Head Surgery at Camp Dodge Base Hospital. Of these individual records I have personally observed sixty cases, have made a detailed report of same and have endeavored

to tabulate them for statistical and definite conclusions. These conclusions are:

1. This type of epistaxis occurred as a pro-drome or as one of the earliest symptoms in the course of the "flu" epidemic.

2. The locality of the epistaxis seemed to be invariably on the septal side of the nose and in the course of the septal artery.

3. Bacteriologic findings indicate that the streptococcus hemolyticus was definitely identified as the causative factor in this form of epistaxis.

4. The cases in which the epistaxis occurred seemed to be those in which the most intense activity and more serious complications developed.

5. Where this epistaxis was spontaneous and violent, subsequent hemorrhage appeared in other localities of the respiratory tract or in other organs of the body.

6. Where epistaxis was found pneumonic complications were quickly presented.

7. Where epistaxis was not controlled by the sero-logical therapy that we carried out the end result to the patient in the large majority of cases was fatal.

In 1905 I conducted a series of observations on the coagulation time of the blood in patients who presented themselves for operative work on the nose and throat, including the resection of the septum, adenoids, and tonsillectomy. At that time the reduction of coagulation-time of the blood by the use of normal sterile horse-serum was being investigated. In my series of cases I timed in each case the coagulation of the blood preceding the operation, injected 10 cc. of normal sterile horse-serum and again timed the blood coagulation prior to operation. I found that in every instance, even in those of homo-pteliacs, the coagulation time, following the administration of the serum was reduced from one to three minutes and found that all patients that registered below the fixed coagulation time limit showed no tendency to hemorrhage during or after operation.

It occurred to me, therefore, that this type of epistaxis, associated with a specific micro-organism known to develop an active hemolysis, might be materially benefited by the same form of sero-logical therapy.

By co-operation with the department of general medicine and with the laboratories a general order was issued to inject 10 cc. of normal sterile horse-serum in all patients during the active "flu" epidemic as soon as epistaxis was observed.

In sixty cases of epistaxis in which this serum treatment was promptly carried out, no mortality is recorded. These patients have been followed to final disposition, namely, to the pneumonia ward, to quarters, or to duty. Even where severe pneumonia developed, the patients have recovered.

It is a significant fact that in twenty-two cases in which epistaxis was found, but where the patient became violently ill and was transferred to the pneumonia wards before the serum could be injected, fifteen were fatal, developing pneumonia, empyema, other complications, and death. There is, therefore, a peculiarly significant relationship in the application of this serum therapy to the hemorrhage pathology developed in the course of this serious "flu" epidemic. Hemorrhage seems to have been the keynote in the pathological status of each patient.

Another observation to corroborate this hemorrhagic intensity is found in a series of over seventy cases of so-called myringitis hemorrhagica. In these cases the membrana tympani presented either single or multiple, circumscribed, dark-red blebs which, on puncture, exuded a drop or two of bloody serum. In eight of these cases, the bacteriological culture of the contents of these blebs showed the presence of streptococcus hemolyticus. The clinical picture presented in this form of myringitis was not that of the usual acute myringitis where the membrana tympani is diffusely and uniformly congested, and where the mucosa of the tympanic cavity is less injected. The puncture of these blebs was limited to the external epithelial layer of the membrana tympani and did not penetrate the tympanic cavity. Many

of these cases, as far as the otologic conditions were concerned, cleared up without further invasion or treatment. Many were complicated by pneumonia and empyema. I merely wish to point to the corroborative evidence in this selective type of myringitis to a hemorrhagic condition closely associated with that found in the nasal and other respiratory mucous tracts.

The fauces, pharynx and the tonsils in almost all of the cases during the serious "flu" period exhibited the same mahogany-red, intensely injected mucous membrane and swabs from these throats demonstrated the presence of streptococcus hemolyticus almost without exception. These bacteriological findings run up into hundreds of cases, and when multiplied by similar observations made in the military hospitals throughout the country, into thousands of cases.

Within twenty-four to thirty-six hours after the initial symptoms were developed, in some instances shortly following epistaxis, in others where epistaxis did not occur, the case records of many patients show the admixture of pure blood with the sputum. This I take to be an indication of localized tracheal bleeding. Here again we have evidence of the same hemolytic changes in the mucous membrane of the trachea, or larger bronchi, followed by active bleeding.

In the report furnished by the medical officers in charge of the woman's wards where nurses and civilian females were cared for during the epidemic there is an interesting factor which further corroborates our hemorrhagic pathology, namely, in all epidemic "flu" cases, menstrual hemorrhage occurred almost as early in the symptoms-complex as epistaxis, irrespective of the normal menstrual period of each patient. There were fewer cases of epistaxis among female patients than in male, but this may be accounted for by the fact that practically every female patient developed irregular menstrual hemorrhage.

In the post-mortem room we have not ceased to wonder at the enormous hemorrhagic character exhibited in the lungs and plural cavity in this epidemic. As someone significantly

remarked—"These poor fellows seem to have been drowned in their own blood."

From the Genito-Urinary Department I received the report of several cases of intense hematuria. An autopsy of one patient revealed an active hemorrhage in the suprarenal capsule. In another autopsy the bladder was filled with blood and the mucosa of the bladder showed the same, diffusely injected, dark-red appearance as in the other mucosa tracts attacked by hemolytic changes.

It seems fairly logical, therefore, to conclude that hemorrhage in its various manifestations, hemolysis in its peculiar influence on the character of the mucous membrane and the streptococcus hemolyticus, in its frequent presence in so large a proportion of cases, must have some close pathological relationship and identity. There is still much discussion as to what was actually the original potent bacteriological cause of this epidemic. An eminent authority in bacteriology, terms the causative factor—"streptococcus hemolyticus plus," and the observations and conclusions that we might reach from the observations here reported are quite corroborative of this.

There have been many hypotheses and theories developed, but no tangible and absolute conclusions reached. The endothelial lining of the body is a protective mucosa. Hemolysis is created by the presence of the streptococcus hemolyticus. Wherever hemolysis in this mucous lining tract occurs there is a break in the continuity of these protective surfaces and a possible entrance for any form of aerobic micro-organism. These observations may throw but little light on the specific micro-organism or combination of micro-organisms that have actually made of this "flu" epidemic one of the most violent forms of infection of the respiratory tract in this country, but it may offer some tangible evidence as to the character, course and form of invasion, by which such micro-organisms or combination of micro-organisms have attacked the lungs with such direful and destructive results.

In a survey of the accompanying detailed table a number of interesting features are in evidence. In cases numbered 19, 21, 25, 44, 46, 48, 49, 50, 51, 58, 59, and 60 streptococcus hemolyticus was found in the culture made from the blood during epistaxis. In Case 2 the same micro-organism was found in the hemorrhagic bleb from the ear.

With but few exceptions the nasal hemorrhage in each case ceased with normal promptness. In many the bleeding stopped spontaneously without any mechanical aids, but in cases numbered 3, 6, 8, 12, 14, 29, 34, 37, 40, 42, and 55 the nose was packed with gauze. In Cases 6, 8, 12, and 34 there was recurrence of epistaxis in from fifteen minutes to twenty-four hours notwithstanding the nasal pack. In Cases 4, 12, and 24 the second injection of ten cc. normal sterile horse serum was used.

It will be further noted that in all cases giving a history of previous epistaxis the hemorrhage during this "flu" period was profuse.

In no instance had any of this selected series of sixty cases developed pneumonia at the time of their admission as far as could be clinically determined. All sixty cases showed the presence of streptococcus hemolyticus or of bacillus influenza either in the blood culture from the nasal hemorrhage or from the swabs taken from the throat. Thirteen (13) of these cases developed pneumonia following "flu" infection. Five of these thirteen cases showed the presence of pure blood mixed with the expectoration coughed up from the deeper respiratory tract. This pure blood-mixed sputum was noted within twenty-four to thirty-six hours after the onset of symptoms and indicates, in my opinion, a process of hemolysis in the larynx, trachea or larger bronchia.

The severity of epistaxis does not seem to be an index of the severity of the infection, as many of these cases in which nasal hemorrhage was profuse developed mild types of "flu," and several of the cases in which epistaxis was moderate in amount developed serious and protracted pneumonia.

In conclusion let me emphasize these facts: (1) that each of these sixty cases was injected with ten cc. of horse serum as soon as the onset was reported; (2) that epistaxis occurred in each case as one of the symptoms of onset during the epidemic; (3) that bacteriological findings in each case corroborated the diagnosis of epidemic influenza; (4) that the entire series of sixty cases have been traced to their final disposition and that all have recovered.

CANDIDATE'S THESIS

LARYNGEAL BOUGINAGE

HENRY LOWNDES LYNNAH, M. D.,

New York

It is extremely difficult to cure chronic retained tracheal cannula cases. Laryngostomy has always been the operation selected and heretofore has offered the best results. Some less radical treatment than laryngostomy, which requires an endless amount of aftercare and which is not always followed by satisfactory results, seemed desirable to the writer. Prolonged intubation is required in all laryngostomy cases, even after the laryngotracheal lumen has been covered with a perfect skin lining, because the hyperplastic infiltration extends into the submucosa and perichondrium and may lead to an undetermined amount of contraction. So much contraction occurred in two of my laryngostomy cases that immediate tracheotomies were necessary. After the tracheotomy tube was introduced the lumen opened and dilatation with special soft rubber covered tubes was required for a year before the patients recovered. After laryngostomy the voice is never as good as it is after gradual dilatation by the author's latest method—laryngeal bouginage.

Bouginage in these cases requires great care lest undue force be employed in dilating the stenosed larynx and trachea. A small olive tipped bougie should be passed from above through the endoscope avoiding a false passage into the tissues of the neck, or an injury into the esophagus. The first size or smallest bougie is placed against the stricture with the olive directed ventrally. If the small bougie does not pass readily forcible dilatation should not be attempted. After five minutes the trial should be discontinued and a second attempt made a day or so later. Usually after the third or fourth trial the small olive will pass through the

tightest stricture. Forcible attempts should never be employed with a larger bougie until the smaller size has been passed with ease several times. When this occurs a larger and larger bougie may be used, but never more than three sizes at any single sitting. After endoscopic bouginage is successful, dilatation from below upward may be attempted. Finally, before the author's split cannula carrier and the rubber laryngeal tube are inserted bouginage should be performed three or four times so that the larynx is thoroughly opened.

The introduction of the rubber laryngeal tube furnishes two ways for breathing; the tracheal cannula and the mouth. This has proved invaluable in reeducating the children in mouth respiration. However, it is very difficult at times to teach them to breathe through the mouth even when the tracheal tube is tightly plugged while the laryngeal tube is in place. They have become so accustomed to breathing through the tracheal cannula that the function of the larynx is lost. Tracheotomy is frequently unsuccessful for cure even when performed early in patients with retained tubes in intubation cases, if the cicatricial subglottic and tracheal contraction forms a web. In some instances these children breathe fairly well through the small lumen in the web. However, the web has no tendency to disappear spontaneously, nor does the lumen tend to increase its size no matter how long the child may be able to breathe with the tracheal cannula partially occluded. The remarkable voices possessed by many of these children is surprising, even though there may be only a millimetre lumen in the web. A method which conserves the voice should be employed and is offered by laryngeal bouginage.

In treating these patients after the primary endoscopic introduction of a bougie, the writer introduces his very fine cautery knife to cut the lumen of the web in its antero-posterior diameter, and follows this by gradual endoscopic and retrograde bouginage, finally introducing the laryngeal rubber tube. After galvanocauterization the burned edges of the web may adhere firmly if they are not separated by

an intubation or rubber laryngeal tube for at least a week.

In our experience at the Willard Parker, Riverside and Kingston Avenue Hospitals, chronic laryngeal stenosis has followed tracheotomy just as frequently as it has followed intubation. The extent of the pathological process seems to be the important determining factor; oversize tracheal cannulæ and intubation tubes are also contributing causes. When performing intubation it should be remembered that

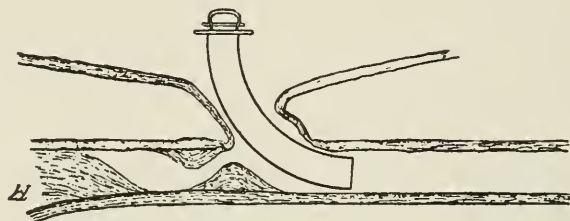


FIG. 1.—Schematic sketch to illustrate the changes which occur in the larynx and trachea when an oversize tracheal cannula is used. Note the anterior and posterior spur formations at the bend of the cannula, and the complete closure of the larynx above.

the smallest intubation tube that will give relief should be used; the age of the patient is not the sole guide. When tracheotomy is performed the same considerations hold for the selection of the tracheal cannula. Patients with tracheal cannulæ entirely too large for the trachea are frequently admitted. When the cannula fits too snugly it is impossible for any air or secretion to pass along the side of the cannula. Marked anterior and posterior spur formations result. The laryngeal breathway may be completely sealed by the pathological lesion on this account. Proper fitting tracheal cannulæ should never occupy more than half the lumen of the trachea. It is unnecessary to have an enormous lumen; the small size tubes are sufficient. Frequent cleansing of the inner tube keeps the lumen free and permits easy respiration.

If there has been an extensive cicatricial contraction at the cricoid level, tracheotomy will not prove successful in the cure of laryngeal stenosis. The contraction must be

dilated gradually by bougies. By this means I have obtained gratifying results and ultimate decannulation of the patients.

The following patients were treated by laryngeal bouginage and rubber laryngeal tubes. All of them were unable to breathe through the larynx with comfort. Some of them had cicatricial web stenoses above the cannula, and poly-poid granulations and tracheal spurs at the bend of the cannula.

CASE I.—A girl of eight, was admitted to the Willard Parker Hospital and intubation was performed shortly thereafter. She was in poor condition having been ill five days, and for two weeks after admission had suffered from a bilateral pneumonia. At the beginning of the third week the child who was unable to breathe without the tube began to cough it up. After her general condition had improved at the end of three months she was able to dispense with the tube. Three months later after an acute nondiphtheritic laryngitis, breathing became so difficult that reintubation was necessary. This was accomplished with some difficulty. She retained the tube for four months, and then remained without it for six, when its second reinsertion was necessitated by cicatricial contraction. The child at this time suffered from a second pneumonia induced by the retention of secretion. She was sent to Otisville, N. Y., where she was greatly benefited by the fresh air and the life in the open. After she had been in Otisville a while Doctor Dickson removed the tube and she was able to remain without it for more than two years. When she was readmitted the third time to the hospital she was suffering from a moderate degree of dyspnea. There were many subcrepitant râles over both lungs, and an X-ray revealed a damming back of the secretion in both lungs as well as an enlarged thymus gland.

On attempting direct laryngeal examination the child became blue, and in all probability would have succumbed had it not been for an immediate tracheotomy. In performing low tracheotomy a large lobe of the thymus protruded

into the wound. This was clamped and pulled aside by my assistant, Doctor Glover. The trachea was found so completely collapsed that a hook was inserted between the rings and the trachea pulled forward and incised in the median line, for the introduction of a long tracheal cannula. The child was restored by artificial respiration. To prevent recurrence of the trouble I decided to resect the thymus by gently pulling it out of its capsule. A large posterior lobe and two smaller lobes were rapidly removed. Hemorrhage was controlled, and infection of the mediastinum was prevented by packing the wound with gauze. At the end of four weeks the wound was healed, and the general condition of the child improved. I then decided to make a direct examination of the larynx for there was very little air passing through it, and she was unable to breathe with the cannula occluded. With each attempt to breathe through the larynx there was a loud whistling sound. The examination revealed a good pair of vocal cords, and on the introduction of a five mm. tracheoscope a cicatricial web was visible at and below the cricoid level. In this there was an opening apparently two millimetres in diameter and well to the right of the median line. Notwithstanding these conditions, the child had a very good voice and freely movable arytenoids. Three days later tracheoscopy was again performed and the web was cut laterally by the galvanocautery.

Great care must be taken in cutting these subglottic and tracheal cicatricial webs, and the eye should be constantly focussed on the cautery tip to avoid injury to the trachea. A short intubation tube was then introduced. Cauterization was repeated and by bouginage the stenosis was sufficiently divulsed to permit the introduction of the rubber laryngeal tube. The next summer the child was again sent to Otisville, and she breathed well through the larynx without the rubber laryngeal tube, and with the tracheal cannula tightly closed. The voice was of good quality, though occasionally hoarse. The child was removed to Baltimore by the parents and placed under the charge of Doctor

Crowe. She was breathing well through the larynx when last heard from, but still wearing the tracheal cannula.

CASE II.—B. E., a girl aged fifteen; intubation had been done for laryngeal diphtheria at the age of four. She had been a severe coughup case which rapidly became chronic. After two and a half years of gradual dilatation by my special intubation tubes she had apparently recovered completely. For seven and a half years she remained without the tube, then as the result of an attack of influenza the larynx became stenosed. During this interval she had a

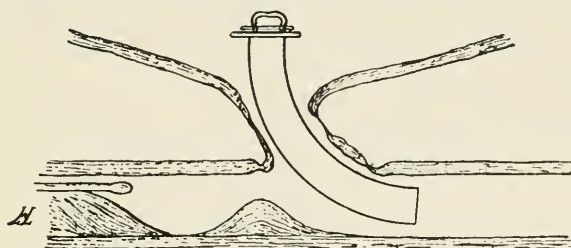


FIG. 2.—Schema showing the properly fitting undersize tracheal cannula which should be used in all cases. The oversize cannula has been removed, a smaller one taking its place. Note the introduction of the small endolaryngeal bougie passed through the laryngeal stricture from above.

normal speaking voice. On February 6, 1917, she was admitted to the Kingston Avenue Hospital suffering from extreme dyspnea. The writer made a futile attempt to perform intubation and then performed tracheotomy. An enlarged thymus gland appeared in the wound. This was pulled to one side by Dr. Stanley Laub, and the trachea opened. The trachea was not compressed as in the younger child but there was definite flatness. After the trachea was opened the girl breathed easily, and the thymus was partly resected. X-ray treatment was later employed. By direct endoscopic examination of the larynx, and by retrograde tracheoscopy a dense web was seen in the region of the cricoid cartilage. There was a minute opening in it. Doubtless the stenosing web had been present for some time, and the acute influenza made the tiny lumen edema-

tous; this shut off respiration almost completely. Radiographic examination showed enlarged mediastinal glands as well as the thymus extending well downward. On physical examination of the chest little air entered the right lung. By tracheotomic bronchoscopy the right main bronchus was seen to be compressed, but when the bronchoscope was passed through the compression stenosis air entered the lung with ease. A perforated soft rubber tube was

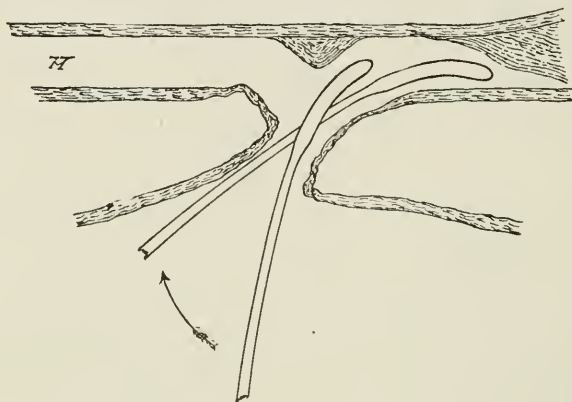


FIG. 3.—Schematic illustration of retrograde bouginage. The bougie is introduced into the tracheal fistula almost perpendicularly, the curved being used to lift the upper anterior tracheal wall for easy introduction. The anterior wall is the guide for all bouginage.

introduced into the right bronchus through the tracheal cannula. This greatly improved the aeration and drainage of the lung. An X-ray picture showed the tube in the right bronchus. X-ray treatment was given once each week, and the laryngeal lesion was treated by bouginage. The girl had a perfect speaking voice in spite of the extreme dyspnea before tracheotomy was performed, and after tracheotomy it had a tendency to become stronger. The vocal cords were normal in appearance. The ventricular bands were normal, and there was free motion of the arytenoid cartilages. This condition existed in spite of the prolonged treatment performed in the past by dilating and narrow neck intubation tubes. In order to conserve this excellent

voice endoscopic treatment was employed.

The lumen of the web which was very thick at its edges and thin in the centre, was gradually dilated with bougies until the galvanocautery knife could be introduced. The web was cut in its anteroposterior diameter and a small intubation tube introduced. In less than a week further galvanocauteric applications were made, and a soft rubber covered intubation tube introduced after dilatation with bougies. A week later the larynx was again dilated and a No. 20 F, rubber tube, was passed from the tracheotomy wound through the web stricture to the base of the epiglottis and anchored in the trachea. The tracheal cannula was

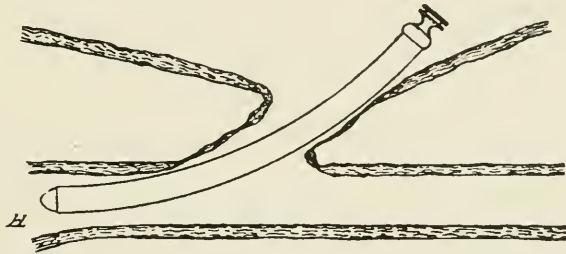


FIG. 4.—Schematic illustration showing the introduction of the author's split cannula carrier with obturator, for the introduction of the soft rubber laryngeal tube.

then reinserted. The girl was now able to breathe through the larynx with the tracheal cannula occluded. This treatment has been continued, and I am happy to report that the patient can now breathe normally through the larynx. There is no stridor and she has a normal speaking voice.

CASE III.—C. D., a girl of seven, was admitted to the Kingston Avenue Hospital for laryngeal diphtheria, and intubation was performed three hours later with a 4-5 O'Dwyer tube by Doctor Eberle. She had a moderately severe diphtheria and retained the tube for six weeks. Having done well for four months in the hospital without the intubation tube she was discharged as cured. The parents were instructed to return the child to the hospital once a month for observation. At the end of a year the child was

apparently in perfect condition with a normal voice and easy respiration. The parents thereafter neglected to report to the hospital. A year and a half later, that is, two and a half years after she was discharged from the hospital as cured, she was readmitted with a new infection of diphtheria and with such extreme dyspnea that intubation was indicated. An attempt was made by Doctor Eberle which was unsuccessful, but an immediate tracheotomy gave prompt relief. Direct laryngeal examination was performed a few hours later, and revealed a very edematous

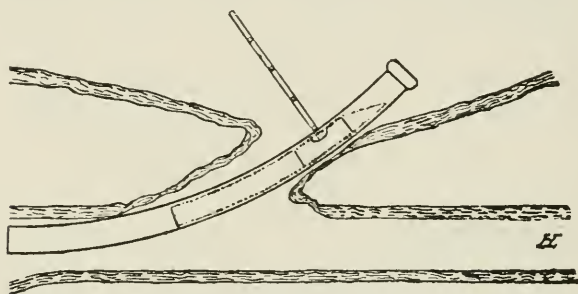


FIG 5.—Schema showing the introduction of the soft rubber laryngeal tube after the obturator has been removed. The cannula is removed as soon as the rubber tube enters the larynx.

larynx, but no visible membrane except on the epiglottis and in the laryngopharynx. In three weeks the child had completely recovered from the diphtheria but the laryngeal stenosis persisted and it was impossible to decannulate. The laryngeal picture gradually returned to normal and the voice though hoarse was fairly good. A rather dense shining cicatrix with a posterior opening was visible in the cricoid region. This cicatrix was observed from time to time for any increase in size of the opening. By the end of the second month the voice was normal, and though the child could breathe through the larynx with the cannula partly occluded, because of the web obstruction, respiration was not easy. In order to preserve the voice we decided to gradually bougie and cauterize the stricture. Repeated tracheoscopic galvanocauterization and endoscopic and re-

trograde bouginage were performed with gratifying results. The opening in the web was gradually dilated until a small laryngeal rubber tube could be introduced. The child was treated for six months at intervals of one to two weeks. Then the opening was sufficiently large to admit a five mm. tracheoscope. Bouginage was continued for three months longer to prevent subsequent contraction. At the end of nine months the larynx was freely open and no tracheal spurs were visible. The child was decannulated and has remained well ever since, fifteen months. On my last direct examination there was no sign of recurrent stenosis. The child is able to breathe with ease, and has a normal speaking voice.

CASE IV.—P. Van H., a girl of eight, was referred to Dr. J. C. Jones, of Panama City, Fla. The child had been intubated for laryngeal diphtheria at the age of one, and because of persistent coughing up of the tube during the second week tracheotomy was performed. Several futile attempts to decannulate were made during the first two months. No air entered the larynx, and the tracheal fistula collapsed at each attempt to remove the tube.

In October, 1918, the child was brought to me for treatment. By direct laryngeal examination, the larynx was seen to be completely closed. The vocal cords were visible and tightly fused. The arytenoid cartillages were fixed. The tracheal fistula was now examined. The cannula was oversize and covered with concretions, for the nickel plating had worn off from the brass cannula. By retrograde tracheoscopy the trachea above the fistula was seen to be almost completely closed by an anterior and a posterior tracheal spur produced by the oversized cannula. An attempt to pass a bougie from above and from below was unsuccessful. After the third trial the smallest bougie was passed through the larynx from above, and a small curved bougie passed from below. A small No. 10 F. rubber tube was introduced into the larynx from below and anchored to the tracheal cannula. This procedure was repeated weekly and the rubber tube increased in size. At the end of six

weeks the larynx admitted a rubber tube 22 F., and for the first time since her illness the child was able to breathe through the larynx, and discovered that her mouth had another function besides chewing food. This child was in perfect physical condition though she had worn a tracheal cannula for seven years. Her intelligent mother taught the child to cough and breathe through the larynx which was kept open by the rubber tube. After three months' treatment a trial removal of the rubber tube was made. The trachea was smooth. There was no evidence of spur forma-

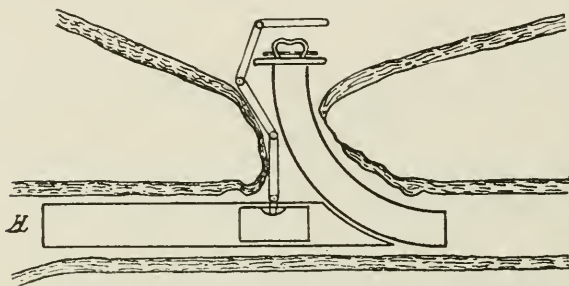


FIG. 6.—Sketch showing the rubber laryngeal, dilating and drainage tube anchored in place. The tracheal tube has been reintroduced. Air easily passes through the laryngeal tube, and the child can be reeducated to mouth respiration.

tion and the larynx was patent to a five millimetre bronchoscope. The child was able to breathe fairly well through the mouth, and could cough easily through the larynx with the tracheal cannula occluded two-thirds by a rubber stopper. To avoid a northern winter the child returned to Florida. She was able to breathe through her larynx fairly well at the time she left. She will return shortly for further treatment. Doctor Jones states that her condition has not changed since she left my care.

CASE V.—J. P., a boy of six, was admitted to the Kingston Avenue Hospital suffering from laryngeal diphtheria for which he was intubated shortly after. His diphtheria was a severe type. There was no membrane below the

intubation tube. During the second week, after the diphtheritic process had subsided the tube was coughed up on an average of twice daily and bronchopneumonia developed.



FIG. 7.—Radiographic view of the rubber laryngeal tube and tracheal cannula in place; anterior view.

He recovered from the pneumonia in a month, but except for short intervals he was unable to remain without the

intubation tube. A direct laryngeal examination was made. The tube was removed and in a few minutes subglottic edema closed the larynx. A tracheoscope was introduced which gave prompt relief. As the tube continued to be coughed up, tracheotomy was performed two weeks later by Doctor Eberle. The tracheotomy relieved the lung of considerable secretion and the general condition of the child improved. The laryngeal lesion had not improved since no air could pass through the larynx. In the region of the cricoid there was a marked change in the tissues which caused the coughing up of the tube. In the centre of a constricting web there was a slight dimpling through which the smallest endolaryngeal bougie could be passed. By gradual weekly bouginage the opening was sufficiently dilated to admit the galvanocautery and the introduction of a No. 17 F. rubber tube. The tube was changed once a week and the larynx dilated. At the end of the second month the larynx was apparently well open admitting a five mm. tracheoscope, and a trial detubation was made. The tracheal cannula was partly closed by a rubber stopper, and the boy instructed to cough and breathe through the mouth. For two months he did fairly well, but the stenosis gradually recurred and a repetition of the treatment was necessary. This was continued weekly for six months, when detubation was again attempted. This time the child was able to breathe well through the larynx without plugging the tracheal cannula, since the cannula was undersize for his age. Since then the larynx has remained open. He is able to breathe well through his mouth, though the voice is somewhat hoarse.

CASE VI.—C. McC., a boy of seven and a half years, was admitted to the Kingston Avenue Hospital and was immediately intubated for laryngeal diphtheria. He had been ill five days and was in an extremely toxic condition. A dose of 20,000 units of antitoxin was administered. By the seventh day the boy's condition had improved, he was extubated but required reintubation in less than five minutes. A week later a second attempt to extubate was made. The

boy remained without the tube this time for twelve hours, then he was reintubated, because of his progressive dyspnea, high temperature and damming back of secretion in the lung. On direct examination the ventricular bands and arytenoid cartilages were found to be swollen. A flat head tube was introduced and worn for a week. The supraglottic edema subsided, and at the next trial the patient remained without the tube for two weeks. This time gradual contraction in the subglottic region caused increasing dyspnea. An unsuccessful attempt to reintubate was made and an emergency tracheotomy was performed by one of the house staff. The operation was hurried and therefore, a stab emergency tracheotomy, and though it saved the life of the child, the tracheoesophageal wall was severed and there resulted an annoying tracheoesophageal fistula. Swallowing either solid or liquid food was accompanied by leakage through the tracheal fistula. A rubber catheter was therefore introduced through the nose and all feeding was by gavage. By the end of three weeks the boy could swallow fairly well with very little leakage of fluid through the tracheal wound. At this time esophagoscopy revealed a small slit in the anterior esophageal wall which in healing produced a tracheal stenosis above the cannula. There was no stenosis of the esophagus at this level, though there was a depression into the tracheal lumen from cicatricial contraction. A seven millimeter esophagoscope was introduced with ease. Instead of the larynx opening above the cannula after tracheotomy, it gradually closed so firmly that the boy was unable to breathe by mouth. After waiting three months with the tracheal tube partly closed there was no improvement in mouth respiration. The tracheoesophageal fistula had healed completely.

At the first trial laryngeal and tracheal bouginage was unsuccessful, but finally a small bougie was passed through the larynx from above. Because of the tracheal stenosis bouginage from below was impossible. Persistent attempts were not made for fear of opening the old wound in the esophagus. After dilatation from above a short intubation

tube was introduced to keep the larynx open. After thorough dilatation from above bouginage was successful from below. After more than six months' treatment the larynx was sufficiently dilated to admit of a large rubber laryngeal tube. The boy has worn the rubber laryngeal tube and tracheal cannula for two years. From time to time the larynx and trachea are bouginaged and larger rubber tubes introduced. At the present time the larynx and trachea are well open, and respiration is comparatively easy through the larynx with the tracheal cannula partly closed. Of course I do not present this boy as a cured patient.

CASE VII.—J. McQ., a boy aged seven and a half years, was admitted to the Willard Parker Hospital during his third year, suffering from laryngeal diphtheria and was immediately intubated. During the second week he coughed up the tube as frequently as ten times a day. An unfortunate unsuccessful attempt to stop coughing up was made with oversize tubes. A Lynah three year non-coughup tube was introduced. The larynx now had a chance to rest since the tube was retained. Slight infiltration developed in the tissues of the neck, but soon disappeared after the application of poultices. At the end of a week the non-coughup tube was removed and the boy went without it for five days. Cicatricial contraction at the cricoid level had resulted from the repeated coughing up and necessitated reintubation, a three year non-coughup tube being used. For the first six months the boy could go without the tube for a week or two. Subglottic edema would then necessitate reintubation. Galvanocauterization was performed six times, and ultimately by the end of six months the boy remained without the tube. He breathed fairly well and his parents, believing him cured, refused further treatment. He remained four years without the tube, having a fair voice though an inspiratory crow which was loud especially when asleep, and some expiratory dyspnea on exertion. The boy was admitted to Riverside Hospital where Dr. John Crawford and myself studied his case. The thorax was markedly distorted from prolonged inspiratory effort against obstruction and

the sternum was depressed. The loud inspiratory crow, especially marked during sleep, was due to bilateral anky-



FIG. 8.—Lateral radiographic plate showing how the rubber laryngeal tube is anchored in the trachea. Note the relation of the slanting end of the rubber tube to the tracheal cannula. No recurrent spur formations are possible by this method.

losis of the cricoarytenoid joints. The vocal cords were partly separated in the centre on expiration, while on

inspiration they were sucked together to produce the crow. Respiration occurred through a small opening in a subglottic cicatricial web. The boy did not stand the direct laryngeal examination well by reason of the ankylosed arytenoids and subglottic stenosis. After the boy had quieted down from the examination and resumed his usual respiration Doctor Crawford, assisted by me, performed a low tracheotomy under novocaine anesthesia. The trachea was collapsed from the prolonged respiratory effort which was so violent that the suprasternal notch was sucked in with each inspiration. A hook was introduced between the rings to pull the trachea forward and the trachea was opened. Air escaped along the trachea before it was opened and caused marked emphysema in the tissues of the neck. This was obviously due to violent efforts at expiration against a tight obstruction. A special long tracheal cannula was required to make respiration easy. This was probably due to collapse of the trachea beyond the distal end of the usual short cannula. The inflammation in the subglottic region subsided after the tube had been worn for a week. Through the tracheoscope the web was freely cut by the cautery in an anteroposterior direction and a small short tube introduced. A second examination was made a week later and a slight amount of motion of the arytenoids was noted. A small mass of polypoid tissue was removed from the left ventricular band, and its base cauterized. The cicatricial web was again cauterized and dilated sufficiently to admit the introduction of a 17 F. soft rubber laryngeal tube. It was anchored in the tracheal fistula and remained in place for a week when it was changed for cleansing. After twelve weeks of treatment, and after a long anterior commissure was cut between the extremely shortened cords, the laryngeal tube was removed. The following week the arytenoids were found to be moving fairly well, and a five millimeter tracheoscope was readily introduced. Bouginage has been repeated once each week since then, and at the present time the boy is able to breathe easily through the larynx, and wears his tracheal cannula constantly occluded. The inspir-

at'ory crow has disappeared and the voice has improved greatly. At the end of the fifth month of bouginage the condition is so much improved that the writer awaits an ultimate successful outcome.

The author has under treatment at the present time six cases besides those reported. Two of these children have no difficulty with respiration and will be decannulated shortly. Two are wearing soft rubber laryngeal tubes, and two are able to breathe well through the larynx without plugging the tracheal tube. Three other recently admitted patients from neighboring cities have been wearing tracheal cannulæ for from five to nine months without improvement. All of them show cicatricial webs with a small central opening at the cricoid level.

127 WEST FIFTY-EIGHTH STREET.

CANDIDATE'S THESIS

LARYNGOLOGY AND RHINOLOGY WITH THE AMERICAN EXPEDITIONARY FORCES FRANCE

ROSS HALL SKILLERN,

Lieut-Colonel M. C.

In a retrospect of the work accomplished during the latter months of the War when the specialists with especial reference to the upper respiratory passages should have reached a comparatively high state of development and efficiency, it is with no small sense of disappointment that one mentally reviews the conditions that were to all intents and purposes universally met with in France during that period. The writer was stationed at Mesves sur Loire, one of the largest American hospital centres abroad with actual accommodations for twenty thousand patients including the convalescent camp. The centre was composed of ten base hospitals each with the capacity of two thousand beds including the crisis expansion. The individual base hospital units were complete entities with their own operating rooms, laboratories, X-Ray departments, etc., and were understood to be in a position to properly treat any case that might come under their care. As a consequence, during the early days of the centre, no differentiation was made but only at a later date were certain units designated to care for special cases, thus contagious diseases to one, influenza and pneumonia to another, orthopædic and fractures to another, etc., but I do not recall any one designated for nose and throat cases. It is true that a unit did set aside one or two wards for head cases but these were more particularly mouth and jaw injuries and were under the supervision of a dentist and oral surgeon. Each hospital unit was equipped with a field set

for nose, throat and ear cases and was supposed to have one room solely for this work but as this specialty was never encouraged, this room was seldom in evidence. Despite these discouragements, certain laryngologists endeavored to organize their departments but on account of the apathy of those in command, together with the inefficiency of the medical supplies, and the lack of adequate lighting and water supply, the result was rather crude and totally inadequate for even the proper examination of the patients. Small wonder is it then that little encouragement was held out to patients requiring the use of the nasal or laryngeal speculum.

Actual Conditions Encountered During the Great Influx of Patients from the Meuse-Argonne Offensive

This time is chosen as it was the greatest and most comprehensive effort of the United States to turn the tide of battle and as a consequence was fraught with great casualties; but was worth the price as it was this drive that definitely overcame the military superiority of the Germans and caused them to lay down their arms.

Train loads of sick and wounded arrived with such frequency that the capacity of the centre was soon taxed to its utmost, all available bed space being occupied. The character of the cases was rather curious. One would naturally suppose that those suffering with wounds would be in the preponderance while, as a matter of fact, the sick, shell shocked and gassed constituted about 50% of the total, at least as far as our centre was concerned. Of these the most interesting, laryngologically speaking, were those that had been gassed, not considering the very exceptional throat wound cases. These gas cases were placed on the medical side and treated by the internist with occasional examination and advice from the staff laryngologist. (It must be remembered that the laryngologist was detailed as a ward surgeon and had little opportunity to devote time to his specialty).

The symptoms in these gassed patients depended upon the

concentration of the gas and the length of time it was inhaled. Like the severe wounds of the throat, those badly gassed were sent to hospitals near the front, so as to avoid any transportation that was not absolutely necessary. As a consequence, we received only those cases that could be called moderate. On admission these patients were usually ambulatory stating they had been exposed to the fumes of mustard gas but did not appear to be suffering nor did they, as a rule, complain greatly. They were at once placed in bed and not permitted to smoke, although most of them had already desisted as the tobacco seemed to have a peculiarly unpleasant taste. This was one of the earlier symptoms of gas poisoning. After three or four days, the cough became more distressing and the laryngeal mucosa affected which manifested itself by various degrees of hoarseness to complete aphonia. While, of course, this was due to the direct irritation of the gas, nevertheless, in my experience the psychological element entered largely into the aphonia. Inspection at this stage revealed an intense hyperæmia of the faucial structures which extended down into the larynx, the cords being red, thickened and relaxed. The parts were exquisitely sensitive and were difficult to cocanize making the examination more or less tedious. Local treatment seemed to have little influence on the affection and in five or six weeks it had usually ameliorated to such an extent that the patient could be sent back to his organization.

The grave form of gas poisoning was a much more serious proposition. Only one case of this character came under my observation and I am not sorry to say that it was in a German prisoner; a more distressing example of suffering I have never seen. The dyspnœa was marked and accompanied by a persistent cough which continued during the night and was very difficult to control. Expectoration was scanty, thick and sometimes streaked with blood, the voice had completely disappeared.

It was difficult to make an inspection, partly on account of the condition of the patient but mostly on account of the lack of facilities where he was confined. It was, however,

plain that the entire mucosa of the upper respiratory tract, with the exception of the nasal, was intensely inflamed, red, swollen and covered with a grayish, dirty exudate. The inter-laryngeal structures (arytenoids, ary-epiglottic folds and ventricular bands) were oedematous as far as could be seen. This condition gradually improved until at the end of eight weeks the patient had recovered from the distressing symptoms leaving a very sensitive respiratory tract with a persistent cough and hoarseness.

Wounds of the Throat Involving the Pharynx and Larynx.

These were exceedingly rare in the hospital centres at some distance from the line of battle as most of the cases of this nature were classed as urgent and sent to hospitals situated in the immediate vicinity of where the injury was received. The actual number of cases in comparison to other injuries was small, due to the protection which the chin offered, and, in the event of being wounded, to the fatalities from injuries to the great vessels in the neck.

Pharynx

These were rare but occasionally when a missile of low penetrating power entered the neck and happened to avoid the great vessels, it either wounded or found lodgement in the pharynx. When this occurred from a high explosive shell or shrapnell the injury was more or less extensive and correspondingly dangerous due to the certainty of infection and to the probable extension to vital structures. Machine gun bullets, on the contrary, could cause a penetrating wound of the neck traversing the pharynx, followed by prompt healing and little discomfort to the patient. It was really astonishing the slight inconvenience that some of these through and through wounds of the neck caused, especially when their location was taken into consideration.

Larynx

Wounds involving the internal structure of the larynx were seldom seen due in a large measure to the natural

protection afforded by the chin, as well as the mobility of the larynx itself; moreover it must be remembered such injuries, when received, were rarely confined to the larynx but frequently embraced the great vessels of the neck in their destructiveness with almost immediate fatal consequences. Such wounds if received from the front were apparently most frequently due to high explosives while those from the side shrapnell and machine gun and rifle fire. By far the most frequent appearing at the hospital were caused by machine gun bullets. The relative infrequency of any sort of wound involving the larynx can be judged by the reports of Guisez who found 17 in 726, and Scheier 7 in 2500, but as the latter are Prussian statistics, they may be taken for what they are worth.

Symptoms

One of the earliest and most common symptoms of a throat wound involving the larynx is dyspnœa. This is due to a number of causes including (a) the missile acting as an obstructing foreign body, (b) obstruction from the injured structures, (c) paralysis of the laryngeal muscles, and (d) the appearance of œdema. Hemorrhage is constant and frequently serious in character due, of course, to the rich blood supply of the larynx and the numerous and important vessels in its immediate vicinity.

Treatment

Almost every case of this character, sooner or later, required a tracheotomy. Indeed many more patients would undoubtedly have been saved had an early tracheotomy been performed. Should dyspnœa not occur immediately after reception of the injury, the possibility of its appearing later is by no means precluded and should be confidently anticipated. The swelling and œdema plays the most important role in this connection and the patient should be closely watched on this account. Immediate and secondary hemorrhage caused serious concern on account of its peculiar fatality. In many instances, the cartilagenous portions of

the larynx were so shattered that it was difficult to find the bleeding points; these were the type of cases in which secondary hemorrhage so often occurred.

After the first phase of the treatment is completed, that is, when danger to life has passed and it is assured that the patient will survive, the attention should be directed to the conservation of the laryngeal tissues. The objects of this are to prevent subsequent stenosis, to preserve as much of the voice as possible and for cosmetic effects. This is accomplished by plastic resections and is largely in the province of general surgery.

*Non-surgical Affections of the Pharynx and Larynx
Peculiar to War Conditions*

Excluding those conditions produced by the irritating gases, (chlorine, mustard and sneezing) it cannot be properly said that any conditions peculiarly incident to war conditions were observed. The various commoner affections such as choriza, sore throat, etc., were present as in civil life, but as the men became more inured to life in the open, they were much less frequently met with. There is no question that the men complained much less of nose and throat conditions than they did in the camps and cantonments in the States. The care and attention that these men received at home from the specialists before they were sent abroad was, without a doubt, responsible for this "happy state of affairs and I am proud to state that the results of the throat surgery practiced upon these men were almost unexceptionally without reproach.

The Epidemic of Influenza in Relation to the Nose and Throat

Everyone recalls the marked predilection for the respiratory tract shown by the causative factor of the influenza during the late epidemic and with what intensity and rapidity the pulmonary structures were involved. One would naturally suppose that the upper respiratory tract, particularly the nasal sinuses, would have shared in the involve-

ment at least in a more or less attenuated form. Previous epidemics have always been followed by a certain amount of sinus disease, therefore, everyone was on the lookout for the first symptom of this complication and being particularly interested, I was especially alert. I can now state that among the many hundred cases which I personally saw, not one gave the slightest symptom pointing towards the nasal sinuses. On inquiry among the other hospitals I found the same condition prevailing. Whether this will appear at a later date as a sequellae remains to be seen.

Acute angina was also the exception rather than the rule even among those who contracted pneumonia. The larynx and trachea were not involved in the ordinary cases and seldom among the pneumonics. This was substantiated not only by laryngoscopic examinations, but in the cases that ended fatally, by autopsy.

As a resumé, it can be said that the great epidemic of influenza, at least in southern France, showed very little predilection for the mucosa of the upper respiratory tract.

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CANDIDATE'S THESIS

THE NATURE AND ORIGIN OF STAMMERING

ELMER L. KENYON, A. B., M. D.

Chicago

Introductory

In all the multitudinous efforts to solve the etiology of this distressing disorder no direct effort has been made in this connection, so far as the author knows, to analyze either the physiologic difficulties involved in speech development, or the bearing on the problem of the psychology of the speech developing child. And yet certainly more than 95 per cent of the cases of stammering develop during the period when the young child is struggling to gain control of the complex speech function. These psycho-physical developmental processes of the speech development period involve not only the creation of new thought processes and of language for their expression, but also coincidentally the acquirement of a knowledge of, and skill in using, the peripheral physical apparatus for the expression of these new thoughts in words. Any one of these processes alone would be a matter of exceeding difficulty. Nature to be sure has provided so well for them, and, especially, has provided such an abundance of time for their full maturing, that as a rule they ultimately, after several years of effort, attain to practical success. But not always. Students of speech subjects are all familiar with that class of partial failures in speech development exemplified by the various forms of articulative imperfection. This class of failure is in its simplest manner of manifestation by no means uncommon, and is common enough even in its grosser forms of manifestation.

The etiological factors tending to upset Nature's carefully

laid purpose for successful articulative development are usually physical in character and related either to impairment of normal cerebral, or peripheral, physiology. But apart from these evidently organic etiological factors others more obscure and of a seemingly functional nature also exist. They lead to a relatively mild but sustained and probably often essentially accidental, psychical disturbance of physiology, sufficient to cause milder articulative imperfections in the development of speech. It is here that the etiology of articulative imperfections in speech development approach closer to the etiological factors producing stammering. For stammering, in the author's view, is to be classified frankly side by side with the articulative disorders, as another, albeit quite different, manner of upset in Nature's well layed plan for normal speech development. And this statement is made with full realization of the fact that stammering is also rarely incited later in life, even as, through cerebral or peripheral disorders, articulative disturbances also may rarely supervene at a later life period.

PART I
UNDERLYING
PHYSIOLOGICAL AND PSYCHOLOGICAL
CONSIDERATIONS

Definition and Characteristics

To the observer stammering presents itself as a series of abrupt holdings, repetitions, and stoppages in the speech, through which the natural smooth flow of words is interfered with or the speech completely blocked. To the sufferer, stammering consists on its peripheral side in successive muscular tensions and spasms somewhere in the region of the peripheral musculature of speech; and on its central side in more or less profound psychical disturbance. The articulative disorders of speech are fixed and unvarying almost regardless of time, place or circumstances. Stammering, however, is characteristically variable both as to occurrence, or non-occurrence, and as to intensity, depending on circumstances. Its manifestations may be almost, or even, at any rate so far as outward evidence is concerned, completely, in abeyance even for hours at a stretch. One may roughly in this connection compare the disorder of stammering with that of hay fever. An understanding of the latter disorder involves a differentiation into (1) An underlying peculiar susceptibility of the nasal mucosa to irritation; (2) Influences which incite this susceptibility to irritation into activity, and (3) the characteristic manifestations of the disorder. And likewise with stammering, an understanding of which demands differentiation of the phenomena of the disorder into: (1) An underlying susceptibility to the characteristic disturbance of speech; (2) influences which incite the stammering into activity; and (3) the characteristic manifestations in talking.

The most striking fact concerning the excitation of the underlying susceptibility in an individual subject to stam-

mering is the absence of disturbance of speech when the stammerer is reading, or talking to himself alone, or to his horse, or dog, or to very young children (if older persons be not within hearing distance). Exceptions to this almost absolute fact are uncommon, and, when exceptions do occur, the stammering is reduced to a mere pittance of its usual character. This great fact, that the presence of older children, or adult persons, is required for the awakening of the underlying susceptibility to stammering, holds practically universally. Not only that but the disorder varies characteristically both in frequency and intensity with the social circumstances, the personnel of the social group, the subject matter of the conversation, and the temporary physical and mental status of the stammerer himself. He may talk to one person with almost no tendency to stammer, and to another be quite unable to talk without severe manifestations, and this marked influence of these two personalities on the stammerer may go on through an indefinite period of time. Under certain circumstances the sufferer may talk smoothly to certain persons, and under other circumstances he may with the same persons stammer seriously. The susceptibility to stammering is, then, aroused only when talking to people, and is aroused variably in conformance with altered personnel of the conversers and with altered conversational circumstances.

Talking in whisper and singing are usually stammer free, without, so far as the author knows, much reference to surrounding circumstances. No class of persons, and no nationality (in so far as the nationalities have been observed in this connection) are stammer free. Females are much less subject to the disorder than males. No manner of personality is exempt from attack, although temperamental characteristics influence the development of the underlying susceptibility.

Considerations Respecting the Peripheral Phenomena of Stammering

Among students of stammering the custom has been uni-

versal, I believe, to discuss the physical phenomena of the disorder in terms of sounds. An author, for example, may speak of stammering "in passing from the B to the O sound," and the like. Nothing could be better calculated to bring about vagueness of apprehension where exactness is necessary to clear understanding. Spoken sounds, or spoken words are not in themselves muscular movements, but are the result of muscular movements. This muscular effort is exceedingly complex, quickly performed, exact and delicate. Clearness of thought demands that we think in terms capable of visualizing the perverted muscular phenomena. and not in terms which but vaguely suggest such phenomena.

"Stammering" as a technical term applied to the definite physiological disturbances designated by that term, has no application excepting where actual peripheral muscular action undergoes perversion. In other words, in "stammering" a peripheral attempt at speech is made and this attempt is perverted by distorted muscular action. This disturbance of action affecting the muscle itself is the phenomenon which characterizes stammering. Suppose, for example, that through psychical disturbance the proper neurological command to the peripheral apparatus of speech be not forthcoming, and no word or sound ensue, if this phenomenon be not accompanied by peripheral disturbed muscular effort the act is not "stammering." In some stammerers an effort to talk, attended with profound psychical disturbance, may be abortive; if the effort to talk were persisted in a decided muscular struggle would inevitably result; the absence of such struggle is not evidence that stammering occurs without muscular disturbance; it is evidence, merely, of the realization on the part of the stammerer of what must ensue if effort to talk is continued, and the consequent inhibition for the time of the effort to talk. After all, it is this perverted muscular phenomenon which has to be explained. No amount of mere psychical disturbance, as such, can possibly constitute an explanation of stammering, unless the connection between psychical dis-

turbance and peripheral muscular perversion be also made clear. Stammering is certainly not a purely psychical disorder. The application of presumed psychical disturbance to the peripheral muscular disturbance is the key which has been but vaguely conceived and which may be able to help to open the lock of etiological understanding.

*Considerations Respecting the Peripheral Physiology
of Speech*

Remembering that stammering consists physically in spasmodic muscular disturbance of normal action in the peripheral speech territory, it will be necessary to examine more carefully into the nature of the muscular processes of speech. The production of any spoken sound involves four classes of muscular action: (1) Compression of the chest wall upon the lungs; (2) placement of the articulative organs of the mouth (including the soft palate) into their proper mould-positions required to produce the sound to be enunciated; (3) the placement and bracing of the larynx (by the extrinsic muscles) for the particular work to be done; and (4) the approximation (by the intrinsic muscles) of the vocal cords.

In this connection the first important consideration from the standpoint of stammering has reference to the peculiar and important relation in action between the articulative mechanism of speech and the extrinsic and the intrinsic mechanisms of the larynx. The employment in speech of these three in a measure distinct mechanisms occurs necessarily in series in the order, (1) articulative, (2) extrinsic—laryngeal, and (3) intrinsic—laryngeal. This action in series is required primarily because of the intimate muscular relation between the hyoid bone and the base of the tongue. Until the position of the tongue for the particular articulative mould has been determined the extrinsic muscles of the larynx cannot know the kind of action required of them for the bracing of the larynx; and until the body of the larynx, including the thyroid and cricoid cartilages, has become firmly braced the intrinsic muscles are not able to

act normally. Also, since the action of all these three mechanisms is useless without the more fundamental compression of the air in the lungs for its action on the vocal cords, the series action (a form of co-ordination) may be considered to consist of (1) chest compression; (2) articulative mould formation; (3) extrinsic laryngeal fixation; (4) approximation of vocal cords. Other reasons, not to be taken up here, tend to confirm this idea that the series-action takes its beginning with the chest musculature; apparently the articulative and laryngeal mechanisms await the cue afforded by the compression of the chest. This action in series of the musculature of the speech apparatus necessitates, of course, that the underlying psychoneurologic excitation should also be in series. It is for the exact placement of these wonderfully complex movements in speech that very much of five or more years of the child's life are required.

The second important consideration with reference to the peripheral musculature has reference to the possibilities of action of each of the four peripheral mechanisms and also of the soft palate with respect to, (a) the capability of each mechanism to act independently of its fellows, and (b) the capability of each to act by conscious, voluntary control.

The chest is capable of conscious compressive control independently of speech production. The mouth organs (tongue, lower jaw) are capable of general conscious control, and, although they cannot be placed for every mould without thinking of the sound to be produced, the intensity of their action in any mould position is consciously controllable. The complete closing of the vocal cords is consciously possible without thinking of producing a sound, especially in connection with chest compression. This action comes much into employment in the act of coughing. The fixation of the larynx by the extrinsic laryngeal muscles is impossible without thinking of producing a sound but the intensity of muscular action in the process of fixation is largely controllable. Of the speech musculature there re-

mains only that of the soft palate, and this organ cannot ordinarily be moved consciously, excepting through thinking of a sound to be produced (excepting in swallowing and gargling), and the action of its musculature cannot directly be consciously altered in intensity during the production of a sound. This exceptional incapability of voluntary holding in respect to the soft palate seems to throw light on the nature of the peripheral muscular disturbance in stammering and will be referred to later.

Each peripheral mechanism supplies its own force through action of its own muscles—chest, mouth, palate, larynx extrinsic and larynx intrinsic—and each mechanism is, to the extent we have seen, capable of acting out of harmony with the others. All peripheral movements must for correct speech production be accomplished instantly, delicately, accurately, and with great rapidity. Now if overaction from whatever cause be applied to one mechanism, or to a muscle group within one mechanism, this overaction interferes with the required instant production of the next act in the series, and thus the series-action required for speech production for the moment fails of complete realization and the machine becomes disturbed in action, or blocked. Thus is explained in a general manner the mechanics of stammering. For, a holding in any part of the speech machine effectually interferes with the action for word production of the other parts, wherever that inco-ordination may occur.

Concerning the Psychology of the Speech Development Period

The child exists in a world of objects and activities, which, through the entering channels of the sense organs, are continually impressing the potentially capable, but still undeveloped and unimpressed, childish mind. Step by step the auditory word center begins to become charged with the sounds of the language, at first with extremely crude impressions. The action of the peripheral organs of speech is initiated at the very beginning of life, when breathing and swallowing and crying, and, later, babbling, constitute

the child's natural activities. Even the systematized serial action of the complex speech machine is exercised a little later, by the playful efforts at imitation of his own sounds, even before attempt at imitation of spoken words has begun. But only at this point, when the child actually attempts to produce the words he hears, does the education of the motor word center properly begin. It is the function of this center to store the memories of the neuro-muscular acts required for the production of spoken sounds, syllables, and words.

From these primitive primary conditions, when the childish mind is feeling crudely its own self-consciousness, as well as its relationship to the outer world, when the store rooms of the brain are well nigh empty of ideas, that the potential possibilities of the cerebral centers for speech and of the peripheral organs of speech, enter on their processes of education and development. The problem is for the child to re-create on his own physical apparatus the same sounds he hears produced on others constructed almost identically like his own. And so the learning to play his own speech apparatus under these initially difficult conditions becomes the chief purpose of the early years of the child's life. By close observation one may become cognizant of the struggle of the child as he stumbles along in his early efforts to materialize his thought into words. The memories of the auditory word center are crude, or lacking, the development of the mind is primitive, the motor word center is relatively blank, the capability of attention is childish, and, perhaps above all, the peripheral musculature is clumsy, complex in its requirements, and untrained for its work. The struggle and persistence required for speech development is best appreciated by realizing the number of years of constant effort ordinarily required for its accomplishment.

This period of years involves, also, as has been suggested, the process of establishing the child's realization of himself and the world he has been ushered into. It is a period of peculiarly confusional psychology. It is a period when knowledge, experience, and capability of reasoning are lacking, a period when most things are doubtful and mys-

terious because not understood; a period of inability to measure relations and events truly; a period of exaggerations, when a molehill of difficulty appears like a mountain, because relative sizes cannot be measured; a period when the very atmosphere is peopled with apprehensions; when almost everything presents its own mystery and consequent fear; and it is, of course, consequently, a period of ready susceptibility to psychological disturbance.

The processes of speech development are so instinctive as to be almost as imperative as eating, and even as imperative as walking. In this generally sub-conscious process of development of the speech conscious effort has also a part, but of just what character and degree is hard to determine. Probably this conscious effort is applied chiefly towards a vague attempt at exactness of imitation, and is more manifest in accordance with definiteness of such effort; and it plays a larger part as the child grows older, and the pronunciation approaches nearer to normal. This conscious effort is comparable, if the childishness of the effort and the active imitative instincts be kept well in mind, to the effort at correctness of pronunciation required by the adult for the learning of a new language. Its object is not directly muscular control, but the attainment of standards of sounds; consequently the neuro-muscular acts of speech are not impressed on the mind. The child attains to the particular sound without acquiring a knowledge of the muscular acts which produce it. Such conscious effort is concerned almost solely with the articulative processes.

The instinct to express the childish experiences, desires, and thoughts keeps in constant effort this complex process of speech development. The psycho-neurologico-muscular memories grow more and more true and more and more deep. The speech is becoming the constantly active medium for thinking and for the expression of thinking. As the psycho-nerological grooves become permanent and are repeated in exactly the same way with each repetition, the memories become deeper and deeper. Before the seventh or eighth year ordinarily such speech memories may,

through the acquirement of marked deafness, be quite quickly forgotten. After that period they have become more fixed and permanent. Before that period, progressively backwards in the direction of the beginnings of speech, these partly developed speech processes and memories are much more ready of disturbance; and forward beyond that period are progressively less ready of disturbance. Stammering represents one of the very few disorders capable of producing permanent disruption of this process of development. It creeps in usually when the processes of speech are extremely crude, a few months, or a year, or two years, or a few years, after the speech has been begun, and fastens itself like a blight on this wonderful natural function. What it is and how it gets its terrible blighting hold, is our problem.

The Emotions of Social Intercourse

Emotional perturbation due to the social interrelations of life, so far from being confined to stammerers, is a great fundamental fact in human life, and to some degree is universal in men regardless of stammering. Indeed this emotional perturbation of social intercourse is so common as to be accepted as a matter of course, and as hardly calling for psychological analysis. And yet this human characteristic or, perhaps one should say, this human weakness, plays a profoundly important part in the lives and affairs of human beings. Its importance, however, can in the nature of things be clearly evident only to those who suffer most seriously from it, and whose knowledge is therefore obtained through introspection. Only the severe sufferers are able to clearly realize its nature and the profundity of its influence. For its activity is subtle, is mental, is exercised from within, and is apt to show outwardly only its superficial manifestations. Indeed attempt at concealment by the sufferer is so characteristic as to constitute one of the manifestations of the disturbance. We shall call this phenomenon "the emotion engendered by social interrelations," or, for short, "social emotion."

Naturally if this emotional phenomenon plays so important a part in human relations it must be generally known, at any rate superficially, and that is true. Under different circumstances we call it "shyness," "embarrassment," or "stage fright." The content and manner of manifestation of "social emotion" is best studied in the highly susceptible adult individual, who does not stammer. Speaking now of the marked but not unusual manifestation of this disturbance one notices as its foundation an altered state of mind. Let us grant to any individual who is highly susceptible to "social emotion" a certain status of mental habit and content and activity which is natural to him. In this unperturbed mental state the mind acts normally. Mental clearness, memory, capability of attention, self-confidence, self-control, will, feelings, ease of manner and of conversation, initiative, all proceed naturally and without uneasiness. And, yet, in a moment this entire normality of mental content and activity may become through social emotion profoundly altered. The mind now is in a profound *status of emotion* of serious importance. This perversion of the mental state is not at all imagined, or unreal; it is a dominating reality. The individual has become mentally an altered person. He is now thoroughly ill at ease, being highly overwrought by his realization of what he knows must be a repetition of what he has suffered many times before. Whereas normally his mind has been free to attend to any process of thought upon which it might be focused, now the emotional "self-consciousness" compels direction of the mind on this very emotional disturbance. Mental clearness, memory, capability of attention, self-confidence, self control, will, feelings, ease of manner and of conversation, are all seriously clouded and impaired by the dominating emotion. It is as if the capillary circulation to the brain may have for the moment become clogged, thus disturbing and clouding all central cell activity; and this tentative theory of causation, if considered seriously, may not, in view of the well known emotional phenomenon of blushing, be so far out of the way. The personality has

lost its natural self-governing poise; it lies beneath; weighed down by emotion; realization that this state has resulted because of a deeply seated influence exerted by another person, or by demands of the social situation, is tantalizing; timidity is prominent; realization of the innate lack of self-poise and strength and self-confidence, and that this cringing is, or may become, known to others in the social group, intensifies the emotion. The will is perturbed and vacillating, being not easy of guidance. The initiation of speech is often difficult, and the emotion may actually prevent speaking, either through failure of the memories, or inhibition of the will, or tenseness of peripheral musculature. In another moment, if the social circumstances change, the emotion may vanish, leaving only evidence of strain on the nervous organization. The whole process may be repeated over and over endlessly through the years. When the individual is alone the idea of emotional disturbance is so far removed from the then normal state of mind as to seem almost impossible of occurrence.

The incitement into activity of the underlying susceptibility to "social emotion" is brought about by environmental conditions which play subtly on the emotionally highly sensitive and highly apprehensive nature of the individual. In a certain environment it may be entirely absent, unless aroused by the interjection of new circumstances. The susceptibility lies quite dormant when in association with some individuals but is overmasteringly aroused by others. Familiarity with circumstances tends to mitigate its manifestations. Social intercourse, however, is in general rendered very trying. Reciting in school or college is especially difficult.

The phenomenon seems to have a congenital origin and to be deeply interwoven into the very nature of the individual. Widely variant degrees of intensity of the disturbance are observable in the same and in different individuals. Some persons are very little susceptible, although none are wholly free from susceptibility. Susceptibility begins at least as early as the third year, is marked through child-

hood and youth and young manhood; but as the years bring wider experience and easy capability for the meeting of the duties of life, and bring a clearer understanding of people and their interrelations, the susceptibility to social emotion very gradually becomes buried in the more settled personality of the individual. But this commonly requires more than three-quarters of the normal span of life. To those individuals not highly susceptible the gravity here placed on the phenomenon will seem exaggerated, but those who are highly susceptible will know that the gravity and profundity of influence on life "of social emotion" at its greatest intensity *cannot* be exaggerated.

If, under the influence of "social emotion", the mental processes are so seriously disturbed such disturbance would be expected to react on the bodily movements engendered by the emotionally disturbed mind. The physical awkwardness of an embarrassed person is thus accounted for; such a person has not full command of his movements, and the musculature is not easily controlled. The novice who walks across a large room before the eyes of people is swayed by social emotion; the muscle sense which determines the correctness of effort is disturbed, and so the correct placement of the leg becomes uncertain. The emotionally susceptible surgeon operating before a group of persons may perceive a trembling of the operating hands; the steadiness of action, usually so secure, is wavering. If the emotionally perturbed individual talks, the muscles of the throat may become so tense as to render speaking difficult and the voice strained and unnatural; I have in mind an especially striking life-long example of this character in a highly sensitive, highly educated man now of fifty-six years. Public singers are much troubled by this muscle strain in the throat. The effect of "social emotion" on the muscles of the lips during speech is one of the most striking of these muscular phenomena. The lips become swollen, their feeling becomes unnatural, "woody", and their control in speech is difficult. This disturbance is especially trying to the sufferer because it makes his em-

barrassment more evident to others. In some stammerers one finds this disturbed actions of the lips in talking also carried along, as it seems, into the anterior part of the tongue.

PART II.

A STUDY INTO THE NATURE AND ORIGIN OF THE PHENOMENA OF STAMMERING.

The facts of determining importance thus far brought out are: (1) The dependence of the arousing of the susceptibility to stammering on the presence of other persons; (2) the initiation of the disorder in most cases not at the very beginning of speech but during the early months or years of the period of speech development; (3) the impulsive, immature, unreasoning, apprehensive, emotional character of the child's mental activities; (4) the unsettled, wobbly, half-developed state of both the mental and physical processes of speech in the young child; (5) the great complexity and the action-in-series of the peripheral musculature of speech; (6) the possibility of conscious overaction in any one of the divisions of the peripheral musculature, excepting that of the soft palate; (7) the psychologic effects and the importance of the phenomena of "social emotion". The chief problems to be inquired into are: (1) The origin and nature of the susceptibility to stammering; and (2) the causes which arouse the susceptibility into action. For convenience the second of these two problems will be approached first.

The Excitation of the Underlying Susceptibility to Stammering Into Activity

All of the above reference to the phenomena of "social emotion" would have no place in this study if it had not a definite bearing on stammering. First, let it be understood that the perturbed state of mind of the stammerer is identical to the minutest detail to that of the "social emo-

tion" of the non-stammerer. In other words, when the stammerer stammers his state of mind is identical with that of the non-stammerer who is experiencing the emotional disturbance described as "social emotion". This is the author's observation. Other writers on stammering commonly speak of the stammerer's emotion, but it is the author's desire to clearly identify "social emotion" as a universal human phenomenon, and to point out the exact identity of this phenomenon with the mental disturbance of the stammerer, and, furthermore, to point out the presence or absence, the severity or lightness, of the stammering, in precise accord with the conditions which increase or diminish "social emotion" in the non-stammerer.

Other writers, notably Dr. H. Gutzmann, lay much stress upon stammering as a *producer* of emotion, but deny its causative relation to stammering. However, Dr. Gutzmann admits freely the influence of emotion in increasing the intensity of the disorder, although, as I have said, denying its fundamental causative influence. This author analyzes at length the causes of stammering¹. He finds psychical causes clearly present in, (1) stammering following intense emotional excitement (intense fright or anxiety, for example), and (2) psychical contagion (imitation). In general, however, he agrees with Kussmaul, whose disciple he is, that "stammering is an involuntary spastic co-ordination neurosis". He is certain with many other authors that stammering is often closely involved in psychical disturbance but generally the disorder is, he believes, not a psychosis but is a "co-ordination neurosis", although he does not offer an explanation for the neurosis. He does offer, however, certain "predisposing causes" for such a neurosis, which, however, he realizes, are present in only a part of the cases. For example, unusual temperamental excitability, and excessive rapidity of thought as compared with the slow ability to peripheral speech production, leading to confusion of peripheral speech action. This is good

¹ Sprachheilkunde, Berlin, 1912; page 373 and following.

so far as it goes, but it does not go far enough either backwards into the psychical direction, or forwards deep enough into the peripheral end of the speech physiology. During his entire discussion this author impresses one as strenuously attempting to escape from the emotional causative net which his own reasoning keeps involving him in deeper and deeper. When thoroughly interwoven in the net he yet finds a loop hole of a relatively unimportant fact through which to crawl out.

In the first place Dr. Gutzmann gives no clear realization on the etiological side of the highly significant variations in the circumstances under which the manifestations of stammering occur, and especially leaves unmentioned in the causative connection the crucial fact that when not in the presence of other persons stammering is always practically in abeyance. He gives no evidence of his realization of the existence of important definite emotional phenomena arising in non-stammerers through social relations, although he recognizes "depressive emotion", meaning embarrassment and the like. He believes that stammerers are not ordinarily in childhood in a state of emotion, and lays great importance on the fact that certain adult stammerers in his acquaintance have declared to him the absence of emotion during their stammering. And yet he fails to ask or answer the question which would help so much to settle the point at issue, do these individuals stammer when talking or reading to themselves alone, or to dogs, or young children; or in general does their stammering vary as to circumstances, which manner of variation might demonstrate its dependence on the changing social circumstances? Moreover Dr. Gutzmann does not give evidence of realizing at all that stammering which had had as its ultimate cause a fundamental emotion might continue as a life habit for years after maturity had practically banished the earlier emotional states. Nor does this author note the tendency of emotional people to conceal the existence of their emotion, which seems to them to speak for humiliation. One must ask also how Dr. Gutzmann knows

that children do not experience embarrassment, even when this is not outwardly evident? Children often even struggle to conceal their emotion. Here again he omits the one test which would doubtless disprove his observation, does the child stammer when talking to himself alone?

But Dr. Gutzmann finds "depressive emotion" in stammerers in abundance, but chiefly as a *result* of the stammering. And yet he grants at any rate a subordinate effect of emotion in producing stammering in certain relations. "Embarrassment caused by reciting alone before his fellows is capable of making small abnormalities more pronounced"¹—thus "social emotion" may increase the intensity of stammering, although it may not initiate it. And yet under circumstances incapable of arousing social emotion in this child, he would not stammer—especially when every vestige of emotional cause were removed, as when he were talking alone to himself or to his dog. Dr. Gutzmann is compelled to emphasize the marked incitation of stammering; as well as its increase in intensity, during the first school year, and is puzzled by it. But is not this step—the passing from out the protection of the home into the great outer world—one of the crucial steps in the life of the child? In the especially susceptible it commonly constitutes a notable period of increase in "social emotion." "Character, predisposition, anxiety, bashfulness, embarrassment and timidity constitute strong predispositions to speech trouble. A person who is anxious and timid will never speak so finely as one of courage and self-confidence. While it is undoubtedly certain that such peculiarities of character are developed from speech disorders, it is also true that the speech disturbance may itself be secondary."² At last, even against all effort to hold the bag tight, the cat is out—"speech disturbance" may result from "social emotion".

Having granted the existence of a disposition to stammer

¹ Ibid, page 378.

² Ibid, page 378.

in any individual Dr. Gutzmann freely admits that the stammering may be intensified even to the point of dumbness by the "depressive emotion" induced by the difficulty in talking. "I ask a child his name and he answers M—M—Max Schulze. I act as if I had not understood and have the answer repeated. Now the stammering on the M endures longer. And I press the child for a third time to tell his name, and it may happen that he actually cannot speak, that the spasm has become so intense that he remains holding and is dumb." With curious blindness to both fact and logic, with rigid inflexibility of attitude apparently due to a preconceived opinion, Dr. Gutzmann refuses to admit that the cause which he is certain intensifies the stammering in this child could not have been the occasion of inducing the stammering when the child *first* spoke. Does the author presume that the child experienced no embarrassment before he uttered his *first* reply? For, even according to the author he would in that case, being susceptible to stammering, presumably show some tendency to stammer. Thus Dr. Gutzmann's reasoning becomes based on so fine a presumptive thread that clear vision must rule that it does not (at any rate in this example) exist. Does this author not know that the same child could go at once out into the yard away from all persons and speak freely a hundred times without the shadow of hesitation? But that at once in the presence of the great physician his natural ease of mind and body are more or less tied down by emotional perturbation?

"One finds numerous stammerers in the schools, when all the psychic causes exist which ordinarily increase the stammering, who talk excellently",—therefore this stammering is not psychogenetic. "It happens with children that stammering occurs with friends and play fellows but is in abeyance with teachers",—then, since, in a group of children susceptible to stammering, when the social circumstances capable of arousing emotion are identical for each child, some stammer and others do not, therefore the stammering is not aroused by emotion—such is his argument.

From my own experience with stammerers I could bring almost endless pictures of similar peculiarities. For example, one stammerer talks to me with complete freedom from stammering, while another stammers at his worst. A brother and sister both stammer; the brother stammers scarcely at all while at home, and yet the sister under the same circumstances experiences her greatest difficulty. Precisely similar occurrences are common in non-stammerers who are subject to "social emotion". Turning for a moment to manifestations of emotion without the realm of speech, one notes that a certain individual promptly faints away when he sees an accident on the street; another finds it unthinkable to faint under the same circumstances. The explanation is clearly accounted for by the complexity of human physiology and psychology. Likewise if we were built alike there would be no differences of sex emotionalism, thus leading to infinite clashing in the struggle to possess the same man or the same woman, and so on without end. How, let us ask Dr. Gutzmann, could it possibly happen, that, of two stammerers one of whom should habitually, time after time, react to the same circumstances differently from the other, one stammering and the other not, excepting through different emotional states set up in each of the two stammerers?

The excitation of emotion is determined by the peculiarities in the personality, in the experiences of the individual and in the temporary, or lasting, physical and nervous normality or disturbed normality, of the individual. No two persons can possibly be emotionalized always by exactly the same circumstances. If all stammerers were incited to stammer by identically the same circumstances we must conclude that stammering could not be caused by emotion. In other words the very facts which Dr. Gutzmann here advances in condemnation of this emotion-genetic theory are the very facts which incontrovertibly prove that theory. The stammerer goes about the world praying that he may not meet with conditions which arouse his "social emotion", for if he does not he will not stammer. It is highly charac-

teristic) two typical examples flash into my mind as I write) that certain lightly susceptible individuals stammer objectively almost not at all excepting under certain conditions which deeply arouse their social apprehensions. In each of the cases in mind stammering practically never occurs excepting when called upon to recite in, not all, but in only a certain one, of their high school classes; and this is a practically regular experience. How characteristic this is of emotion; and what else could possibly explain the difficulty in talking? These two boys experienced concealed difficulties in talking under less trying circumstances—neither was an extreme subject of “social emotion”—but the uncontrollable outbreaks appeared only when the extreme emotional tests arose.

Now, in order to clinch in an unbreakable chain of fact, his belief that the Kussmaul conception—that “stammering is a co-ordination neurosis, resting on a congenetally excitable (reizbaren) weakness of the articulative apparatus”—Dr. Gutzmann triumphantly brings forward certain recent discoveries of “the newer application of experimental phonetics”. Thus he and others have learned that stammerers do not control the chest muscles in making long expirations so perfectly as non-stammerers. This fact proves the underlying “weakness” of the speech musculature. Likewise, when the application of the chest action to prolonged production of vowel sounds, a like relative imperfection of control in the stammerer occurs. One “finds clear evidence of weakening, one finds a light tremolo, an irregularity of strength, a lack of skill in holding the tone regularly on the voice pitch. Thus one may be easily convinced that even when a stammerer is evidently talking smoothly he makes imperfect movements. Yes, there are stammerers in whom actual hesitation (Anstoss) seldom occurs, and who apparently speak smoothly, but who suffer subjectively from their own imperfect manner of speech, and they are well aware of it.”¹

¹ Ibid, page 393.

Unless experiments upon human beings take carefully into consideration human factors which might subvert otherwise well founded conclusions they are clearly open to criticism. Throughout Dr. Gutzmann's argument he shows an obvious inappreciation of the severity and importance of "social emotion" phenomena outside of stammerers and in stammerers outside of their stammering. When one grasps the fact that muscular tension is practically always present in stammerers, that stammerers continually talk under the painfully difficult sway of emotional muscular tension, and yet do not outwardly stammer, and when one remembers that stammerers have for years habitually talked with imperfect chest action, and, therefore, with wrongly trained musculature, he is prepared to fully discount the value of these experiments as bearing on etiology. And yet it is highly reasonable to believe that certain children do acquire command over the complex function of speech less perfectly than others, and that such a misfortune may have a bearing on the etiology of stammering. But such a developmental weakness must be demonstrated, if it is to be presented as a valuable etiological fact, before stammering has begun, and not after years of disturbed speech has rendered its diagnosis apart from stammering practically an impossibility.

Stammering then, is a peculiar susceptibility to spasmodic disturbance of the peripheral musculature of speech, manifested under the influence of certain causes which arouse this susceptibility into activity. Once the susceptibility has become established two great excitation influences may act to a certain degree independently of each other, although they usually do in fact act interdependently. The more fundamental of these two exciting influences, and the one upon which stammering positively and distinctively rests, in the author's view, is the phenomenon of "social emotion"; and the other is the *habit* of wrongness of psycho-neuromuscular action, determined by the repetitive character of the disorder. The habit factor can be more clearly discussed at a later point in this study.

The Origin of the Susceptibility to Stammering

The more fundamental problem, that relating to the origination of the susceptibility to stammering, is made very difficult because opportunity to study the very beginnings of the disturbance of the speech are scarce, and these opportunities are also not of sufficient closeness and duration for the solution of so difficult a problem. I have seen probably scarcely more than a half dozen children in whom the stammering has been known to have endured for less than one month, and even in these cases I have not had the opportunity for the close and persistent observation demanded by the difficulties of the problem.

The initiation of stammering occurs only with rarity at the very beginnings of speech. The susceptibility to the disorder is for some reason superimposed on the already normally acting developmental processes of speech production. What is it and why is it that such spasmodic tendency appears in these normally acting developmental processes? If Dr. Gutzmann should question the statement that the developmental processes of speech were proceeding normally in the child who later, say at three or four or five years, begins to stammer, if he should persist in the assertion that in such children a "congenitally excitable weakness of the articulative apparatus" exists, he would still be under the necessity of explaining what forces serve now, after months or years of normal activity, to bring this so-called "excitable weakness" into active disturbance. We may never be able to prove or disprove, the existence of such weakness previous to the manifestations of stammering. One fact is, however, certain, namely, of all the children who seemingly might possess such "congenital weakness" of the peripheral speech musculature only an extremely small fraction ever enter on stammering. And, moreover, many children who seemingly do not possess such fundamental weakness do become stammerers. All of this tends to the conclusion that any theory as to the cause of stammering based on the conception of a fundamental weakness

in the peripheral musculature is certainly, (1) on unsafe ground; and (2) is at best a partial explanation.

Let us not at this stage in the discussion lose track of certain basal facts relating to the child and to the disorder: (1) One of these facts concerns the uncertainty, the impulsiveness, the crudeness, the unreasoned immaturity, of all the psychical and muscular activities of the developing child. (2) Let us clearly recall also the fact that the muscular holdings of stammering are intensive in origin. Whatever be the condition of tension, or of vasomotor disturbance, in the peripheral musculature when the patient is not talking the spasmodic or pseudo-spasmodic holdings denoting stammering, occur only when the effort to speak has been set into action. (3) A childish impulsive, voluntary, or pseudo-voluntary holding, of the peripheral musculature during speech *might* be a factor in the incitation of stammering. This possibility will be discussed later. (4) Children are much more susceptible to social emotion than adults and from circumstances so slight as to be incapable of affecting the adult. (5) Whatever be the factors which incite the child into stammering these factors are themselves capable of, and in fact do habitually, undergo progressive increase in quickness of susceptibility to action and in intensity. Stammering is not only superimposed on the developing processes of speech, but the disordered processes on which the stammering depend themselves enter into this process of development. The beginnings of stammering which has become after a few years of the most extreme severity, may at the beginning have been too insignificant to cause any alarm. Unless one realizes this developmental factor in the disorder his picture of stammering is inadequate and untrue.

I am strongly inclined to believe that the broader our view with respect to these earliest causal possibilities the nearer we shall be to the truth. In view of the progressive character of the stammering phenomena and of the frequent seeming insignificance of the beginnings one should realize that not one but several different manners of mis-

direction of the child's efforts at speech production *might* open up the developmental road to stammering. And one must not lose sight of the great fact that the emotional side of the young child, in contrast to the reasoning side, is ever prominent and dominant.

One Manner of Inciting the Susceptibility to Stammer

The education of the motor word center is determined by the physiologic requirement of word production. This center, therefore, is painstakingly educated to produce speech sounds and their combinations. But does this preclude the possibility of its education to produce peripheral movements other than those required for speech sounds? Certainly not. This is readily proven by its education in certain instances to produce remarkably strange sounds, as in the more peculiar manifestations of imperfect articulation. It is in no manner far fetched to imagine a particular child wrongly educating the cerebral centers in their control of the peripheral speech musculature to odd and worse than useless purposes. If a child of, let us say, three years should set out purposelessly, under childish impulses not easy to determine, upon a process of educating the motor word center to peculiar speech movements during speech, and persisted in this purpose, no reason can be advanced for the failure of the success of the child in this peculiar wrongness of education. If, for example, a child, as children may, should happen accidentally to start to play with its speech production in the way of repeating, at first occasionally, the first sound of the word before producing it, and should persist in so doing, that child might thus become a stutterer. The false effort might through habit become fixed and persistent. In this connection one must give full importance to the earlier physiologic process involved in speech development, in which the child definitely imitates its own early crude efforts at speech. One has the best of ground for believing that these suppositious wrong efforts would be likely to be imitated and so repeated by the child. When, later, this child came to experience

definite social emotion and, consequently, embarrassment from this wrongness of habit began to manifest itself, as it certainly would, the added upset of a developing intensified social emotion, especially if the child were unusually susceptible to such emotion, and especially also if of an excitable disposition, might carry the disorder along even to serious stammering of the usual type. Such a process is true to the general clinical picture of certain cases of stammering. If such a child were not by nature highly excitable and not highly susceptible to social emotion, one would expect the disorder to gradually cease as the child became more mature. And this, too, is true to another aspect of the general clinical picture disclosed by stammerers.

Such an explanation of the onset of the susceptibility to stammering applies pretty closely to cases arising by imitation, or "social contagion". Considering the many opportunities for association with stammerers, imitation is relatively a rare occurrence. Either accidental social circumstances, or a chance childish impulsiveness, or, more likely, obscure but quite definite emotional states or tendencies, must account for the relatively occasional imitative development of the disorder. Given the objective source from which imitation may be begun, imitation may follow, a habit may tend more and more to be inculcated, and, finally, the influences of social emotion would tend to cause the speech disorder to become increasingly intense.

And yet one must eventually attempt to answer the question, is not a child incited to make these peculiar spontaneous essays at holding of the speech musculature, as well as the one who starts these holdings through imitation, in truth impelled to these beginnings through the obscure influences of emotions incited by social association? If this were on further observation found to be true, the one possibly weak point in the theory—an exact explanation of the onset and especially of the persistence of these faulty holdings—would be satisfied. Moreover the natural and highly probable connecting link between the development of the susceptibility to stammer, and the later incita-

tion of this susceptibility into activity by social emotion, would also be satisfied. Until, through observation, we are able to say that these slight repetitive holdings at the beginning of the disturbance are produced as well when alone and when not swayed by "social emotion" as when under such sway, we shall be unable to declare that stammering develops entirely apart from those emotional phenomena. For, very young stammerers, even of three, or four (as I have stated before) who have stammered for months, always (so far as my observation goes) show their characteristic disturbance with the same typical reference to social association as do their elders. If we were able to follow them back to the very beginning of the disorder, have we any good reason to presume the occasion of the manifestation of stammering would be altered? Indeed does not the regular manifestation of the established susceptibility in accordance with the manifestations of social emotion constitute in itself strong presumptive evidence of the dependence of the earliest manifestations on the same cause?

Types of Stammering During the First Weeks

At the very beginning of stammering I have noted two quite well defined types. In one the type is such as has just been mentioned. A child of thirty-four months (I have in mind a particular example) repeats on the beginning of the word, sometimes frequently within a short period of time and again only very rarely. He is always in motion, talks with childish crudeness of articulation, but not especially rapidly, and with no more than ordinary indication of emotion. As to speech disturbance when entirely alone I have been unable to learn.

In the second type the emotion is conspicuous, as is the excitableness. The child seems to be either in great distress as to the speech or is pretending to be. The speech movements are violently produced, and appear to be incited by the more or less conscious efforts of the child. This child recovered rapidly. Between these two types are less

typical modifications. I have never been able to learn with certainty how these children talked when not in association with others; although the father (a medical student) of a child of six, who had been stammering for only a few months, assured me, after observing his child at my suggestion, that no manifestations occurred when the child was talking to his baby brother.

A Second Manner of Origination of the Susceptibility to Stammering

Stammering is a perversion of the psycho-neuro muscular acts required for speech. These acts take their directive purpose from the motor word center. In developing children this center, being in the developmental stage, is attempting to do its work under the guidance of the sounds to be produced. Its standards are developing. The child is in no manner perturbed by failure to attain to a correct sound, unless, perhaps, it be not understood. This crudeness of action of the motor word center of itself alone is normal to the child, and is not, so long as no impulsive increase of muscular action occurs, subversive of the normal processes of speech development. But let the activities of the motor word center become perturbed, either by peripheral muscular failure to respond to its direction, or through perturbation arising from psychical disturbance, and then this directive control of the complex peripheral musculature has thereby been caused to go astray, the peripheral muscular series action has become disturbed, and a holding, or misdirection of the peripheral muscular action becomes inevitable. Thus the careful complex series of nervous impulses demanded, if each group of muscles is to be accorded its own proper relative intensity and direction, is, through confused incitation of the primary impulse, disturbed; some group or groups over act, or misact, the smooth interaction of the entire series is thrown out, and the speech becomes catchy and distorted. If this wrongly initiated impulse to speech action were made with little intensity the resulting localized muscular overaction would

be light, and a light stammering (for example, stuttering) would result, but if the impelling action were intense and explosive, severe spasm and severe stammering would be the outcome. What seems to be required is unguided, or misguided, nervous impulse for setting into operation the peripheral musculature.

Confused precipitation of misdirected effort at speech production is, then, required to produce stammering. If confusion and precipitation become severe the mental state and its resulting muscular overaction may be best described as a psycho-muscular *panic*. The "precipitation" element required for stammering is provided for by the social conditions of speech, and depends upon the impelling seeming necessity under the eyes of the people about, of going on with the talking. Involved in such a situation is an element of "social emotion." The "confusional" element is necessarily central as to the point of perversion, but may be peripheral, or central, as to its inciting cause. Peripherally such a cause must serve to instill in the central controlling mechanism an element of doubt as to the reliability of the peripheral muscular apparatus for carrying out the central commands. Such peripheral doubt might be due to (1) Dr. Gutzmann's theoretical peripheral "weakness" for this function, or (2) nervous, or vaso-motor, or muscular (for example; tension) impairment of peripheral normality, resulting from social emotion; or (3) relative sluggishness and unskillfulness of the peripheral musculature,¹ or (4) to other causes not yet understood.

Central causes for confusional misdirection of the motor word center might include: (1) marked nervous shock, resulting usually from severe fright. The cause of such severe upset may from the adult standpoint seem insignificant, and yet the effect on the child be profound. One effect of such shock is the inculcation of a marked susceptibility to emotional perturbation. This is a common basis for the inculcation of a susceptibility to stammering. (2)

¹ Blume and H. Gutzmann: Sprachheilkunde, page 375.

Confusion with respect to the thought to be expressed; such a cause would not be likely to operate sufficiently often to inculcate stammering, excepting as influenced by a marked tendency to emotional disturbance. (3) Impairment of the sound picture emanating from the sensory word center (for example, the particular conception of Dr. C. S. Bluemel)¹. The general psychical picture of the stammerer is not of individuals who lack in readiness for words, or for correct pronunciation. On the other hand the general picture is more apt to be that of individuals readily capable in the use of words and in their enunciation. A temporary marked disturbance in the action of the sensory word center is entirely possible, but only, I think, as a manifestation of emotional perturbation. Mental weariness, or dullness (from lack of general physical exercise, for example), or emotional upset (from social causes, as stage fright, for example) are all capable of impairing the memory, including the memory center for words. The theory of Dr. Bluemel as to the cause of stammering involves, in my view, fundamental errors in observation as to the peripheral phenomena of stammering, which make his theory as an explanation of stammering untenable. But it is entirely possible, and even probable, that emotional disturbance of the sensory word center plays a certain part in producing the confusional wrongness of speech action of the stammerer. (4) Impairment in the "visualization" affecting the thought to be expressed². Much of the thought above mentioned "(3)" would apply here. The stammerer is not typically dull in "visualization" or other mental capabilities, unless it be temporarily, when under the sway of emotion, as he is when he stammers or fears stammering. Then the confusion of thought may be decided. This discovery of Dr. Swift I would interpret as but one of the protean effects on the mind of "social emotion." (5) General cerebral upset due to social emotion. The tendency to

¹ C. S. Bluemel, 1913; "Stammering and Cognate Defects of Speech".

² Dr. Walter B. Swift: "A Psychological Analysis of Stuttering". The Journal of Abnormal Psychology—October, November, 1915.

emotional disturbance may have various underlying encouragements, as will be mentioned later. In the author's judgment it is at present impossible to find a basis for the confusional speech panic of the stammerer excepting with emotional perturbation as its cause. (5) Other possible explanations not yet understood.

We have now discussed the probable incitation to stammering through childish misdirection of peripheral speech action, which later through processes of habit and of emotional developmental accentuation tends to take on the usual confusional misdirected precipitation of the speech; and we have just discussed the possible causes which might incite this order of confusional panic more directly. The mind of the little child has not yet attained to a state of development which enables reason and self-control to measure the factors of the situation and to set going processes of inhibition. On the other hand the young child is much more likely to fall in with the confusional speech panic above described and to encourage it, and this confused voluntary encouragement is often evident to the close observer. Adult stammerers sometimes declare that it seems to them that they *hold* their throats and *prevent* their own speech. Such confusional pseudo-voluntary holdings would tend to be determined by the location of the pathologic muscular tensions present, and the muscular regions most easy of voluntary guidance, as well as by the particular articulative positions then in action. Later in this study it is the author's intention to analyze the evidence tending to indicate an element of conscious holding in all stammering.

The conditions then, which shall in the individual case determine the onset of the susceptibility to stammer may concern minor, or severer, central or peripheral, disturbance, (1) in the developmental physiologic processes, (2) in peculiarities of character and disposition (excitability, emotionalism, etc.), (3) in the great variety of possibilities of social circumstances leading to social stress and, (4) also in other more or less accidental circumstances. Two or more of these disturbing conditions are apt to be inter-

blended. The initial circumstances and the initial disturbance may be so slight as to give little or no suspicion of the developmental possibilities. For example, the nervous excitation resulting from a seemingly minor nervous shock, as from fright, if persistent, may so upset the emotional stability as to produce the light, panicky, psycho-muscular misdirection required for inciting the disorder. The tonsil-adenoid operation does at times so act. An unusual degree of nervous excitability predisposes to such beginnings of the disorder, by encouraging nervous precipitation in talking in a child not skilled in the use of the peripheral musculature. This is offered, as has been mentioned, by Blume and H. Gutzmann, and seems to the author highly probable. Circumstances which awaken strong "social emotion," as the first weeks at school, especially if this be coupled with natural over excitability, are predisposing social conditions. Prolonged disease, or prolonged convalescence at times temporarily arrest altogether the developing speech. By impairment of the physiological processes generally disease is liable to increase both the nervous and the emotional excitability, and to make temporarily less sure all psychical, nervous, and muscular developmental processes; these facts account for the relatively common advent of stammering following the diseases of childhood. "Psychical Contagion" (imitation) is well known as an exciting cause. Who can tell the reason for the failure of many children to develop one or a few articulating moulds correctly? Who can possibly have such insight into childish psychology as to understand fully the relatively slight psycho-emotional states, which, however, although slight, may be capable of setting going the developmental processes leading to stammering. And, finally, what part may confused voluntary effort play in this whole matter of stammering?

Stammering is Itself a Developmental Disorder

But if one is to understand stammering in its completeness it is necessary to realize that the disturbing phenomena take their origin at the period when the developmental

processes of speech, as of mind and body, are acting at their greatest intensity. At this period in the child's life nothing remains fixed; every activity is looking forward to change—change which should point towards greater physiologic perfection of action. But woe to the child who at this period makes a false start on any process capable of development wrongly. The great fact that we must come to understand is that these slight beginning disturbances are capable of setting going pathological developmental processes capable of upsetting the entire life of the child. We must come to realize that childhood is especially the period of danger with respect to habit formation. In this respect any persisting perversion of physiological processes is likely to be important. The psycho-nervous grooves which determine habit have not as yet been more than lightly formed. The plasticity of the cerebral substance lies, as it were, fallow for what-so-ever processes, right or wrong, that the child shall insist upon employing it for. When for whatever be the reason the motor word center day after day and week after week acts wrongly, and when day after day and week after week the normal series-action of the peripheral muscles of speech is perverted, the habit grooves, psychical, nervous and peripheral, grow deeper and broader, are more easily entered and more difficult of escape, while the intensity of perversive action, and the consequent depth of the plunge, all tend to progressive increase. What may at its incitation have been at least partly voluntary becomes, through involvement in these serious developmental—habit processes, chiefly, if not entirely, involuntary. All of this constitutes one side of the terrible habit feature of stammering.

But on the emotional side a still more terrible developmental—habit process goes on. Once the beginning stammerer becomes cognizant even to a partial and childish degree of the terrible predicament into which his disturbed speech has precipitated him, the attacks of "social emotion" are bound to become progressively more and more easily produced and more and more intense. Such manifestations

tend to grow into pathologic exaggerations of a susceptibility to which human beings are all to some degree subject. Fully developed and perverted in the stammerer they become one of life's most serious physiological perversions. When this pathologic emotional state is in full activity the sufferer for the moment has reached a state of practical helplessness. He has for the moment ceased psychically to be a normally controlled human being. Moreover the character of the stammerer, as well as his attitude towards life in general, react to this terrifying inability for normal self-expression. He is apt to become intensely self-centered, morbidly fearful of all social contacts, self-conscious, morose, and unhappy. He loses developmentally the social courage and strength required to fight successfully his own infirmity. These developmental habit factors are, of course, intrinsic elements of the disorder of stammering.

Moreover it must be realized further that as stammering continues, the wrongness of cerebro-neuro-physical education concerned with the inculcation of the disordered muscular action involves the immediate association of social emotion with the habit of wrongness of action. The two become through this pathologic process of education largely inseparable; so that misdirected muscular action occurs almost solely when preceded and instigated by "social emotion;" when emotion is not present the normal habit of correctness of muscular action is to be expected and almost always occurs. Wrongness of habit of muscular action, separable from "social emotion," does, however, play a much lesser part in stammering.

Conflict Between Normal and Disturbed Speech Action

But still another important consideration must again be called to our attention. If stammering were nothing more than a developmental habit the typical disorder would be continuous. One must reckon with the fact that, while to be sure disordered speech occurs in abundance, normal speech also occurs, sometimes in greater abundance than the disordered speech. The normal and abnormal proceed

in the same person alternately.

It now becomes evident that the psycho-neuro-physical processes concerned with speech in the stammerer involve continually a conflict between the domination of emotional (stammering) or non-emotional (smooth) speech. The reason why the disordered speech tends to keep the upper-hand is because the normal speech is subconscious and, therefore, not fully directible, since conscious intelligence cannot well be applied to its correction. Once the tendency to disordered speech is set going counter corrective effort becomes only weakly applicable, because the sufferer has never acquired a conscious understanding of what is necessary to produce speech normally. His efforts at correction are usually to a degree mistaken and very often tend distinctly to increase rather than to diminish the stammering.

And yet the confusional misdirection and overaction of the psycho-muscular acts in stammering tend strongly at all times to right themselves. This corrective tendency results from the long training to normal action of the psychical, nervous, and muscular factors of speech. All the pre-stammering developmental normal acts of speech, all normal breathing, all speech (singing included) which takes place without stammering phenomena, efforts at psychical and physical control, all experience (by tending to lessen "social emotion"), work towards this corrective tendency. Indeed in one of its aspects stammering may rightly be viewed as a struggle between perturbed psycho-physical action, and a strong, more fundamental tendency to reversion to the normal psycho-physical processes. Once the misdirected muscular holding is, through the necessity for breathing, or through psychical self-control temporarily arrested, the deeper normal psycho-physical habit processes tend to temporarily again gain the mastery. The word may then be completed under the sway of the relatively normal action of the motor word center, and this normality of action may keep up through that sentence or even beyond. In the course of years these deeper normal tendencies usually gain practically complete mastery.

The Voluntary Element in Stammering

We have already mentioned the obscure but actual effort consciously made by the child in the development of speech, an effort directed particularly towards perfecting the sounds by exact placement of the articulative moulds. When in a state of emotional excitement, being impelled by the situation to plunge on with the talking, what is more natural for the child than to confusedly, excitedly, half-voluntary overact in the mouth or laryngeal region. This supposition is fully confirmed by the evident voluntary muscular holding in some very young stammerers. Even in certain young stammering children one suspects a conscious muscular holding carried out quite deliberately in the way of childish reaction to the self-realized embarrassment. On the other hand in some very young relatively recent stammerers the spasmodic action is sudden and violent and precludes any possibility of more than the minimum of voluntary effort. In some young adult stammerers an accentuation of the muscular holdings of the stammering is evidently produced voluntarily, apparently in the way of an effort to make the struggle appear more terrible, in order to gain the sympathy and understanding of other persons. In the author's interpretation of his observations it seems to him clear, that a confused half-voluntary muscular effort may in some cases constitute, with other causative factors, an element in producing the disordered effort of stammering. Mr. Ernest Tompkins,¹ in 1916 published a monograph in which he offers as the explanation of stammering the substitution by the child of a wrongly directed conscious effort to produce speech, in place of the normal subconscious effort. Years before that monograph appeared the present author had begun to struggle with an explanation of this voluntary element in stammering, which he had seemed to discern. To boldly offer this conscious misdirected effort as an explanation of stammering without explanation of the more

¹ "Stammering and Its Extirpation," by Ernest Tompkins; The Pedagogical Seminary; June, 1916; page 153.

difficult and subtle psychologic and physical phases of the disorder which must underly such conscious effort, seems but to state a fact (if it be a fact) connected with the disorder, without explaining that fact or explaining the disorder. But Mr. Tompkins was the first, so far as I know, to express in print the idea that stammering might be incited by voluntary effort.

One observation with respect to the peripheral phenomena of stammering has seemed to the author to point with much directness to the presence of a voluntary element in all stammering, at any rate at the time of its incitation. This is the failure of the soft palate to become spasmodically involved. If the soft palate entered into muscular spasm during the act of speech the voice must show such spasmodic struggling in more or less of spasmodic nasalizing of the voice (*rhinolalia aperta*), and this the author has never seen. When in a stammerer the voice is nasal—and this is relatively as common as in non-stammerers—the nasalizing occurs in exactly the same manner and degree whether the individual is stammering or not; it possesses no spasmodic element; and it is due to conditions having no relationship to the stammering. In view of the fact, already stated, that the functioning of the soft palate is the only division of the various peripheral muscular acts of speech, over which the will can not exercise voluntary increase of muscular action, it is fair to question whether all stammering may not possess at its incitation an actual, even though obscure, voluntary element. Otherwise one is compelled to question why the soft palate does not also enter into spasm, a very difficult query to answer. Let it be understood that underlying any such voluntary act, which usually is buried in a mass of confused emotional subconscious effort, is the wholly involuntary *emotional* state. Also through much repetition an originally voluntary effort tends to pass completely into the realm of the involuntary.

If we follow certain young stammerers in the development of their disorder we perceive certain quick pseudo-spasmodic movements to arise without the direct realm of

the peripheral speech musculature—face, arms, chest, legs, etc. These "*Mit bewegungen*" of the german literature, or let us call them in English, associated movements, are in the opinion of Liebmann and others, including the author, very largely a conscious voluntary product of the emotional excitement of the sufferer. They may in part originate in a call for sympathy and in part in a vague struggle against the holdings in the speech region proper. But in this connection I wish to point out their confused voluntary character and their dependence on emotional excitement. And the causes of their origin may not be so remote in character from the origin of the stammering itself.

Onset of Stammering Later in Life

Thus far we have confined our discussion to the incitation of stammering in the young child. One of the striking facts with respect to the disorder is the evident difficulty of onset after the speech processes have become permanently established. It is doubtful whether one in two, or even three, or four hundred, cases is initiated after the eighth year of life. Most of these later cases develop during, or about the period of puberty. At this time not only are the emotional processes active but also the physical conditions of speech undergo change. Another disturbance of the speech not directly concerned with stammering, falsetto voice, develops also at this time. It is worthy of note that this disturbance has also chiefly a psychological, as well as a peripheral physiological basis. I am unable to throw any particular light on the development of stammering at this period excepting to suggest the possible relationship between the physical changes in the larynx characteristic of this period and a possible consequential physiological modifications in the muscular action of speech production not as yet understood; and also the general tendency to increase of emotional excitability. But the cases developed at puberty tend in my experience to be relatively light in intensity and relatively easy of cure. Their manner of manifestation does not differ from the cases developed in

early childhood. So long as emotional excitability is markedly active (which may be considered to extend beyond the thirtieth year of life), the development of stammering is entirely possible. But in proportion as reason and maturity enter to set up processes of controlled inhibition against abnormal physiological activities, the tendency to the initiation of stammering becomes lessened.

The very occasional incitation of stammering later in life than the puberty period without severe nervous shock, I can also throw no especial light upon, having had almost no opportunity for observation; but I suspect the presence of undisclosed causes for emotional excitation of a deeper character.

The cases arising from severe shock later in life, such as are evidenced in the present war, involve a marked temporary or permanent disturbance in the stability of the general nervous organization. As yet I have had no opportunity personally of studying cases of stammering arising during the present war. In one observed case arising from extreme circumstances of severe nervous strain from fright and consequent shock, in a man twenty-four years old, complete mutism for three or four days was followed by stammering. The later disorder was still in existence eight years after, when the patient still showed extreme general symptoms of nervous excitation. He was usually so completely unable to control his speech that he carried a tablet with which he wrote what he would rather have spoken. The mere attempt at speaking would often throw him into an intense emotional panic. The indications seemed to point to hysteria, but I had but one opportunity for observation. The nervous upset in such cases involves marked increase of emotional excitability, which might readily explain the stammering.

Relative Exemption of Girls

The relative freedom of girls as compared with boys from stammering has been a great stumbling block. It is to be carefully noted that girls also stammer, as well as boys,

only not nearly in so great proportion. Stammering in the author's view is a definite individual manner of reaction to a particular emotional disturbance which disturbance is, at any rate to some degree, universal in human beings. Girls are subject to social emotion to a degree, so far as I am able to say, at least as intense as boys. The point to be realized carefully is the fundamental congenital differences of mental and physical endowment in the two sexes. In the first place certain differences more directly referred to the speech may be pointed out here, as they have often been pointed out by others. In general girls are more facile in talking than boys. The beginnings of development of speech occur on the average a few months earlier than in boys. Girls are in general possessed of greater facility and ease of muscular movement. The mental processes of speech are more lively and easy of action,—girls are more talkative.

But, more fundamental mental differences are present. The boy is more aggressive in tendency, the girl more reticent. The boy pugnacious, the girl gracious. The boy plays baseball and marbles; the girl plays with dolls and jumps the rope. In short, the nature of the girl is not the nature of the boy. And there lies the point. Why should one assume at all that in a disturbance involving deeply the nature of the individual child that girls would be expected to react as do boys?—One should not so expect. Girls stammer less often because by nature they find it less natural than boys to react to a certain emotion in the same manner as their masculine opposites. One should expect nothing else. What is more protean in its manifestations than emotion, and what more delicately responsive to the fundamental shades of human nature and to the influence of environment? The boy is expected to be brave and manly, because he is a boy; the girl is expected to be fearful and effeminate, because she is a girl. Therefore one may presume that the embarrassments of social emotion react upon the boy nature more profoundly than on the girl. In short, only an insight profound enough to intimately analyze the differences of

sex psychology can explain the relative exemption of girls, as compared with boys, from stammering.

Singing, Whispering

The ability of the stammerer to sing without stammering, while not universal, is nearly so. He is ordinarily able even to intone his speech smoothly. When one sings he assumes voluntary control of the speech machine and consciously concentrates his mental efforts on the maintenance of an accurate adjustment between the entire laryngeal apparatus, extrinsic and intrinsic, and the oncoming air pressure as carefully controlled by the chest musculature. Both the readjustments of the laryngeal mechanism for changing of pitch and of the articulative mechanism for word production, must be subordinated and attuned to this fundamental mutual adaptation of chest and laryngeal mechanisms. In talking stress is being laid on the constantly changing articulative movements rather than on voice production, thus tending to encourage the throwing of the series-action of the mechanism by articulative over-muscular emphasis out of action. Certain psychological facts should also receive due emphasis. First is the necessary voluntary concentration of the mind required for singing upon a definite control of the speech machine; this inhibits voluntary misplaced action, and at the same time tends to exclude serious emotional perturbation. Where the conscious mind is actually under concentrative control the subconscious activities are relatively in abeyance. One should also bear in mind that the incentives to voice and speech activity in singing and in talking differ. The emotion of the stammerer is compelled by subtle psycho-emotional states not easy to analyze but very real. Singing is itself an expression of emotion, and concentration on the psycho-neuro-physio-emotional process of song production of itself inhibits those emotional states peculiar to stammering. Psychologically, emotionally and physically singing is a very different procedure from talking; above all it demands a fundamental intent mental concentration on true action

of the peripheral speech machine. The greater ease the stammerer experiences in whispering as compared with loud speech points to the importance of the peripheral musculature as involved in the stammering phenomena, as does singing. But little action either in intensity, or extent, or complexity, is required of the extrinsic laryngeal muscles during the production of the whispered voice; and much less action in extent or intensity of the intrinsic muscles; the whisper eliminates two-thirds of the chest force required in loud speech, and nearly eliminates the most complicated portion of the series action of loud speech, that of the extrinsic laryngeal muscles. Whispered speech then offers too little difficulty even for the emotional individual when panic moved, to struggle upon. The subconscious experienced realization of the relative simplicity and absence of muscular effort in whispering absolves the stammerer from doubt of his ability to manage the peripheral speech machine.

Summary and Conclusions

The conception of the nature and origin of stammering here presented is markedly different from any other conception known to the author. Others have sought its explanation in some early profound perversion of normal physiological phenomena. The conception here presented finds the origin of the disorder in relatively light childish perversions of the psycho-physical processes required for the development of the complex speech function; and places great weight on the *development* of these light beginning perversions. The mind at this early period of life is easily impressionable; the emotions are perturbed from relatively light causes. Behind each of these early light perversions of childish speech effort is probably usually, if not always, emotional disturbance. Excessive nervous excitability, excessive rapidity of speech, unusual susceptibility to emotional perturbation, nervous shock, social circumstances encouraging emotional stress, imitation, protracted sickness, are known contributing factors. The natural childish ten-

dency, especially under the sway of emotional excitement, to make a pseudo-voluntary effort somewhere in the speech territory, thus interfering with the normal processes of speech development, is always a possibility. Once a perturbation of the normal processes of speech development has begun, a process of increased tendency to the incipient disturbance sets in; the neuro-physical processes of habit become deeper, while the psycho emotional perturbations become increasingly more profound. The developing disorder plays more and more profoundly on the sensitive emotional nature of the sufferer; thus step by step he is rendered pathologically susceptible to the characteristic physico-emotional perversions characteristic of his stammering.

The important etiological significance of the characteristic irregularly alternating periods of non-stammering, of light stammering, and of severe stammering, is analyzed. The stammerer is susceptible to the characteristic spasmodic disturbances of speech just in proportion as he is rendered emotional by the social circumstances of the moment. Only one contributing factor serves to modify this fact; *i. e.*, habit. Thus a conflict between the emotional state of mind with more or less stammering, and the relatively non-emotional state of mind with relatively smooth speech, goes on day by day.

In the course of this study certain important etiologically contributing factors have been pointed out: the "action in series" of the various muscular mechanisms of speech; the intimate and important relationship between the articulative and the extrinsic-laryngeal mechanisms of speech; the ease with which excessive effort in all but one division of the speech musculature could block the action of the entire mechanism; the exceptional and apparently significant freedom from stammering spasm of the soft palate; and the importance and significance of the emotions engendered by social interrelations.

Such a conception of stammering as is here presented throws much light on the various plans of treatment now

in vogue. A corollary to a conception of stammering which lays so much stress on the importance of the developmental aspect of the disorder, is the importance of prevention and of early treatment and arrest. As fire gains headway by its own activity, so does stammering. As it is important to stamp out fire before it has gained headway, so is it important to stamp out stammering at its very beginning, or, at any rate, to enter on treatment at the earliest period possible.

104 SOUTH MICHIGAN BOULEVARD.

LIST OF FELLOWS

1919

Active Fellows

- 1917. ARROWSMITH, HUBERT, 170 Clinton Street, Brooklyn, New York.
- 1915. BARNES, HARRY ALDRICH, 305 Beacon Street, Boston, Massachusetts.
- 1908. BARNHILL, JOHN F., 408 Penway Building, Indianapolis, Indiana.
- 1904. BERENS, T. PASSMORE, 35 Park Avenue, New York.
- 1893. BIRKETT, HERBERT S., 252 Mountain Street, Montreal, Canada.
- 1891. BRYAN, JOSEPH H., 818 17th Street, Washington, D. C.
- 1913. BUTLER, RALPH, 4606 Spruce Street, Philadelphia, Pennsylvania.
- 1915. CANFIELD, R. BISHOP, Ann Arbor, Michigan.
- 1917. CHAMBERLIN, WILLIAM B., Osborn Building, Cleveland, Ohio.
- 1897. CLARK, J. PAYSON, 71 Marlborough Street, Boston, Massachusetts.
- 1902. COAKLEY, CORNELIUS G., 53 West 56th Street, New York.
- 1917. COATES, GEORGE MORRISON, 1736 Pine Street, Philadelphia, Pa.
- 1899. COBB, FREDERICK C., 11 Marlborough Street, Boston, Massachusetts.
- 1918. COX, GERARD HUTCHINSON, 8 East 54th Street, New York.
- 1905. COFFIN, LEWIS A., 616 Madison Avenue, New York.
- 1903. COFFIN, ROCKWELL A., 234 Clarendon Street, Boston, Massachusetts.
- 1893. COOLIDGE, ALGERNON, JR., 613 Beacon Street, Boston, Massachusetts.
- 1913. DABNEY, VIRGINIUS, 1633 Connecticut Avenue, Washington, D. C.
- 1917. DEAN, LEE WALLACE, Iowa City, Iowa.
- 1881. DELAVAN, D. BRYSON, 40 East 41st Street, New York.

- 1901. FREEMAN, WALTER J., 1832 Spruce Street, Philadelphia, Pennsylvania.
- 1914. FETTEROLF, GEORGE, 134 South 20th Street, Philadelphia, Pennsylvania.
- 1905. FREER, OTTO T., 25 East Washington Street, Chicago, Illinois.
- 1879. FRENCH, THOMAS R., 150 Joralemon Street, Brooklyn, New York.
- 1917. FRIEDBERG, STANTON A., Monroe Building, 104 South Michigan Boulevard, Chicago, Illinois.
- 1897. FROTHINGHAM, RICHARD, 616 Madison Avenue, New York.
- 1919. FAULKNER, E. ROSS, 410 Park Avenue, New York.
- 1913. GOLDSTEIN, MAX A., 3858 Westminster Place, St. Louis, Missouri.
- 1898. GOODALE, JOSEPH L., 258 Beacon Street, Boston, Massachusetts.
- 1905. GRAYSON, CHARLES P., 262 South 16th Street, Philadelphia, Pennsylvania.
- 1906. GREENE, D. CROSBY, JR., 483 Beacon Street, Boston Massachusetts.
- 1917. GREENE, JOSEPH B., Asheville, North Carolina.
- 1905. HALSTED, THOMAS H., 831 University Block, Syracuse, New York.
- 1896. HARDIE. T. MELVILLE, 34 Washington Street, Chicago, Illinois.
- 1903. HARRIS, THOMAS J., 104 East 40th Street, New York.
- 1915. HASTINGS, HILL, 924 Trust & Savings Bldg., Los Angeles, California.
- 1893. HOPE, GEORGE B., 159 West 72nd Street, New York.
- 1895. HOPKINS, FREDERICK E., 25 Harrison Avenue, Springfield, Massachusetts.
- 1895. HUBBARD, THOMAS, 515 Nicholas Building, Toledo, Ohio.
- 1919. HURD, LEE MAIDMENT, 15 East 48th Street, New York.
- 1904. INGERSOLL, JOHN M., 1021 Prospect Avenue, Cleveland, Ohio.
- 1907. JACKSON, CHEVALIER, 1018 Westinghouse Building, Springfield, Massachusetts.
- 1878. JOHNSTON, SAMUEL, 204 West Monument Street, Baltimore, Maryland.
- 1918. KENYON, ELMER L., 104 South Michigan Avenue, Chicago, Illinois.

- 1894. LELAND, GEORGE A., 354 Commonwealth Avenue, Boston, Massachusetts.
- 1914. LEVY, ROBERT, Metropolitan Building, Denver, Colo.
- 1918. LEWIS, FIELDING OTIS, 261 S. 17th Street, Philadelphia, Pennsylvania.
- 1911. LOCKARD, LORENZO B., Metropolitan Building, Denver, Colorado.
- 1913. LOEB, HANAU W., 537 North Grand Avenue, St. Louis, Missouri.
- 1897. LOGAN, JAMES E., 1208 Wyandotte Street, Kansas City, Missouri.
- 1919. LYNNAH HENRY LOWNDES, 127 West 58th Street, New York.
- 1915. LYNCH, ROBERT CLYDE, 634 Maison Blanche Building, New Orleans, Louisiana.
- 1896. MACCOY, ALEXANDER W., 1503 Locust Street, Philadelphia, Pennsylvania.
- 1914. MACKENTY, JOHN E., 43 West 54th Street New York.
- 1883. MACKENZIE, JOHN N., 605 Washington Place, Baltimore, Maryland.
- 1896. MAYER, EMIL, 40 East 41st Street, New York.
- 1913. MCKIMMIE, OSCAR A. M., 1330 Massachusetts Avenue, N. W., Washington, D. C.
- 1904. MOSHER, HARRIS P., 828 Beacon Street, Boston, Massachusetts.
- 1914. MUNGER, CARL E., 81 North Main Street, Waterbury, Connecticut.
- 1901. MYLES, ROBERT C., 11 East 48th Street, New York.
- 1903. PACKARD, FRANCIS R., 304 South 19th Street, Philadelphia, Pennsylvania.
- 1906. PIERCE, NORVAL H., 31 Washington Street, Chicago, Illinois.
- 1908. RANDALL, B. ALEXANDER, 1717 Locust Street, Philadelphia, Pennsylvania.
- 1903. RENNER, W. SCOTT, 341 Linwood Avenue, Buffalo, New York.
- 1897. RHODES, JOHN EDWIN, People's Gas Building, Chicago, Illinois.
- 1884. RICE, CLARENCE C., 123 East 19th Street, New York.
- 1905. RICHARDS, GEORGE L., 124 Franklin Street, Fall River, Massachusetts.
- 1902. RICHARDSON, CHARLES W., 1317 Connecticut Avenue, Washington, D. C.
- 1913. ROY, DUNBAR, Grand Opera House, Atlanta, Georgia.

1907. SHAMBAUGH, GEORGE E., 122 S. Michigan Avenue, Chicago, Illinois.
1909. SHURLY, BURT R., 32 Adams Avenue W., Detroit, Michigan.
1919. SKILLERN, ROSS HALL, 2030 Chestnut Street, Philadelphia, Pennsylvania.
1909. SLUDER, GREENFIELD, 3542 Washington Avenue, St. Louis, Missouri.
1908. SMITH, HARMON, 44 West 49th Street, New York.
1911. STOUT, GEORGE C., 1611 Walnut Street, Philadelphia, Pennsylvania.
1889. SWAIN, HENRY L., Colonial Building, 191 Church Street, New Haven, Connecticut.
1903. THEISEN, CLEMENT F., 172 Washington Avenue New York.
1892. THRASHER, ALLEN B., The Groton, 7th and Race Streets, Cincinnati, Ohio.
1892. WAGNER, HENRY L., 518 Sutter Street, San Francisco, California.
1892. WATSON, ARTHUR W., 126 South 18th Street, Philadelphia, Pennsylvania.
1908. WILSON, J. GORDON, 104 S. Michigan Avenue, Chicago, Illinois.
1906. WINSLOW, JOHN R., The Latrobe, Charles and Reade Streets, Baltimore, Maryland.
1905. WOOD, GEORGE B., 129 South 18th Street, Philadelphia, Pennsylvania.
1890. WRIGHT, JONATHAN, Windy Rock, Pleasantville, New York.

Honorary Fellows

1915. BOSWORTH, FRANCKE H., 41 Park Avenue, New York.
1914. COHEN, J. SOLIS, 2113 Chestnut Street, Philadelphia, Pennsylvania.
1914. DE LA SOTA Y LASTRA, Ramon, 7 Calle de Torqueros, Seville, Spain.
1914. LEFFERTS, GEORGE MOREWOOD, Katonah, New York.
1910. MOURE, E. J., 25 Cours du Jardin Public, Bordeaux, France.
1919. OLIVER, HENRY K.,
1909. SEMON, SIR FELIX RIGNALLS, Great Missenden, Bucks, England.
1914. THOMSON, SIR ST. CLAIR, 64 Wimpole Street, W., London, England.

Corresponding Fellows

1901. COLLIER, MAYO, 145 Harlet Street, Cavendish Square, London, England.
1893. DESVERNINE, CARLOS M., 52 Cuba, Havana, Cuba.
1901. GRANT, DUNDAS, 18 Cavendish Square, W., London, England.
1919. KELLY, ADAM BROWN, 26 Blythswood Square, Glasgow, Scotland.
1902. LERMOYEZ, MARCEL, 20 Rue de la Boetie, viie, Paris, France.
1897. LUC, H., 15 Rue de Chanaleilles, viie, Paris France.
1903. MCBIDE, P., 20 South Drive, Harrogate, England.
1896. MACDONALD, GREVILL, 85 Harley Street, Cavendish Square, London, W., England.
1894. MACINTYRE, JOHN, 179 Bath Street, Glasgow, Scotland.
1919. MCKERNON, JAMES F., 62 West 52nd Street, New York.
1896. MYGIND, HOLGER, 31 Havnegade, Copenhagen, Denmark.
1901. NATIER, MARCEL, 10 Rue de Ballechasse viie, Paris, France.
1919. PATERSON, DONALD ROSE, 15 St. Andrew's Crescent, Cardiff, Wales.
1919. ROGERS, JR., JOHN, 303 East 30th Street, New York.
1894. SAJOUS, C. E., 2043 Walnut Street, Philadelphia, Pennsylvania.
1896. SCHMIEGELOW, ERNEST, 18 Norregade, Copenhagen, Denmark.
1903. TILLEY, HERBERT, 72 Harley Street, Cavendish Square, London, W., England.
1913. TURNER, LOGAN, 27 Walker Street, Edinburgh, Scotland.
1901. WINGRAVE, WYATT, 11 Devonshire Street, Portland Place, London, W., England.
1894. WOLFENDEN, R. NORRIS, The Grange, Kent, England.

Emeritus Fellows

1914. BBOWN, J. PRICE, 28 College Street, Toronto, Cana.
1914. DE BLOIS, THOMAS AMORY, 48 Gloucester Street, Boston, Massachusetts.
1918. FARLOW, JOHN W., 127 Bay State Road, Boston, Massachusetts.
1918. HINKEL, F. WHITEHALL, 581 Delaware Avenue, Buffalo, New York.

- 1912. LINCOLN, WILLIAM, 210 Lennox Bldg., Cleveland,
Ohio.
- 1914. PORTER, WILLIAM, Ocean Springs, Mississippi.
- 1914. ROBINSON, BEVERLY, 42 West 37th Street, New York.

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1882.	G. M. Lefferts	1903.	J. H. Hartman
1883.	F. H. Bosworth	1904.	C. C. Rice
1884.	E. L. Shurly	1905.	J. W. Gleitsmann
1885.	Harrison Allen	1906.	A. W. de Roaldes
1886.	E. Fletcher Ingals	1907.	H. S. Birkett
1887.	R. P. Lincoln	1908.	A. Coolidge, Jr.
1888.	E. C. Morgan	1909.	J. E. Logan
1889.	J. N. Mackenzie	1910.	D. Braden Kyle
1890.	W. C. Glasgow	1911.	James E. Newcomb
1891.	S. W. Langmaid	1912.	George A. Leland
1892.	M. J. Asch	1913.	Thomas Hubbard
1893.	D. B. Delavan	1914.	Alexander W. MacCoy
1894.	J. O. Roe	1915.	G. Hudson Makuen
1895.	W. H. Daly	1916.	Joseph L. Goodale
1896.	C. H. Knight	1917.	Thomas H. Halsted
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1899.	Samuel Johnston		

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1883.	S. W. Langmaid	W. H. Daly
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1887.	J. N. Mackenzie	C. E. Sajous
1888.	W. C. Glasgow	C. E. Bean
1889.	E. Holden	J. H. Hartman
1890.	J. O. Roe	S. Johnston
1891.	M. J. Asch	

1892.	S. Johnston	J. C. Mulhall
1893.	J. C. Mulhall	W. E. Casselberry
1894.	C. C. Rice	S. H. Chapman
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1897.	A. W. MacCoy	H. S. Birkett
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1902.	G. A. Leland	T. Melville Hardie
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1914.	Clement F. Thiesen	Lewis A. Coffin
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1889.	C. H. Knight	1918.	D. B. Delavan
1895.	H. L. Swain	1919.	J. M. Ingersoll

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- 1912. Bosworth, Francke H., New York City.
- *1893. de Roaldes, Arthur, New Orleans, La.
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- *1878. Lefferts, George M., New York City.
- *1883. Mackenzie, Sir Morell, London, England.
- *1910. Massei, Ferdinand, Naples, Italy.
- *1887. Moure, E. J., Bordeaux, France.
- *1879. Oliver, H. K., Boston, Mass.
- 1881. Semon, Sir Felix, Bucks Co., England.
- 1878. Solis-Cohen, J., Philadelphia, Pa.
- *1914. Wagner, Clinton, New York City.

Corresponding Fellows

- *1892. Browne, Lennox, London, England.
- *1887. Gouguenheim, A., Paris, France.
- *1894. Holden, Edgar, Newark, N. J.
- *1881. Labus, Carlo, Milan, Italy.
- *1880. Meyer, Wilhelm, Copenhagen, Denmark.
- 1880. Sajous, Charles E., Paris, France.
- *1881. Thornton, Pugin, London, England.
- *1880. Whistler, W. McNeil, London, England.

Emeritus Fellows

- 1914. Brown, J. Price, Cranbrook Lodge, Wycombe, Ontario, Canada.
- 1914. DeBlois, Thomas Amory, Boston, Mass.
- 1892. Farlow, John W., Boston, Mass.
- *1914. Gleitsmann, Joseph W. New York City.
- 1888. Hinkel, F. Whitehill, Buffalo, N. Y.
- *1912. Knight, Charles H., New York City.
- 1912. Lincoln, William, Cleveland, Ohio.
- 1914. Porter, William, Ocean Springs, Miss.
- 1914. Robinson, Beverley, New York City.

Active Fellows

- *1880. Allen, Harrison, Philadelphia, Pa.
- *1878. Asch, Morris J., New York.

- *1880. Bean, C. E., St. Paul, Minn.
- *1893. Bliss, Arthur Ames, Philadelphia, Pa.
- *1895. Boylan, J. E., Cincinnati, Ohio.
- *1892. Brown, Moreau R., Chicago, Ill.
- *1889. Casselberry, William E., Chicago, Ill.
- *1883. Chamberlain, C. W., Hartford, Conn.
- *1896. Chappell, W. F., New York.
- *1882. Chapman. S. Hartwell, New Haven, Conn.
- 1880. Cushing. E. W., Boston, Mass.
- *1878. Cutter. Ephraim, West Falmouth, Mass.
- *1880. Daly, W. H., Pittsburgh. Pa.
- *1878. Davis, F. H.. Chicago, Ill.
- *1901. Dickerman, E. T., Chicago, Ill.
- *1878. Donaldson. Frank, Baltimore, Md.
- 1901. Getchell, Albert C., Worcester, Mass.
- *1907. Gibb, Joseph S., Philadelphia, Pa.
- *1878. Glasgow, William Carr. St. Louis. Mo.
- *1878. Hartman. Jacob H., Baltimore, Md.
- *1879. Holden, Edgar, Newark, N. J.
- *1882. Hooper. Franklin H.. Boston, Mass.
- *1901. Hyatt, Frank, Washington, D. C.
- *1882. Ives, Frank L., New York City.
- *1878. Ingals, E. Fletcher. Chicago. Ill.
- *1880. Jarvis, William C., New York City.
- *1878. Johnson, Hosmer A.. Chicago, Ill.
- *1879. Johnson, Woolsey. New York City.
- *1879. Kealhofer, R. H.. St. Louis, Mo.
- *1901. King. Gordon, New Orleans, La.
- *1885. Knight, Charles H.. New York City.
- *1878. Knight, Frederick Irving. Boston, Mass.
- *1898. Kyle, D. Braden, Philadelphia, Pa.
- *1880. Langmaid, Samuel W., Boston, Mass.
- *1878. Lincoln, Rufus P., New York City.
- *1888. Lowman, John H., Cleveland, Ohio.
- *1898. Makuen. G. Hudson, Philadelphia, Pa.
- *1881. Major, G. W., Montreal, Canada.
- *1879. McBurney, Charles, New York City.
- *1885. McSherry. H. Clinton, Baltimore, Md.
- *1881. Morgan, E. C., Washington, D. C.
- *1886. Mulhall, J. C., St. Louis, Mo.
- 1892. Murray, T. Morris, Washington, D. C.
- *1881. Mynter, H., Buffalo, N. Y.
- *1893. Newcomb, James E., New York City.
- *1895. Nichols, J. E. H., New York City.
- 1894. Park, William H., New York City.

- 1892. Porcher, W. Peyre, Charleston, S. C.
- *1880. Rankin, D. N., Allegheny, Pa.
- *1879. Roe, John O., Rochester, N. Y.
- 1881. Robertson, J. M., Detroit, Mich.
- *1878. Rumbold, T. F., St. Louis, Mo.
- *1879. Seiler, Carl, Philadelphia, Pa.
- *1893. Shields, Charles M., Richmond, Va.
- *1878. Shurley, E. L., Detroit, Mich.
- *1879. Smith, Andrew H., Geneva, N. Y.
- *1892. Simpson, William Kelly, New York City.
- *1879. Tauber, Bernhard, Cincinnati, Ohio.
- *1899. Thorner, Max, Cincinnati, Ohio.
- *1888. Van der Poel, S. O., New York City.
- 1896. Ward, Marshall R., Pittsburgh, Pa.
- 1879. Ward, Whitfield, New York City.
- *1886. Westbrook, Benjamin F., Brooklyn, N. Y.
- 1896. Woolen, Green V., Indianapolis, Ind.



Memorial

ARTHUR WASHINGTON DE ROALDES

ARTHUR WASHINGTON DE ROALDES was born in Opelousas, La., January 25, 1849. The first ten years of his life were spent in New Orleans, after which he was taken abroad where he received his classical education at Sarlat, Toulouse, and Paris. He graduated in Medicine in 1869 from the Medical Department of the University of Louisiana, and from the Faculty of Paris in 1871. He received the degree of B. A. in 1865, and that of B. S. in 1866, with special mention, from the University of France.

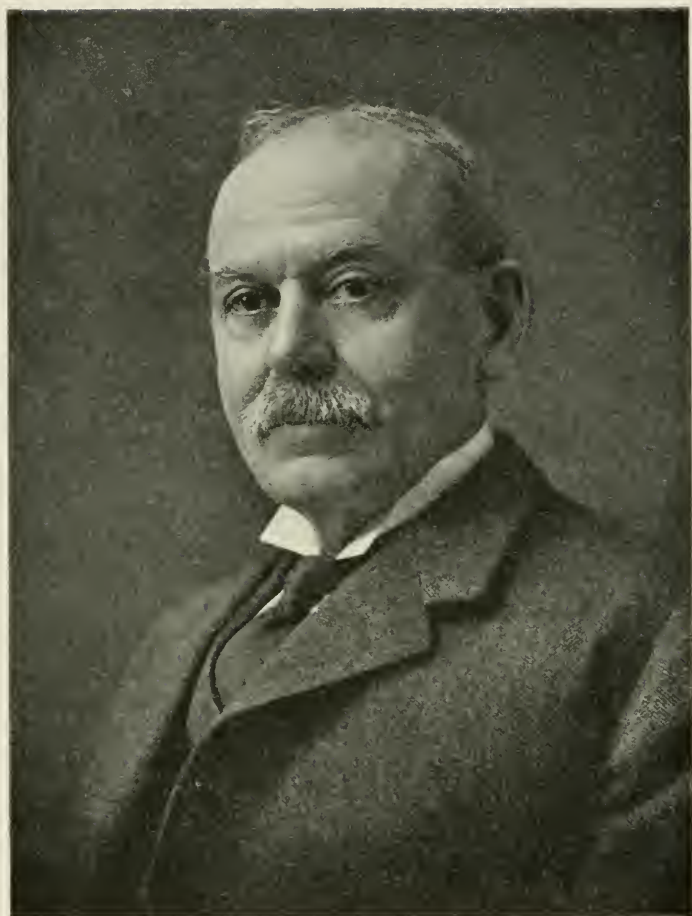
He served as interne in the Charity Hospital in New Orleans, where later he became visiting surgeon. He was a member of the New Orleans Medical and Surgical society, of the Society of Medicine of Nice, of the Orleans Parish Medical Society, the State Medical Society, and the American Medical Association, the American Laryngological Association, of La Société Française d'Otologie, Laryngologie, et de Rhinologie. At one time he was Chief of Clinic in the Chair of Surgery of the Medical Department of the University of Louisiana, Professor of Otology, Laryngology and Rhinology of the Polyclinic School of Medicine, New Orleans. He was connected with the surgical field hospital during the Franco-Prussian War; was visiting surgeon to the Charity Hospital of New Orleans from 1872 onward; Surgeon in Chief of the Charity Hospital from 1880 to 1883; Founder and Surgeon in Chief of the Eye, Ear, Nose and Throat Hospital of New Orleans.

His inaugural thesis in 1871 on "Gun Shot Fractures of the Femur" was awarded a special mention and bronze medal by the Faculty of Paris. It is not to be wondered at that his contributions to the literature of laryngology were numerous and highly valuable, for combined with a remarkably brilliant and active mind his clinical opportunities were unrivalled. In fact, it may be said that he

commanded a wider and more varied range of clinical material than any man in the United States,—including a mixture of races gathered from a wide range of the Southern States, Latin America, and the Islands of the sea.

Limiting himself to the specialty of Laryngology and Rhinology, in 1889 he founded the Ear, Nose, and Throat Hospital and shortly thereafter was appointed Professor in the New Orleans Polyclinic. Rich in initiative and a natural leader of men, he planned the first ambulance service in New Orleans in connection with the Charity Hospital in 1881, and organized the first training school for nurses in the same institution in the following year.

The proudest honor of his life, however, was his appointment as a Chevalier of the Legion of Honor of France, for gallantry on the field of Battle, mentioned in the order of the day of the Army of Sedan.



John H. Loomis

JOHN HENRY LOWMAN

DR. JOHN HENRY LOWMAN died in New York City on January 23rd, 1919, two days after his return from Italy, from which country he had gone in September, 1918, to act as Medical Director of the American Red Cross Tuberculosis Unit.

Dr. Lowman was born in Cleveland, Ohio, October 6, 1849. His ancestors, who had been among the earlier settlers of Cleveland, were of a substantial, intelligent stock and were important factors in laying the foundation of the well-recognized superiority of their beautiful city. Leading members of the Methodist community, the example of their high ideals was a basic element in the development of Dr. Lowman, in whom all of their traits of personal uprightness and of public-spirited citizenship were conspicuously reproduced. From his father, Jacob Lowman, he inherited strong traits of industry, perseverance, and earnestness; from his mother, Minerva Peet Lowman, the fine sense of humor, love of the beautiful, for art and for music which so distinctly characterized him. In all of his attributes he was of the best type of the able, cultivated, loyal American.

Dr. Lowman's early life was spent in Cleveland and his early education was gained in the public schools of that city and at Meadville, Pa. Entering Wesleyan University, Middletown, Conn., he received the degree of A. B., in due course in 1871, and 1874 was given the honorary degree of Master of Arts.

In the autumn of 1871 he returned to Cleveland and began the study of medicine under the preceptorship of Dr. G. C. Weber. Personal knowledge of Dr. Weber enabled me to recognize the justice of the position accorded him as the head of the medical profession in his state. A man of remarkable ability and training, his strong personality impressed itself upon his pupil and remained with him a life-long inspiration.

In 1873 Dr. Lowman graduated in medicine from Wooster

University and at once became interne in the Charity and Maternity Hospitals of Cleveland. Having completed his term of service in these institutions in 1874, he obtained a regular position in Charity, now the City Hospital of New York. My acquaintance with him first began in that place, where we were brother internes and where the extraordinary superiority of his mind and character instantly made themselves felt. He early manifested an unusual interest in the diseases of the throat and chest, and as soon as possible allied himself with the late Dr. Clinton Wagner at the Metropolitan Throat Hospital. Dr. Wagner was then the leading instructor in Laryngology and Rhinology of graduates in medicine in New York City. He had organized his hospital in 1873, on returning from abroad where under Dr. Morell Mackenzie and others he had attained unusual experience and proficiency. It is said that Dr. Lowman was the first of that long series of well-equipped specialists who owed the foundation of their knowledge of laryngology to that great pioneer.

Like Dr. Lowman, having had some training in the specialty myself, it became evident to both of us that with the immense clinical resources presenting themselves at Charity Hospital, in no place could the study of laryngology be carried on to better advantage. Almost every conceivable form of disease of the upper air passages was to be found in some department of that vast institution. After much effort, Lowman and myself, although internes, succeeded in gaining the permission of the Medical Department and of the Commissioners of Charities to have a ward set aside for the special care of laryngeal cases. Into this we gathered a large array of patients suffering from all of the phases of tubercular, specific, malignant, and other forms of laryngeal disease in wide variety. This ward proved of great interest to us and we devoted much time to the development of its resources for the special care of the inmates. As no members of the attending staff were particularly interested in it, we had the field practically to ourselves. But the fame of our ward began to be noted abroad and,

attracting the attention of the late Dr. Louis Elsberg he at once had himself appointed Special Attending Laryngologist, and from that time our names were heard in connection with it no more.

Graduating from Charity Hospital, Dr. Lowman at once returned to Cleveland. His entrance into practice there was signalized by his immediate acceptance at the hands of the very best elements of his home community. Amply equipped with a general foundation, it was Dr. Lowman's intention at this time to specialize in laryngology; but in 1876 he was appointed Professor of Materia Medica and Therapeutics in Wooster University. This position he held until 1881, when an effort was made to consolidate the Medical School of Wooster University with the Cleveland Medical College, which in turn became the Medical Department of Western Reserve University.

In 1877, he received the *ad eundem* degree from the College of Physicians and Surgeons, Columbia University, and the same year was appointed one of the Visiting Physicians to Charity Hospital and to Lakeside Hospital, Cleveland, continuing to hold the latter until his death. During his thirty-eight years of service in the Western Reserve University the following Professorships were held: From 1881 to 1899, he was Professor of Materia Medica; for the following five years he was Professor of Medicine; following this, he was made Professor of Internal Medicine and Clinical Medicine; in 1909 he became Professor of Clinical Medicine and Ethics. This position he held until the time of his death, thus completing forty-two years of active service in the splendid institution which his wisdom and loyalty had done so much to develop.

He was always interested in furthering the progress of scientific medicine, and when in 1889 the histological department of the medical school needed microscopes he collected the necessary funds for equipping the laboratory.

Notwithstanding the demands of a very large and important practice, he succeeded in keeping thoroughly abreast of the times in the medical world and at the same time

succeeded in originating and developing various socio-medical institutions and associations of far-reaching value.

In 1902 he visited the most prominent tuberculosis sanatoria and institutions in France and Germany, and in 1905 attended the International Congress on Tuberculosis held in Paris during the same year. Upon his return he conceived and founded the Anti-Tuberculosis League of Cleveland, an association that later became responsible for the development of the Municipal Department of Tuberculosis and the Warrensville Sanatorium.

In the upbuilding of the Anti-Tuberculosis League he again showed his clear conception of the problem and his good judgment of the methods of its solution by drawing together, as members of its board of trustees, representatives of the various groups which were already working through well-equipped organizations for the improvement of Cleveland's educational and social conditions. Thus he accomplished the important work of establishing an enduring relationship between these representatives themselves and of making the local tuberculosis movement from the start a powerful co-operative alliance. The Anti-Tuberculosis League of Ohio counted him as one of its Founders and he became its first President. In 1913 he was made President of the National Society for the Study and Prevention of Tuberculosis.

His quickness in seizing an opportunity for the betterment of the community and willingness to give liberally of his time and counsel is well illustrated by the following incident, related by an associate and friend: "On a Tuesday, toward the end of 1905, he learned of the development abroad of prophylactic tuberculosis clinics for family members, especially for children of all parents attending the regular tuberculosis clinics. On the following Saturday I had the pleasure of opening with him the first prophylactic family clinic in this country. So it also was with the further enlargement of infant welfare activities in Cleveland. He immediately recognized that most of the essential parts of such an organization were already present in the city

and needed only to be correlated. At his suggestion, a meeting was held at his home, with representatives of the Milk Fund Association, to discuss the possibility of this newer co-ordination. As a result, the Infants' Clinic of the Milk Fund Association and the Visiting Nurse Association was formed in July, 1906. Later, in December, 1906, through the efforts and interest of Dr. Edward F. Cushing, this was enlarged and incorporated as the present Babies' Dispensary and Hospital."

Dr. Lowman followed Dr. Cushing and Dr. Powell as the medical member of the Executive Committee of the Babies' Dispensary and Hospital, and held this position until his death. He was also Chairman of the staff of the Lakeside Hospital, and Visiting Physician at this institution from the time of its beginning. He was one of the Founders of the Cleveland Medical Library, now a flourishing institution of acknowledged usefulness.

The resolutions adopted by the Board of Directors of the Broadway Savings & Trust Company give evidence of his usefulness to institutions other than medical and of the wonderful love and respect that his associates bore toward him. Originally organized at his suggestion, he was from the first a cherished and honored member of the Board of Trustees of the Cleveland Museum of Art. The published resolutions of this admirable institution emphasize his real and positive value to it.

In 1893 Dr. Lowman visited Italy as one of the Vice-Presidents of the Roman International Congress of Medicine.

The three basic principles of his whole philosophy of the relation of the physician to the community were: the family instead of the individual, prevention instead of cure, and co-operation throughout the whole field of remedial agencies,—principles indeed frequently held but not often carried out, and still less frequently appearing so consistently and continuously in the work of one man.

In 1891 Dr. Lowman was married to Miss Isabel Wetmore, a lady of excellent family and of remarkably broad opportunities of education. It is seldom that the union of

two such brilliant minds results as happily as did this one. A more perfect wedded life could not be imagined. Eminently congenial, cultured, and broadly hospitable, their home was the center of a wide circle of intellectual influence. Their three fine sons were brought up as only such parents can rear children worthy of themselves. All offered their services to their country at the beginning of the war. John, the eldest, became Commander of the American Aviation Detachment in Italy. The second, Henry, was promoted to an officership in the American Aviation Corps, while the youngest, Shephard, was attached to the training camp at Paris, South Carolina.

Ever unsparing of himself, the strain of unremitting devotion to his professional and philanthropic work began to tell upon him, and for several years Dr. Lowman's health had become distinctly impaired, although his activities were not allowed to lapse. His reputation as an authority upon the subject of tuberculosis had become international, and when the necessity arose for sending a Commission to study the conditions of that disease in Italy, Dr. Lowman was appointed to the Medical Directorship of it. Although physically unfit for the hardships and uncertainties of such a task, he at once accepted, and as a Major of the American Red Cross started with the other members of the Commission to Europe, going by the way of Paris where he spent a few weeks in necessary work. He arrived in Rome at the height of the epidemic of influenza, and was shortly taken ill with that disease. Although not sufficiently recovered, as events proved, he was urged by his superior officers of the Red Cross to return home as soon as possible. Relapsing on the voyage, he reached New York City in a serious condition of illness, and two days later passed away. Perhaps with increasing infirmity the end might not, in any case, have been long postponed.

Intimate with him from his early manhood, I have never known a stronger, finer, or more well-rounded character. While he was devoted to medicine, he was an incessant reader in the highest and best fields of literature; a versa-

tile linguist, and one whose excellent memory enabled him to carry with ease those things which he especially treasured and enjoyed. As a conversationalist, he had few equals. As a writer, his style was pure, elegant, and vigorous. He possessed a keen perception of the best in music and in art. Some of his sonnets, written at a particularly happy period of his life, challenged the attention and admiration of the best literary critics, and had he devoted himself to poetry it is likely he might have become as well known in that department as in medicine.

No one in any walk of life ever failed to appreciate the friendliness of his nature and the transparent superiority of his character. From the most wretched Charity Hospital outcast, to his closest associates at home and his most distinguished acquaintances abroad, his sincerity, purity, and unselfishness were plain to all. In the words of a patient who had enjoyed his friendship and his professional care: "he was one of the greatest influences and finest souls I have ever known, a true physician." Dr. Livingston Farrand, an associate with Dr. Lowman in organizing the national forces against tuberculosis, speaks of him as "one of the best and finest men that the medical profession in American has known. Of all the many physicians with whom I have been associated in the last fifteen years, I know of no one toward whom I felt the same sense of personal attachment as well as of admiration." Another, of even longer association in the same work, writes: "He was about the best man, always and at all times, that I ever knew. There was a real wealth of cheer, of friendliness, of thoughtfulness for others, of sympathy with all that was tender and gentle and good in the very tones of his voice; and as I think of him the recollection of his bright personality, of the confidence that strengthened so many in difficult places, of his constant unselfishness, cheer, and encouragement, there seems a radiance in his memory which overcomes the darkness of the shadow, and I am comforted because of what he was."

From the Secretary of War came this eulogy: "I write

to express my personal sympathy and my official gratitude for the unselfish service which cost Dr. Lowman his life. Throughout my life in Cleveland, Dr. Lowman was one of the great influences for better and wiser things in public affairs, and when the world's great test came he could not help sacrificing himself to minister to the stricken and suffering. Surely he died a soldier's death after living in the best sense of the words a soldier's life."

His war record is typical of his whole life. All that he had, all that he was, he gave to the very limit of his ability for the benefit, the uplifting, and the protection of others. How rich were his gifts this scanty outline of but a small proportion of them gives little idea. Loyal, modest, unselfish in every relation of life, no soldier at the front ever showed greater herosim or met with a more fitting end. A true man of noblest spirit he was before all else an incomparable friend.

D. B. D.



WALTER FRANKLIN CHAPPELL

WALTER FRANKLIN CHAPPELL, A. B., M. D., M. R. C. S. (London), was born December 26, 1856, at Decew Falls, Ontario, Canada. His Father, ROBERT CHAPPELL, was born in Gloucestershire, England, and his mother, Mary Moore, was from County Antrim, Ireland.

His early years were given largely to outdoor sports, which inculcated that love of the woods and nature's solitudes which abided with him through life. His tendencies to study were largely due to his early tutorage under Professor Carswell, to whom he attributed a large degree of his success in the profession of his choice. His high school education was obtained at the Collegiate Institute at St. Catherine's, Ontario, at which school he prepared for his course at Toronto University. There he was the silver medalist of his class. Ultimately he undertook the study of medicine at Trinity Medical College, Toronto, where he graduated as gold medalist in 1880. Not feeling that his medical education was completed, he went to London, England, and studied there under the distinguished Sir Frederick Treves and Sir Morell Mackenzie. While in London he was elected to the Royal College of Surgeons, and for a while practiced medicine in the East of London, where opportunities were afforded for obtaining most valuable experiences for his subsequent work in America.

Feeling that he had devoted sufficient time to clinical work in London, he offered himself for examination and was admitted to the British Navy as a Junior Surgeon. He was assigned to the "Condor" then under the command of the late lamented Sir Charles Beresford. Not long after this, the "Condor" and other British ships were ordered to Alexandria, where the famous bombardment of that city took place. During the engagement Dr. Chappell was ordered to one of the boats comprising the landing party. His boat started for the shore, but on the way a shell from the enemy hit it, killing a number of the party and wound-

ing others. Lieutenant Chappell was included in the latter category and was thrown into the water from the wrecked boat. When he came to the surface he struck out for shore. After landing he found that a fragment of the shell had knocked out three teeth from one side of his mouth and two from the other; he also received a scalp wound of several inches upon the back of the head and was more or less covered with blisters from the exploding shell, which had entirely torn his uniform from his body. Few of his friends knew of this episode of his life. But to me he has told of this adventure on several occasions, and in his immediate family it was a well-known fact, in testimony of which the scars upon his body bore evidence. After this experience he decided that a land career was more desirable than a marine one. He therefore came to New York, bringing only one letter of introduction, and this to our late fellow member, Dr. Andrew H. Smith. He first located in 8th Street and began a general practice, later becoming an associate of Dr. Andrew H. Smith, with whom he remained for a number of years.

His first Hospital connection was with the Manhattan Eye and Ear Hospital, as it was then called, in the year 1886. Here he rose from Clinical Assistant to Surgeon, and ultimately to the Presidency of the Board of Surgeons. To this institution he devoted his life's work, and to his ardor and instrumentality the present commodious, splendidly equipped and efficient institution is to an important degree due. When the new building on East 64th Street was built the name was changed to The Manhattan Eye, Ear, and Throat Hospital, which adequately represents the work being accomplished there, and the addition of the Throat Department in the designation of the name of the institution was due entirely to Dr. Chappell's efforts.

The subject of these memoirs was a man of unswerving character,—loyal to his friends, unforgiving of his enemies. His reticence often made him appear ungenial, but to those who were favored with his friendship there was nothing too good for them nor were any efforts lacking on his part

when he could do a good turn for them. He was a good fighter and his integrity of purpose could in no way be diverted by either honeyed words nor hopes of emolument. His professional success was phenomenal, and his knowledge of medicine was by no means confined to his specialty of laryngology. His demise was sudden and sharp, shocking the sensibilities of his patients and admirers, and overwhelming his friends in sorrow. In the midst of his professional work he was suddenly stricken when mind and body seemed at the zenith of their glory. Too high tension from work and mental anxiety over his son, who was an Ensign on one of the torpedo-boat destroyers in our late war, probably proved too much for his cerebral arteries.

Appended are the Societies of which he was a member, and other data to which members of the Association may wish to refer. Before considering these, however, I would add that on January 31, 1894, he married the worthy daughter in a well known and influential family, Miss Mary Louise Graves, of New York City, who preceded him to the undiscovered country, leaving three children,—Louise Chappell Kunhardt, Constance Chappell Talmadge, and Walter Franklin Chappell, Jr. No man could have loved family more, and after his wife's death no sadder spectacle could present itself than this strong character bent with grief, for Dr. Chappell placed home and family before all else in the world.

At the time of his death Dr. Chappell was Clinical Professor of Laryngology at the College of Physicians and Surgeons, Consulting Laryngologist to the Babies' Hospital; a member of the American Laryngological Association, a member of the American Laryngological, Rhinological and Otological Society, a fellow of the American College of Surgeons, a member of the New York Academy of Medicine, of the County Medical Society of New York, of the American Medical Association, and the American Climatological Association.

He was a communicant of the Protestant Episcopal Church. The clubs to which he belonged included the Oak-

land Golf Club, the Somerset Hills Country Club, the Blooming Grove Hunting and Fishing Club, and the Union League Club, New York City.

He was of a bright, jovial disposition and of an intense nature, with keen insight into and understanding of humanity.

H. S.

REPORTS AND CONTRIBUTIONS FROM FELLOWS IN
ACTIVE SERVICE DURING THE WAR

WAR ACTIVITIES

of

MAJOR JOHN H. LOWMAN

Dr. John H. Lowman was commissioned a Major in the American Red Cross and was made the Medical Director of the Red Cross Tuberculosis Commission to Italy.

He sailed from New York on September 18, 1918, and landed at Bordeaux. The Commission then went to Paris and after a short stay there proceeded to Rome. A few days after reaching Rome Dr. Lowman was taken seriously ill with influenza. In spite of his illness he was vitally interested in the work in Italy and kept in constant touch with the men on the medical staff. During the month of December, 1918, he was able to be in his office for consultation with the other medical men, but his physical condition was such that it was deemed wise for him to return to America and he sailed for home early in January, landing in New York on the 21st of January, 1919. He went directly from the ship to the New York Hospital and died there on January 23, 1919.

His military record is typical of his whole life. He gave, without limit, of his ability for the benefit of others.

MILITARY ACTIVITIES

of

JOSEPH H. BRYAN, M. D.

First: Date of entering service, April 3, 1917.

Second: Rank on entering service, Captain.

Third: First duty as chief of the Eye, Ear, Nose and Throat Service, Walter Reed General Hospital, Takoma Park, D. C., June 11, 1918.

Fourth: Promoted to Major June 4, 1917; Lieut.-Colonel February 1, 1919, Officers' Reserve Corps.

Fifth: None.

Sixth: Demobilized December 2, 1918.

Seventh: Reported for duty at the Walter Reed General Hospital, June 11, 1918, and was assigned chief of the Eye, Ear, Nose and Throat Service. At this time the service was in charge of Captain William H. Huntington, with Captain C. Norman Howard and Lieut. S. A. Alexander as assistants. This service was in a very disorganized condition at this time owing to the most inadequate facilities for caring for the patients. There was only one treatment table in a room about 25 x 30 feet, and a very small dark room for examining the eye cases, and the operating room was so small that it was with the greatest difficulty the operation could be properly done. At this time we were located in the Administration Building. Owing to the great influx of patients from the surrounding camps, and the inadequate housing facilities, the building operations grew enormously, extending over a very large territory.

About the time of my reporting for duty plans had been drawn for the building of an operating pavilion which was to be divided equally between the Dental and the Eye, Ear, Nose and Throat Services. General radical changes had to be made in these plans in order to meet the rapid growth

of the service of which I was chief. When completed this pavilion served our purpose very well. The reorganization of this department required a great deal of time and some tact on my part in order to bring about the changes most desired.

Owing to the rapid growth and the daily increasing numbers of patients, at my request the Eye was separated from the Ear, Nose and Throat, and made an independent service with Major Haden in charge.

The service now consisted of seven medical officers, five nurses, and four separate wards assigned to the Ear, Nose and Throat. We averaged between eighty and ninety patients in the clinic daily, and the operations numbering occasionally as high as twelve. We carried out some interesting scientific investigations in conjunction with Lieut.-Colonel Nichols, chief of the laboratory service, viz.: tonsils in relation to streptococcus carriers, and the sinuses and the ear in relation to the recent epidemic of influenza. The result of these investigations are now being made public.

My work was both administrative and professional, all of the major operations were done by myself, and we had a large number of interesting operations.

In all my service in the Army was most attractive and inspiring and I regret I had only such a short time to serve actively.

MILITARY REPORT

By

MAJOR HENRY LEWIS WAGNER, M. C., U. S. A.

San Francisco, Calif.

December 22, 1909, Commission, 1st Lieutenant, M. R. C., U. S. A., Inactive list.

June, 1916, Student Training Camp for Medical Reserve Officers at Fort Winfield Scott.

July 1, 1916, transferred to active service, 1st Lieutenant, M. R. C., U. S. A.

Duty assigned: Chief of the Eye, Ear, Nose and Throat service at the Letterman General Hospital, Presidio, San Francisco, from July, 1916, until December, 1918.

Promotion: Major, M. R. C., U. S. A., July, 1917.

Subsequent assignment to duty September 26, 1918. Commanding Officer Letterman General Hospital, Presidio, San Francisco.

Honorably discharged, December 5, 1918.

MEDICAL REPORT OF THE NOSE AND THROAT DEPARTMENT LETTERMAN GENERAL HOSPITAL, PRESIDIO, SAN FRANCISCO FROM JULY, 1916, UNTIL DECEMBER, 1918

Peritonsillar abscess, in large numbers quickly eradicated under local anesthesia, by usual incision with counter opening into supra-tonsillar space for proper drainage.

Tonsillectomies and Adenectomies, in large numbers, under local anesthesia with additional pituitrin. Small children under gas and ether. Few severe hemorrhages but no deaths. Preliminary blood and urine analysis if deemed necessary.

Bacillus Fusiforme with Vincent's Spirochæte, infection in mouth and throat in fairly large numbers were comparatively quickly eradicated by curettement and application of tincture of iodine and general treatment.

Arthritis of Larynx, especially crico-arytenoid joint, in a few older enlisted men verified by repeated radiograms, did not offer any favorable prognosis.

Tongue Lesions, excoriations and fissures due to Sprue were only symptomatically benefitted by lanolin and vaselin applications.

Calculi in submaxillary duct in several men with long Philippine service simulating gastric and duodenal disturbances were entirely relieved by the Wharton duct operation.

Chlorine Gas poisoning cases, accidentally during time of training, producing edematous hyperæmia in upper and lower respiratory tract, did well under chloride of calcium internally and adrenalin locally applied.

Nasal Leprosy, ulcerations in a civil employee from Alaska, showing pure culture of Leprosy Bacilli, transferred to Leper Colony.

Congenital nasal syphilis, in infants of enlisted men, Stadium sicum and Stadium secretionis most successfully treated by rectal unguentum hydrargyrium suppositories.

Operated Sinus cases, after measles and scarlet fever improved more readily under Chlorine of Calcium treatment.

Fracture of Anterior Frontal Sinus wall and nasal bridge, in aviator was corrected by intranasal operation.

Mosher's operation for draining lachrymal sac and nasal duct into the unciform fossa was found most practicable in comparison to other methods.

Convalescent Cerebro-spinal Meningitis cases, showing labyrinth or retinal or optic nerve disturbances manifested concomitant symptoms in the olfactory nerve tract.

Malingering amongst nose and throat patients was rarely observed. Instruction in personal nose and throat hygiene given to all patients.

Daily sanitary inspection of our department wards, clinics and operating room produced a high degree of efficiency in our personnel.

MILITARY ACTIVITIES

of

BRIGADIER GENERAL H. S. BIRKETT, C. B.

Entered the Military Service of the Dominion of Canada in July, 1887, having been appointed Surgeon-Lieutenant to the 3rd Victoria Rifles of Canada.

In 1894, promoted to the rank of Surgeon-Major; in 1898 proceeded to the Headquarters of the Royal Army Corps, Aldershot, England, and there qualified with first-class certificate.

Upon returning to Montreal organized the first regimental Stretcher Section, each member of which was fully qualified.

In 1900, promoted to the rank of Lieutenant-Colonel; organized and commanded No. 3 Bearer Company, and No. 4 Field Hospital. In 1904, appointed principal Medical Officer of No. 4 Military District; and in 1907 went on to the Reserve in Medical Officers with the rank of Lieutenant-Colonel.

At the outbreak of War in August, 1914, made application to be returned to the Active List, and assumed the duties of Acting Assistant Director Medical Services, Military District No. 4, and in September of 1914 began the organization of No. 3 Canadian General Hospital (McGill). This Unit was the first of its kind offered for Overseas and consisted of selected staff from the teaching body of the Medical Faculty of McGill University, with the Nursing Sisters from those hospitals associated with the Clinical teaching of the Medical Faculty. This Unit was accepted by the Dominion Government and the British War Office for Overseas service, and I left in command of it with the rank of full Colonel, proceeding Overseas on the 6th of May, 1915, and arrived in France in June, 1915, and was

appointed consultant in Oto-Laryngology to the Boulogne Area. Continued as its Commanding Officer until the middle of November, 1917, when on account of illness was evacuated to England and invalided home in March, 1918. In September of 1918 upon the expressed wish of the Military Authorities Overseas, was requested to return for duty, having recovered my health, and was promoted to the rank of Brigadier-General, and appointed Assistant Director-General, Medical Service, of the Overseas Military Forces of Canada, and proceeded to take up these duties. Returned to Canada the middle of September, 1919, and demobilized on the 11th of November, 1919.

During this service abroad I was awarded the Colonial Auxiliary Forces Decoration in the field in 1916, and in January, 1917, was mentioned in despatches by the Commander-in-Chief of the British Forces in France, Field Marshall Sir Douglas Haig, and awarded the Companionship of the Most Noble Order of the Bath.

A BRIEF REPORT OF THE ACTIVITIES OF THE
DEPARTMENT OF OTO-LARYNGOLOGY OF
THE AMERICAN EXPEDITIONARY
FORCES, FRANCE*

By

COLONEL JAMES F. MCKERNON, M. C., U. S. A.

Senior Consultant, Ear, Nose and Throat Surgery,
American Expeditionary Forces

In presenting to you a brief history of the activities of the Oto-Laryngological Department of the American Expeditionary Forces, I can perhaps do no better than to give you at first a general outline of what the Department was at the time I was appointed Director and Senior Consultant. At that time it had not arrived at the dignity of the above name, but was known as the Department of Ear, Nose and Throat Surgery, and was merely an offshoot of the department of general surgery.

The first duty of the Chief Consultant was to list all the Base, Camp, Evacuation, Mobile and Field hospitals and divisional areas thus far established, with their personnel and equipment. Second, to obtain a list of the oto-laryngologists already on duty in France and England and to classify them. Such a list was not available in the Chief Surgeon's office. This necessitated visits to all the various hospitals as well as to the divisional training areas. His third duty was to obtain if possible a classified list of all the oto-laryngologists in America who were available for overseas duty. For this list and for others that followed, the thanks of the Department are due to Colonel Parker, and to Lieutenant-Colonel Mosher of the Surgeon General's office.

* This paper is a copy of the one presented to the American Otological Association at Atlantic City, June, 1919, and is published here by the courtesy of the American Otological Association.

The inspection of hospitals showed that when the Senior Consultant was given charge of the Department there were seventeen Base Hospitals actively functioning, with only one oto-laryngologist on duty in each. There were already fifty Camp Hospitals established, thirty of which were not functioning. Only ten of those actively functioning had an oto-laryngologist assigned to them. The total roster of officers doing ear, nose and throat work for the American Expeditionary Forces at this time was thirty-two. Following is a summary of the equipment, or rather the lack of equipment for this work in the hospitals of the American Expeditionary Forces at that time.

Base Hospitals.

One-third of the Base Hospitals operating were lacking in instruments and equipment to adequately care for the patients they were receiving.

Camp Hospitals.

Of those functioning, only two had sufficient instruments and equipment to properly care for cases.

Evacuation Hospitals.

In only one was an oto-laryngologist on duty, with practically no instruments or equipment with which to work.

Mobile Hospitals.

None of those established early had an ear, nose and throat surgeon connected with it.

Field Hospitals.

In none of those functioning was there an oto-laryngologist, or any instruments or equipment for use in this department.

Divisions.

There were six oto-laryngologists on duty with various Divisions. Later the number was increased as requisitions were made, but at no time during activities were there sufficient officers from this department to meet the demands made upon it.

From the above summary it will be seen that in reality there existed no ear, nose and throat department except the service in the seventeen Base Hospitals, and in those there was no uniformity of standard as to the work performed. This lack of available men on the ground, coupled with the fact that only a small number were occasionally landing in France and England, handicapped very much the early activities of the Department. It was found also that while there was an ear, nose and throat man assigned to each of the Base Hospitals, he was supposed to remain there, and for the first six months this ruling held good, even though in many instances two or more men were assigned to the same hospital; and even though some of these hospitals were not actively functioning at the time, their Commanding Officers, with few exceptions, would not allow the officer an assignment for temporary duty elsewhere.

By May, however, we succeeded in obtaining competent men from many of the Base Hospitals, replacing them for the time being with men who were arriving, or with men who had been tried out on front line work and were found more suitable for Base Hospital work. With these men obtained, and with others who were arriving from time to time, all of our Evacuation and Field Hospitals at that time were manned, and the remainder assigned to divisional work.

Before an oto-laryngologist was assigned to duty with the divisions, it was not unusual to have from 250 to 400 men report sick each morning to the Divisional Surgeon. At least one-half of these cases were suffering from colds and minor complications resulting therefrom. The usual mode of procedure at that time was to send these men to some Base Hospital in the rear, where they were treated for a few days, and then sent to a replacement depot where they were held from three to six weeks and then finally returned to their organization. As soon as an oto-laryngologist was assigned to duty with these divisions, an Infirmary or Dispensary was constructed, and at least 50 per cent of the men presenting themselves for morning sick call with

colds and their sequellæ, were treated and returned to duty the same day. Of the remaining 50 per cent about 40 per cent remained in the Infirmary and received treatment for from one to three days, and were then returned to duty with their organizations, thereby saving transportation and loss of man power, both of which at that time we were sadly in need of. The remaining 10 per cent it was found necessary to route to Base Hospitals, where they received more protracted care and treatment needed.

This system which was first put into practice by this Department, was later adopted in the Divisions by every department of medicine and surgery, the net result being a conservation of man power when most needed as well as a welcome relief to an already over-congested transportation service. While some of the Base Hospitals were well equipped with instruments and supplies, the majority were not, and this was especially true of those that came over during the summer and autumn. Many of these upon landing had no instruments or equipment whatever with which to function, the result being that much valuable time was lost to the service at a period when every hospital and man was sadly needed.

Our Medical Supply Depots at no time carried sufficient instruments and supplies to properly equip a hospital in an emergency, and those instruments they did supply for our Department were so few in number and so antiquated that had it not been for the fact that many of the medical officers brought their own instruments, hundreds of cases could not have received treatment at all, for with the exception of buying an instrument here and there that had been discarded by the French during the earlier period of the war, none could be obtained in France. Later, however, this scarcity of instruments and supplies was not such an acute problem, although the supply was always inadequate to the demand.

Hospital Centers.

Where several Base Hospitals were established at one place a set of buildings was assigned to this department,

so that all the work in the center was segregated. Special wards and operating rooms were arranged, and examinations and treatment rooms for ambulatory patients fitted up, and a staff formed composed of officers from the Units of the Center. This obviated duplication of instruments and equipment, and resulted in better care for the patient besides allowing the excess officers in the department to be made available for duty elsewhere.

Center Consultants.

In all the large Hospital Centers a Consultant was appointed whose duty it was to have a general supervision over the center and act as Consultant when called upon by the Center Staff or the individual Units. This arrangement proved most satisfactory, resulting in a better care for the patient besides maintaining a more rigid discipline for the Staffs of the Center.

Among the duties of the Senior Consultant was that of visiting all the Base Hospitals as frequently as possible, seeing cases in consultation and operating when necessary and consulting as to the needs of the service with both the Attending Surgeon of the Department and the Commanding Officer of the hospital. During activities visits were constantly made from one Evacuation, Mobile and Field Hospital to another, seeing cases in consultation and advising as to the proper care and routing of the cases, and later following up those cases that had been routed to Base Hospitals in the rear, and consulting as to the nature and amount of reparative work to be done.

Care and Treatment.

Upon a request from the Chief Surgeon, a circular dealing with the care and treatment of cases in this department was prepared and sent to all hospitals in the American Expeditionary Forces, as many cases were being hospitalized unnecessarily for minor operative work. Upon receipt of this circular much of this unnecessary work ceased.

Classification and Standardization.

A working schedule for the classification and standardization of ear cases was submitted to the Chief Surgeon, believing that it would simplify the work in this Department as well as aid the disability Boards in classifying the cases that must come before them.

Routing.

When possible, all cases requiring immediate special reparative work were routed to hospitals in the advance zone where this type of work could be best cared for and frequent observations made. Those cases that could be transported longer distances were routed to Base Hospital No. 115 where a special staff of officers for reparative work was located.

Records.

The ordinary history sheet used in the army was all that was required, but in many instances this was supplemented by a more complete history from a specialistic standpoint. All officers in the Department were urged to obtain and keep complete records in full and maintain a standard of uniformity. As Consultant I was frequently asked by both regular and reserve officers what need there was for an oto-laryngologist being assigned to an Evacuation, Mobile or Field Hospital. At first my answer was "to care intelligently for cases in his Department." Later experience modified my views on this subject very much. I now believe the need of an oto-laryngologist in an Evacuation, Mobile or Field Hospital is a limited one, owing to the fact that there are but few wounds that would naturally come within the province of the surgeon in this Department that are not multiple, the majority of which concern the general surgeon only. For this reason, especially when there are only a limited number of men available, it is unnecessary to assign a man from this Department for duty at one of these points unless he has had a general surgical training that fits him to act as a member of a team doing general surgery. If a member of such a team can act in a general surgical

capacity in addition to caring for those cases that by right belong to his Department, in such a way only can an oto-laryngologist be utilized to a maximum at these points. To assign and maintain one in the front area for this purpose alone would be wasting his time, as his services are more urgently needed in the Base Hospitals of the advanced zone and in large hospital centers where the special cases are collected. At these places the oto-laryngological surgeon is needed, where his judgment and skill can be utilized in caring for the acute conditions that present themselves, and for the reconstructive work that will follow on these cases that are to be salvaged for future line duty.

The cardinal principle of front line work in our Department was following the example of the general surgeon, a debridement of the traumatized tissue and removal of all loose bone splinters and foreign bodies, when present. Through and through penetrating wounds were closed primarily. In all cases where wounds were open and there was a tendency to contraction with increased separation of the edges, a primary suture was done in order to obtain a better cosmetic result for the future reconstruction work that was to follow. In penetrating wounds of the outer and superior wall of the antrum no matter how produced, counter drainage was instituted from below. In bullet and shell wounds of the nose where the bones were shattered, debridement followed by the removal of the loose splinters was the rule, but in no instance was there removal of any piece of bone where there was still an attachment of periosteum. These pieces were approximated as accurately as possible and held in place by some mechanical device so as to allow of nature's repair. In this way much bony structure of the nose was preserved, so that the reconstructive work could be made easier and the future result obtained more satisfactory.

All shell and bullet wounds of the auricle were treated by primary suture. Impacted shell fragments in the external auditory canal were removed and the resultant wound treated by the open method in order to promote drainage,

and later when necessary, plastic procedures were instituted. In shell and bullet wounds of the mastoid process, removal and open treatment was the rule. In penetrating wounds of the skull in the region of the temporal bone or nasal fossa, a debridement at first was all that was indicated. Later, when the X-Ray had localized the foreign body and the patient's condition admitted it, an attempt at removal (which was many times unsuccessful) was made.

In localizing foreign bodies in the brain no instrument gave us as much help by its precision and accuracy as the Hirtz Compass, and later this was used in all foreign body cases to the exclusion of all other aids. In no brain case was it permissible to further mutilate the brain tissue by digital exploration. If the foreign body could not be removed by a continuous flow of a warm saline solution or other non-irritating fluid from a syringe, or could not be extracted by aid of forceps, it was let alone, as experience soon taught us that many of the cases recovered by letting the foreign bodies remain in situ. When fractures of the skull occurred all depressed areas of the bone were removed. At first a mistake was made by removing too small an area. Experience taught the error of this, as subsequent hernias were far less liable to occur when a large amount of bone was removed. This is probably due to the fact that a large exposure produces a minimum amount of pressure from within, whereas a small opening makes for a maximum of pressure.

In all wounds of the throat and mouth the principles of general surgery were carried out, always keeping in mind that drainage was an important factor. In reconstruction work of the auricle where the greater portion of it has been destroyed a more satisfactory result was obtained by making casts or moulds, and from these constructing an artificial auricle from what was known as Hemming's Paste, rather than doing a plastic operation. These were easily placed in position and held by spirit cement and made to conform in color to any skin, and could be easily removed and replaced by the patient at any time. Artificial noses

were made in the same way. In some of the nasal injuries it was necessary for respiratory as well as cosmetic purposes to loosen all adhesions and elevate them as much as possible by inserting a piece of cartilage or bone to replace in a measure the trauma existing. In many cases it was found advisable to work on these patients in conjunction with dental surgeons, as appliances had to be fitted and incidental details worked out, and much better results were obtained by utilizing the help of one who had been specially trained in devising, making and fitting these appliances. In the reconstruction work that was done, no didactic rules could be laid down as the reparative process depended entirely upon the size, location, shape and condition of the wound and the amount of tissue available for repair. Much less of the reconstructive surgery was done in France than was at first expected. This was owing to the decision made by the Chief Surgeon to return all soldiers to the United States that could not be made ready for line duty in a period of three to four months or less. This decision was in all probability due to our lack of beds at that time.

In many of the cases that confronted us it was quite as important to decide what should not be done as to say what should be done, and in this respect we learned a great deal from both our French and English colleagues, who, by the experience gained in the past four years, were in a measure able to say which cases should be operated upon and which should not. Eighty per cent of the work of the otolaryngologists in France was behind the lines except in the regimental area, and here as well as further back the bulk of it was much the same as that met with in civilian practice, and consisted in caring for the acute conditions and their sequellæ. During the influenza epidemic the cases where possible were segregated, and all were treated with warm naso-pharyngeal irrigations of saline and sodium bicarb three times a day, using from a pint to a pint and a half at each sitting. This was followed by inhalations and the air in the wards was kept as moist as possible. This unquestionably proved beneficial, lessening the cough and

diminishing the duration of the attack. All mucous membrane irritations due to gas were treated primarily by local applications of lime water or bicarb of soda. The laryngeal conditions were best controlled by intra-laryngeal injections of guaiacol 2 per cent, and camphor and menthol of each 4 per cent in oil.

Considerable criticism was made by some of the men when a circular was distributed through the department relating to tonsils, namely that no tonsils were to be removed except when markedly hypertrophied or diseased, and never during an acute process. This was made necessary by the wholesale removal of tonsils that took place the first few months, and many hundreds of patients were hospitalized unnecessarily until this order was enforced.

Ear Protectors.

At first there were many and various kinds. Later on all were discarded and gave way to the use of cotton waste moistened in oil or vaseline. This simple mechanical protection was sufficient as it prevented concussion and maintained a maximum of hearing when worn. It was easy to insert and always obtainable.

Experience has taught us that all hospitals engaged in the care of the sick and wounded should be completely equipped and have the proper assignment of medical officers and nurses when ready to function; and that when assignments are made from the Ear, Nose and Throat Department to Evacuation, Mobile and Field Hospitals those officers should be qualified to act as members of surgical teams, either as heads or assistants, as ordinarily there are not enough cases requiring special attention to occupy their entire time in these hospitals. There should also be a center of instruction established for officers of limited experience, so that they may be taught the modern methods of caring for battle casualties. One of the principle points brought forcibly to our attention was that in wounds involving the anatomical parts that properly come under this department there was a too extensive debridement of the

tissues. In some cases this was carried to such an extent that an immediate reparative process was impossible, owing to a lack of tissue with which to repair, for it should be remembered that in the regions of the ear, nose, throat and face as extensive a debridement is not necessary as in other portions of the body, because of the anatomical difference in the tissues.

Considerable difficulty was experienced in handling men that were assigned to the Department from divisions and other medical organizations. Many of these men would claim to be expert oto-laryngologists and were assigned to this department because of this claim or because they were doing regimental line work and wished to make a change, stating that their former training had been entirely along oto-laryngological lines. These men with few exceptions did not know the first rudiments of ear, nose and throat work, and as soon as this was established they were transferred to a Casual Medical Camp, and subsequently utilized in other capacities.

This brings up an important point for the future consideration of oto-laryngologists, namely that of standardization. Is a man qualified to practice this specialty simply because he claims to be a specialist in this line of work? Or should he pursue a course of study in this specialty at some recognized institution where, after a prescribed course, he be examined both didactically and practically, and if successful in such an examination he be granted a specialistic degree? A man taking such a course at an institution chartered with the power to grant such a degree or diploma, would at once in the eyes of the medical world be looked upon as competent to practice his specialty. If such a standardization were established, the self-styled specialist would in the future (as far as medical support is concerned) be a thing of the past. I feel strongly on this point and speak from experience because of some of the material with which this Department was burdened under the guise of specialism.

During mid-summer the calls for consultation work be-

came so frequent that it was impossible to respond to all of them, and the appointment of a Junior Consultant was requested. This request was granted, and Major John B. Rae was appointed and assigned to Headquarters for duty. This appointment was of great help to the Senior Consultant as well as being of the utmost value to the Department, as it made one or other of the Consultants available at all times. During the summer plans were submitted to the Chief Surgeon requesting that one or more schools of instruction be established for officers of limited experience; that this instruction comprise a thorough course on the functional examination of the ear, as well as the routine and operative treatment of nose, throat and ear cases, and that it also include the teaching of reconstructive work in this department. Owing to the lack of available teachers it was not considered advisable to grant this request, but we were given a promise of establishing these courses later. The early signing of the armistice, however, disposed of any further plans the Chief Surgeon may have had toward establishing such a course of instruction.

In some of the Camp Hospitals only one man was needed to cover the service on the eye, ear, nose and throat. In these instances, through the courtesy of Colonel Greenwood, the Senior Consultant in the Eye Department, an exchange of men between the two departments was made. When the armistice was signed there were 238 officers on duty in the department, and twelve additional held in reserve. When the Third Army was ordered to occupy German territory all the hospitals accompanying them were manned by from one to three officers from this Department, in charge of Major Rae as Consultant, and all instruments and equipment for the special work that was to be carried on was placed with the Medical Supply Depots accompanying the army and requisitioned for use as soon as the hospitals were functioning.

From a personal observation of the French and English hospitals where reconstructive head and face surgery was done, I would most strongly urge that in the event of the

United States becoming involved in another war, similar hospitals be established, equipped and surgically manned and ready for work prior to the opening of hostilities, and not wait to see whether or not such hospitals were going to be necessary, as we were told to do in the early days of the war. In my opinion it is just as necessary that such hospitals be ready to functionate at the beginning, as it is that we have Base Hospitals, if we expect to do our duty as surgeons to the wounded. Such hospitals established early give to the patients a better functional as well as cosmetic result, inasmuch as it insures the work being done early by competent men who have previously specialized along these lines.

My warmest thanks and appreciation are due General Ireland as Chief Surgeon, and Colonel Keller as Director of Professional Services, for the help and advice given me at all times. It was their co-operation that made it possible to organize and maintain the Department on an efficient basis. To those officers and their associates who had charge of the services in the Base Hospitals, my own, as well as the thanks of the Department are gratefully given. It was due to their loyal support and willingness to work at all times in any capacity, that made the service efficient for the care of our sick and wounded.

REPORT

of

COLONEL CHARLES W. RICHARDSON, M. R. C., U. S. A.

Dr. Richardson was commissioned a first lieutenant in the old Medical Reserve Corps, July 5, 1908. Commissioned a major, Medical Reserve Corps, April 26, 1917. Commissioned a lieutenant-colonel, National Army, May 20, 1918. Commissioned colonel, February 19, 1919, M. R. C.

During the early part of the war Dr. Richardson was employed in numerous inactive and active duties. Among the latter was the chairmanship of the Oto-laryngologic Section of the Division of Surgical Specialties, Council of National Defense. During this period, Dr. Richardson, with his able assistants, got out all the questionnaires, classified those that were returned, and compiled a card index of the same. During this period also, Dr. Richardson was on active duty, making a tour of some of the larger cities in the country for the purpose of increasing enthusiasm among oto-laryngologists, and thereby increasing volunteers among the physicians in this line of the profession. Later he was again placed on inactive duty. He was created a special commisisoner on legislation to see that important active legislation did not take away from the Surgeon General the rights of reconstruction, which was accomplished.

On October 24, 1917, he was placed on active duty which he continued until his discharge. During this time he was assigned to the Oto-laryngological Section, Division of Surgery of the Head, as acting chief, in the absence of Major Mosher on a mission overseas. Various activities arose, among the most important of which was the creation of the Army Medical School at Fort Oglethorpe, and the arrangements made for the Section of Oto-laryngology. These were finally completed by Lieutenant-Colonel Mosher on his return.

On March 11, 1918, Dr. Richardson was assigned the directorship of the Defects of Hearing and Speech in the Division of Physical Reconstruction. He organized and assigned the personnel, sought the proper habitat for the patients in defects of hearing and speech, and carried out further details in order to make the undertaking a success. During the period of the war 140 patients returned deaf and required speech correction. Of this number of returned patients, over seventy per cent made excellent speech readers. Eighty per cent of the corrective speech cases were excellent, demonstrating the character of the work done. The methods employed met with the approval of all those who had the pleasure of seeing the patients, and the work done.

From September 10 to October 30, Dr. Richardson was acting chief of the Division of Physical Reconstruction, during the absence of Colonel Billings overseas.

During his service in the office of the Surgeon General it was always Dr. Richardson's pleasure to aid in advancing the grades among the officers who deserved it, assisting in securing the discharges of officers when it was requested, and doing various other acts for the many officers in the service in the section of oto-laryngology.

AN ACCOUNT OF THE ORGANIZATION AND
DEVELOPMENT OF THE SCHOOL OF
OTO-LARYNGOLOGY

Camp Greenleaf, Chickamauga Park, Ga.

By

LT.-COLONEL THOMAS J. HARRIS, M. R. C., U. S. A.,

Director

It was a part of the comprehensive scheme of post-graduate instruction for medical officers, which owed its conception to the far-seeing mind of General Edward L. Munson, M. C. The need of such training to render the medical man competent to do properly the work in the army which was to be required of him, had already, before America entered the conflict, impressed itself upon him.

The full story of how it was put into execution at Fort Reilly by Colonel William Bispham, M. C., at Fort William Harrison by Colonel Ashburn, M. C., and at Camp Greenleaf by Colonel W. H. Page, M. C., and what has been accomplished by them and their successors and the officers working under them, is a subject that deserves to be and undoubtedly will be reported in full at the proper time. It is sufficient at this time to say that it proved to be one of the most important of the many scientific accomplishments, so far as medicine is concerned, brought about by the Great War.

Organization

The School of Oto-laryngology, Camp Greenleaf, was organized May 12, 1918, and the first class began its work on the eighteenth of the same month. On the first of these two dates, Lieutenant-Colonel, then Major, Thomas J. Harris, M. C., reported under orders from the War Department as instructor in Oto-laryngology. A considerable number

of student officers was awaiting instruction and a class of sixteen was detailed for that purpose.

Building

A room in Ward Q of the General Hospital was set aside as the lecture room and equipment sufficient to permit of beginning work the following week was gathered together. The school was operated in connection with the Ear, Nose and Throat Department of the U. S. A. General Hospital No. 14, which soon outgrew the quarters assigned to it. This led to the removal of the wards and the school, in July of this year, to McDonald Field where two buildings and a half of a third building were assigned for its use.

The lower floor of one of these (Ward No. 29), was set aside for clinical and teaching purposes. It contained two treatment rooms, thirty-one by ten feet, with concrete floors, electric lights, etc.; a well lighted operating room, twenty-four by twenty-one feet, with concrete floor; a sterilizing room; a private treatment room for officers; a dispensary room; an office for the director; and a lecture room, forty-eight by twenty-four feet in size. All of these were conveniently connected, one with the other.

The three wards together contained 128 beds most of which were constantly occupied.

Equipment

At the beginning, the equipment of the Department was exceedingly meager; one nasal speculum and a tongue depressor virtually represented all that the staff had to work with. A requisition for a complete list of instruments and equipment was early sent in and in due time everything that was needed in an up-to-date ear, nose and throat clinic, both for treatment and for teaching, was provided. The grateful thanks of the Department are due to all the various purchasing officers of the Surgeon General's office. Without such equipment it would have been impossible to do the work that was accomplished.

The operating room was fitted up with two operating

tables and a "Holmes Operating Chair," an Ohio Chemical and Mfg. Co. "Gas and Oxygen" outfit, an instrument cabinet, dressing cases, etc. The sterilizing room was provided with an electric American Sterilizing Co. apparatus, capable of sterilizing all dressings and instruments for the Department. Each treatment room contained four places for examination and treatment of patients, with a wash bowl at each place serving as a cuspidor, and electric connections for lights. At the end of each room there was a place for the assistant in charge of the clinic to work. Each room was provided with a modern "Wappler" suction apparatus. The private treatment room was also well equipped and contained a "Wappler" suction outfit. The lecture room was provided with blackboards and a "Barany Turning Chair."

The school was particularly fortunate in possessing an unusually valuable collection of cut sections of the head, loaned by Lieut.-Colonel Harris P. Mosher, M. C., and Lieut.-Colonel William H. Haskin, M. C. In addition to these there was a good supply of wet specimens of the head, a gift of Lieut.-Colonel C. W. Richardson, M. C., a fine collection of lantern slides of the accessory sinuses, a gift of Major Hanau W. Loeb, M. C., of St. Louis; and a collection of excellent slides of the ear, a gift of Dr. B. Alexander Randall of Philadelphia. Without these collections satisfactory teaching would have been impossible.

Clinical Material

The clinical material was at all times abundant. At no time were there less than 1,200 patients, and often as many as 2,000 or 2,500 in the hospital. In addition to this, the various camps scattered throughout the Park, contained as many as 60,000 troops at times and served as feeders.

The Student Officers

Altogether 110 student officers have passed through the school. These were selected after careful examination by the director, or his representative, and represented only a

portion of those who desired to take the course. On account of the limited time, it was impossible to admit beginners, only those showing real fitness being received, and these were not allowed to continue the course in case they proved, after a short time, to be incompetent.

Outline of the Course

The course was planned to run from four to six weeks, but from the fact that the War Department did not order the men away at the end of that time, it extended in many cases to eight and ten weeks. It was the endeavor to make the course as thorough as it could be made in the time allotted for it. It consisted of lectures and practical work, observation of operations, ward walks, and the performance of operation by the pupil himself, as he showed his ability.

The lectures were given by the director of the Department, by his assistants and by the heads of the other departments, including that of the School of Laboratories, School of X-Ray, School of Ophthalmology, etc. Much attention was given to anatomy which was taught with wet and dry specimens, lantern slides and upon the cadaver. For practical work, the class was divided into small groups in charge of assistant instructors. Each student officer was provided with a head mirror and examining instruments and required to make examinations and diagnoses himself. Each week the subjects treated during the week were gone over in quiz by the director of the school. At the end of the course, a written examination was given, as well as a practical examination. Based on these two examinations, the officer was rated.

A report of the ratings was sent each month to the Surgeon General. Officers who had graduated satisfactorily from the school were assigned as assistants in the wards of the hospital. Those of the number who showed themselves especially qualified were given temporary assignment as ward surgeons to the hospital, remaining in this capacity until they were ordered elsewhere by the War Department.

The Staff

The corps of instructors consisted, in addition to the director, of Capt. William J. Bailey, M. C.; Capt. William E. Sauer, M. C.; Capt. Francis W. White, M. C.; Lieut. Frederick T. Hill, M. C., and Lieut. John F. Curtin, M. C. From the outset it was the aim of the school to co-operate in every way with the other special schools. To that end, interchange of lectures constantly took place and the assistance of Lieut.-Colonel George De Schweinitz, M. C., and Major Meyer Wiener, M. C., of the School of Ophthalmology; Lieut.-Colonel Edward Martin, M. C., and Capt. W. Lee, M. C., of the School of Surgery; Lieut.-Colonel W. F. Manges, M. C., of the School of Roentgenology; Major Robert A. Keilty, M. C., of the School of Laboratories, in this respect, has been greatly appreciated. Without their help the comprehensive scope that the work assumed, would have been impossible. In the same way the director of the school lectured at regular intervals to the School of Surgery and practical instruction was given to the class, in the methods of examination of the nose, throat and ear.

Conclusion

As stated in the beginning of this article, the School of Oto-laryngology was only a part of a comprehensive plan for post-graduate instruction for medical officers. Scarcely had this country entered upon the war, before the pressing need of such instruction became evident to those in charge of the several training camps for medical officers. All those who had to do with these camps, in any capacity, were agreed that an unwarrantedly high rating had been placed on medical education in this country. So far as oto-laryngology was concerned, this was driven home with increasingly painful consciousness the longer the war continued.

At Camp Greenleaf a board of examiners representing the various branches of medicine and surgery, met daily to examine every student officer immediately upon his arrival. By this plan, everyone representing himself as inter-

ested especially in some one of the specialties, was assigned for examination to the director of the particular school. In this way opportunity was given to ascertain the qualifications of several hundred men drawn from all parts of the country, who claimed to be oto-laryngologists, or as having had more or less training in that specialty. The results of these examinations were as astonishing as they were disappointing. Whether in the practice of the specialty for a few years or many years, they all, with few exceptions, showed a woeful lack of knowledge of the fundamentals of the specialty. With increasing emphasis as the weeks went by, the need of adequate and thorough graduate education truly to fit men for such work, forced itself upon those to whom the duty of making such examinations was assigned. Inquiry shows that out of the entire number who presented themselves, very few had had little more than a six weeks' course of graduate instruction. The all-important subject of anatomy was a closed book to them. Such a thing as the physiology of the nose, throat and ear, few had any realization of. As for pathology, bacteriology and neurosurgery, these did not enter within their field of knowledge. For most of them, the broad field of oto-laryngology, with its many intricate side-paths, meant only the ability to remove tonsils and straighten septa.

This alarming lack of qualifications on the part of the average oto-laryngologist, practicing in the cities and towns of this country, as demonstrated by the results of these examinations, serves but to drive home with greater emphasis the need of comprehensive and adequate graduate instruction in oto-laryngology. So long as the six weeks' course is given to any and all who are prepared to pay the prescribed tuition, apart from whether proper qualifications are possessed or not, so long will our country continue to be at the mercy of ill-trained and uneducated specialists.

The work that the American Medical Association has done in the direction of eliminating third rate medical colleges, is the greatest step that has been made in the direction of raising the standard of medical education in Amer-

ica. Something like this is demanded to put special medicine on a proper basis. The best plan to bring this about is yet to be definitely agreed upon. For several years a special committee representing the several national societies of oto-laryngology has been working upon the subject and at the outbreak of the war had reached the conclusion that only by the standardization of post-graduate instruction, the agreement between the leading class A colleges of the country to accept the standard and then, after satisfactory examinations, to confer a special degree, could the incompetent and untrained self-styled specialist be done away with.

The work that has been done in the School of Oto-laryngology, Camp Greenleaf, is a step in the right direction. In the event of universal military training, in the light of the experience gained at Camp Greenleaf, the pressing need for the continuation of the various professional schools has been conclusively demonstrated.

PERSONAL OBSERVATIONS IN OTO-LARYNGOLOGY IN FRANCE DURING THE WAR

By

MAJOR FRANCIS R. PACKARD, M. C., U. S. A.

Any remarks I may have to make on the laryngology and otology of the war must be of a more or less discursive nature because of the comparatively late time at which I became officially connected with the oto-laryngological service of the A. E. F.

I sailed May 17, 1917, with Base Hospital No. 10, the Pennsylvania Hospital Unit which assumed charge in June, 1917, of British General Hospital No. 16 at Le Treport, France. The hospital had 2,090 beds and was used only for acute cases, patients being evacuated to England or to a convalescent camp or to their units as rapidly as possible. We were one of five or six other British hospitals, located in close proximity. Our hospital received chiefly wounded and gas cases but also had attached to it a contagious division, which received many cases of diphtheria, scarlet fever, measles and Vincent's angina. The otological, laryngological and ophthalmological work of the entire hospital area had been in charge of Dr. MacDonald, of the Canadian Army Medical Corps, a most competent man. We had brought with us an ophthalmologist, as well as myself to look after the eye, nose, throat and ear cases, but we neither of us, found much to do. Practically all operative work, except for wounds or acute conditions, was forbidden.

Tonsil and septum operations and radical mastoids were forbidden, and consequently, except for occasional foreign body cases in anatomical regions which fell within my province and for occasional cases in the Isolation Division with ear and throat conditions, my duties were very light. I was very forcibly impressed, however, with the very great

number of aural cases which occurred among the men and which in civil life would have received appropriate treatment but which were necessarily neglected, owing to the exigencies of active war service. I refer to traumatic ruptures of the membrane tympani, due to concussion, to chronic suppurative conditions of the middle ear with acute exacerbation due to exposure or neglect, and to chronic non-suppurative disorders of the middle or internal ear, due chiefly to exposure to concussion in artillery fire. Most of the traumatic ruptures of the membrane tympani had developed suppuration, chiefly owing to their having been douched when first seen. Chronic purulent otitis media appeared to be entirely disregarded as a disability and I operated on several cases which had developed acute mastoid symptoms as a result of exposure and neglect. Even a quite marked degree of deafness did not exempt the enlisted man and of course such cases became greatly aggravated.

After some three or four weeks at the hospital I went up to a Casualty Clearing Station with a surgical team, being officially designated as anæsthetist. I was very glad of the opportunity to get to the front and felt that I could be better spared from the hospital than most of the other officers as my duties were so light. There was absolutely no work in our specialty at the front, but there was plenty of work of other kinds. After remaining three months at the Casualty Clearing Station I returned to British General Hospital No. 16. The hospital was now receiving a great number of gas cases and the laryngeal lesions were most interesting but chiefly from the pathological point of view as there was unfortunately but little that could be done even by the way of alleviating their sufferings. The patients were chiefly suffering from mustard gas which caused a deep burn through the mucosa involving the underlying tissues and extending from the mouth well into the bronchi. No local applications were of any avail in the pronounced lesions, in slight ones intratracheal injections by means of a syringe of liquid vaseline containing menthol, camphor

or oil of eucalyptus seemed to lessen the pain and irritation.

In September, 1918, I was detached and sent to Paris as Centre Consultant in Oto-laryngology. There were a number of large American hospitals in the Centre, notably American Red Cross Military Hospital No. 1 at Neuilly, American Red Cross Military Hospital No. 2 and American Red Cross Military Hospital No. 3, and U. S. Base Hospital No. 41 at St. Denis and No. 4 U. S. Camp Hospital at Joinville. Excellent work was done at them by the oto-laryngologists attached to their respective staffs, notably Majors W. Sohier Bryant, Hubby, and H. E. Tucker. There were many mastoid and sinus cases, particularly in connection with the pneumonia and influenza epidemics. The hospitals were well equipped owing to the energy and foresight of Lt.-Colonel Jas. F. McKernon, chief consultant in oto-laryngology for the A. E. F., a fact which won the envious admiration of some of our French colleagues who visited them and were most favorably impressed. I in turn, was much struck with the excellence of the oto-laryngological service in the French Military service at Paris. I visited a number of the clinics, notably those of Luc and Lubet-Barbon and found much to admire and but little to criticize.

REPORT

of

MAJOR T. PASSMORE BERENS, M. C., U. S. A.

Commissioned Major M. R. C. May 15, 1918.

Reported for duty U. S. A. General Hospital No. 1, Williams Bridge, New York, June 5, 1918. In charge Section Oto-laryngology.

Discharged therefrom December 6, 1918.

A Retrospect.

Facilities: An empty ward was used as a clinic. Eventually partitions, washstands and sterilizers were secured; a room was set aside for mastoid dressings; another for local anæsthesia operations; another for diagnoses and general treatment; one for a reception room; one for an office, and another for a storage room for dressings (the latter was also used for nurses). The various cases were segregated in their respective wards,—there were wards for post-operative mastoids, wards for observation, tonsil wards (mostly post-operative) and a ward for mixed cases.

Equipment: Ample.

When I reported for duty, the patients in the wards were the general run of ear, nose and throat cases that one finds in a hospital for these specialties. Being a "General (Military) Hospital," the Medical Department had charge of acute cases, such as acute tonsillitis, etc. Those requiring surgical treatment were transferred to the Section of Oto-laryngology, which was part of the Surgical Department. There were many cases of mild coryza, slight deafness, etc., among the staff, nurses and hospital attendants. These were treated in the Clinic.

Influenza: During September and October, at the time of the epidemic of influenza, there were many cases of coryza, largely imaginative. Of some 1300 cases of influ-

enza in the medical wards, 20 developed acute otitis requiring myringotomy. The latter were performed early in the attack. They all made uneventful and rapid recoveries. The accessory sinuses were but seldom and then slightly involved. There was no tonsillar or laryngeal involvement. One case of fully developed mastoiditis (influenza infection) was brought in and required immediate operation. He made an uneventful recovery.

Tonsils: Two hundred and eighty-six cases referred from the Medical Department had bilateral tonsillectomies performed, all under local anæsthesia. A few of these cases had slight hemorrhages following operation and a very few required stitching of the pillars with packing between. No desperate hemorrhage was encountered. This is the more remarkable because many of the operations were performed by men under instruction and without previous experience. Novacaine was the local anæsthetic. Healing took place in ten days or less.

The tonsils of two hundred consecutive cases were collected in sterile bottles and examined pathologically and bacteriologically.

(a) In one hundred cases of chronic tonsillar infection the following results were obtained by the laboratory:

"90 cases showed an indefinite streptococcus			
9	"	"	a streptococcus hæmolyticus
4	"	"	a spirillum characteristic of Vincent's Angina
2	"	"	definite diphtheria bacilli"

(b) In the group of focal infections there were 15 acute rheumatic cases, the tonsils of 8 of which showed indefinite streptococcus; 5 showed streptococcus hæmolyticus; 2 staphylococcus and streptococcus; 1 colon bacillus in preponderance; 15 neurocardiac asthenias showed indefinite streptococcus; 18 goitre cases (15 of which showed indefinible-streptococcus and 3 hæmolyticus); 5 chronic cardiac (valvular) diseases (of which 4 showed indefinite streptococcus and 1 hæmolyticus); 25 chronic arthritis (of which 20 showed indefinite streptococcus; 3 hæmolyticus; (2 not

noted). Microscopically the entire group of tonsils showed chronic involvement,—some with small abscesses of various sizes, some with destroyed crypts, some contained areas of phagocytic invasion. (Report incomplete.)

Results: From what could be learned from the observations of the Medical Department, the only group of cases which showed an immediate benefit were the neuro-cardiac asthenia cases. Their nervousness disappeared, they gained in weight, and the majority of them were sent to full duty. The chronic goitre cases, valvular heart cases and chronic arthritis showed very little improvement during their stay in the hospital. Two cases of acute rheumatism developed acute pericarditis with effusion after tonsillectomy, and one case developed acute rheumatic fever with swelling in some of his joints within a period of ten days after the tonsils were removed.

Among the cases in the wards on my arrival, there were thirty of unhealed mastoid wounds,—cases that had been incompletely operated upon (scratch operations) in different Army Hospitals around the Port of Embarkation. In practically all of these X-Ray examination showed the presence of the zygomatic cells and of the tip cells. According to the history none had had myringotomy or paracentesis before operation. Eight recovered without operative treatment other than curettage under local anæsthesia; the remainder required extensive re-operation. Three developed erysipelas, two on the side that had not been operated upon; one in the stitches of the wound. One had a temporary facial paralysis following a radical re-operation. As was to be expected, the results to hearing in all these cases were not good.

Instruction: Teaching clinics were held for the following: Tonsillectomies under local anæsthesia; the various mastoid operations on the living; accessory sinus and mastoid operations using wet specimens; functional examinations of the ears; bronchoscopies, using the dog as the subject. Considerable interest was evidenced by the men who attended these clinics.

REPORT OF

LIEUTENANT-COLONEL J. M. INGERSOLL, M. C., U. S. A.

First Lieutenant, Medical Reserve Corps, June 5, 1915. Captain, April 2, 1917. Major, May 24, 1918. Lt.-Colonel, April 24, 1919. Began active duty July 25, 1917. Organized the Physical Examining Unit for Aviation Section, Signal Corps, at Western Reserve University, July 25, 1917.

Transferred to the U. S. A. General Hospital, No. 11 (The Hospital for Head Surgery) Chief of the Oto-Laryngological Department, May 6th, 1918.

Transferred to the Surgeon General's Office, Washington, D. C., March 4, 1919. Released from active duty and returned to the Medical Reserve Corps, March 17, 1919.

The paper which I read this morning before the Association gives a rather brief account of some of the work in the Oto-Laryngological Department at the Hospital for Head Surgery. I should simply like to say in addition to this account of our activities at No. 11, that the whole work was one of the happiest periods in my life.

Our Commanding Officer, Colonel Paul F. Straub, was an unusually high type of man and my associations with him, and with all of the other men on the staff, were most cordial and pleasant.

The work of the teachers, in the Section of Defects of Hearing and Speech, deserves special mention. All of them made sacrifices to enter the service and their skill and loyal work and the results which they obtained contributed much to the success of the work.

OTO-LARYNGOLOGY IN THE WAR

By

COLONEL HARRIS P. MOSHER, M. C., U. S. A.

Chief of the Section of Otolaryngology,
Surgeon General's Office,
Washington, D. C.

From the nature of things only necessary operations are permitted in the surgery of the army. The stock operations in the section of otolaryngology therefore, have been myringotomy, mastoidectomy, submucous section of the septum, tonsillectomy, and the incision and drainage of peritonsillar abscesses.

The returns are not all in so that the following table of operations is only approximate:

TABLE OF OPERATIONS

Mastoidectomy (simple)	2,175
Mastoidectomy (complete exenteration or radical), 3.6 per cent.	72
Meningitis (complicating mastoid disease) deaths	22
Brain abscess (number of cases)	15
Tonsillectomy	11,646
Tonsillectomy and adenoidectomy	2,396
Adenoidectomy	584
Submucous resection	3,246
Peritonsillar abscess	1,199

There were 14,042 cases of tonsillectomy with 4 deaths; 2 presumably from cocaine, 1 from embolism which occurred under anesthesia and 1 from tonsillar hemorrhage.

The number of peritonsillar abscesses has been very striking. Camp Devens reported 50 in a month, and Col. McKernon states that overseas one medical officer opened 24

in a week. As the total number which has occurred in the army in the United States is 1,199, there is good ground for saying that at least 1,000 more tonsil operations could have been performed with benefit. The majority of the tonsillectomies have been done under novocain, procain or apothessin, and all the patients, of course, have been adults. I consider it remarkable that so far only one death from tonsillar hemorrhage has been reported.

Thrombosis of the lateral sinus has not been very common. Three hemorrhages from the lateral sinus have been reported, caused by spontaneous rupture of the sinus, four or five days after its exposure in a mastoid operation. The monthly reports bring out the fact that the mastoiditis following measles took a fulminating course and was characterized by early, painless and severe destruction of the cellular structure of the mastoid process. More than one observer has felt that the involvement of the mastoid was often a part of a general blood-stream infection.

Holmes reported the cure of 16 diphtheria carriers by the removal of the tonsils and the adenoids and one cured by a Killian operation. He reported also 11 cases in which non-virulent diphtheria bacilli were found mixed with streptococci and pneumococci in the aural discharge of acute otitis media. Friedberg also reported a series of cases of chronic diphtheria carriers cured by operation. The above list gives the standard army operations.

Operations for the replacement of fracture of the nose, usually from mule kicks, the removal of nasal polypi and drainage of the antrum are next in frequency. A few instances of nearly all the standard operations of otolaryngology are represented in the reports from the camps. In the early days there were two foreign bodies in the trachea dental: a broach and a peanut; these were sent to Philadelphia to Dr. Jackson. A short time ago, at Oglethorpe, a quarter was removed from the upper end of the esophagus. Tracheotomy has been done a few times for edema of the larynx, probably caused by deep infection.

The following tabulation gives an idea of the amount of

work done in one of the most active base hospitals, namely, Camp Sherman:

Number of new cases treated in the ear, nose and throat department.....	7,210
Number of operations performed in the ear, nose and throat department.....	2,227
Number of treatments given in the ear, nose and throat department.....	35,261
Number of deaths.....	10

At times rather too many secondary mastoid operations were necessary. In one series of 158 mastoid operations 28 reoperations were reported and 8 cases of facial paralysis, 6 of which were permanent. This is not a good record. Speaking of the character of the work, I said in a previous paper that, on the whole, it has been good; that it has fallen down in certain places—by this I mean that there were too many cases of facial paralysis in operations for acute mastoiditis, too many cases of reoperation, and at times, in a few places, that there was a suspicion of over-operating—is due to the fact that the otolaryngologists of the country who had the training to make the work better did not come into the service in sufficient numbers to go around.

Leaving this very brief tabulation of operations and turning to a survey of the diseases with which the otolaryngologist has to deal, the reports from the camps show that there has been very little diphtheria. Almost no erysipelas has been reported in connection with mastoid operations in spite of the fact that the streptococcus has been the reigning organism.

NEW CLINICAL OBSERVATIONS. A number of new things have been picked up by the otolaryngologists in the cantonments. Major Owley described a series of cases of ulcerative laryngitis due to the pneumococcus. He saw the cases at Camp Travis and labeled the process a new camp disease. It is distinguished by a superficial ulceration of the anterior ends of the vocal cords. The chief symptoms are hoarseness and aphonia. All of the cases responded readily to

treatment with solutions of silver. Major Eagleton at Camp Dix successfully placed a bone graft from the tibia in the cavity of the mastoid process produced by a simple mastoid operation. Major Eagleton feels that he has a new frontal sinus operation, and Major Fetterolf has confessed to a new procedure for the resection of the nasal septum. Undoubtedly both of these operations will be reported later. At one of the base hospitals there was a run of cases of hysterical aphonia, "Whispering Willies," as they were called. They were turned over to the psychiatrist who had great success in curing them.

When I was in France a year ago I heard that Robertson had autopsied a number of cases of influenza which showed pus in the sphenoidal sinus, the other accessory sinuses being free. Major Bryan while serving at Walter Reed Hospital, Washington, went through a streptococcus epidemic, and the autopsies gave a similar finding. In addition, in one case there was an odd involvement of the epiglottis and of the larynx. In this war, therefore, the sphenoidal sinus has come more and more under suspicion. Eagleton was on the watch to duplicate these findings but in the autopsies which occurred at Dix the sphenoidal sinus was not involved.

Holmes at Sheridan and Harris at Oglethorpe have drawn attention again to the manifested advantage of the use of gas oxygen for producing the anesthesia for mastoid operations in pneumonia cases. Two other medical officers, Porter and Orton, have reported a series of similar cases which they operated under local anesthesia.

A report from Camp Zachary Taylor for the month of January, 1918, gives an account of 39 mastoid operations, 5 of the cases being bilateral. Bilateral operations were not so very rare.

Hill, in a study of the aural complications of the recent influenza epidemic at Fort Oglethorpe, came to the conclusion that in mastoid cases a drooping posterior, superior canal wall did not indicate a suppurative mastoiditis. He still has faith in the other classical signs, namely, increased

purulent discharge, thickened periosteum, mastoid tenderness and edema. Major Scott, of Fort Riley, considers that in mastoiditis the chief indication for operation is bone necrosis as shown by the X-Rays. The X-Rays which he was able to obtain were unusually clear and so enabled him to place great reliance upon them.

The Carrel-Dakin solution, which has figured so largely in the treatment of empyema naturally has been tried also in the treatment of mastoid wounds. Eagleton feels that the solution gives a cleaner wound and hastens the healing. Scott advocates a dressing of chloramine paste for mastoid cavities. Dakin's solution has been used with good results at Cape May in clearing up cases of chronic running ear.

THE INFLUENZA EPIDEMIC. The influenza epidemic, which reached the proportions of a plague or as near a plague as this generation of physicians has ever seen, spent its virulence upon the lungs.

The following account of the epidemic from the otolaryngological point of view is from Shambaugh and duplicates the reports sent in from most of the base hospitals.

"About September 21, 1918, an epidemic (influenza) broke out in Camp Grant. The number of patients in the hospital increased from normal 500 to 3,600, with a daily admission rate running up to 800. The consultation work of this department was enormous. There were over 600 cases observed with otitis media acute suppurativa. In most cases there was a spontaneous rupture of the membrana tympani within a few hours of the onset of ear symptoms. The discharge, as a rule, appeared thick and purulent from onset, and did not have the initial stage of a serosanguineous discharge so frequently met with in the ordinary case of acute otitis media. Many of these cases were complicated by a diffuse otitis externa and very few showed any mastoid reaction. Most of the cases recovered rapidly, that is, in about a week.

"There were, relatively, a small number of cases which showed distinct symptoms of acute sinusitis. Most of the sinus cases proceeded to spontaneous recovery. It seems

probable that not a few cases of acute sinus infection passed undiagnosed. Not a single case of sinus trouble required operation.

"Epistaxis was a very frequent complication. The bleeding in these cases did not become serious and no special treatment was instituted to stop the bleeding.

"Cultures were made from but a few of the cases. In three cases in which cultures were procured immediately following the paracentesis all showed a pure culture of pneumococcus. In two cases in which cultures were procured from pus washed from the maxillary sinus both showed pure cultures of pneumococcus. Cultures were made from the pus found in opening the mastoid in six cases. Four of these showed pure hemolytic streptococcus and one showed a pure culture of pneumococcus."

The initial epistaxis was a striking feature. Green found that it almost always came from a single vessel located in Kesselbarch's circle, but Buff found that it came from the turbinates.

Emerson had the distinction of being made commanding officer of a special influenza hospital of 1500 beds at Camp Lee, and made a striking success of it.

Eagleton experimented with suction for removing the secretion from the trachea of pneumonia patients just after death, his idea being to use it in the living if he obtained results. He found that the secretion was too thick to respond to suction.

The tragedy of the epidemic still awaits a full description. Patients were struck down with the suddenness of lightning. To say that the morgues of the hospitals were overflowing with dead sounds commonplace, because we have heard it said so often. It was, however, literally true. In the camps military funerals were taking place all day long and the hospital flag stayed at half-mast throughout the epidemic. At the railroad stations the coffins which were being slowly wheeled along or lay about waiting for a place in the baggage cars kept the scourge before the eyes of every traveller.

I remember the impression that the blue patients made on me as I went about the crowded wards at Oglethorpe. The virulence of the disease struck me like a blow when the medical officer who accompanied me said: "This man will be dead tomorrow, that one the day after" and none of the patients seemed to me so desperately ill. The fathers, mothers and wives and brothers sitting by the bedsides added to the tragedy and to the general hopelessness.

Only a few doctors died, but enough to show that they were not immune. At last two wives of doctor's who either lived in the camp with their husbands or came to visit were victims. One very sad case of this kind occurred at Oglethorpe. The wife of the pathologist died the day before I arrived. After talking it over with his commanding officer her husband decided to remain at his post and carry on his work in the autopsy room, assembling material while it was still available for scientific purposes. On the day of his wife's funeral one of the visiting physicians happened to be in the morgue at noon and found him crowded with work. The physician asked if he could be of any help. The answer was: "It would help if you could stay a little. At this hour my wife is being buried in New York." That was lonely devotion to duty which words of mine cannot adequately appraise.

In the beginning of the war the section of otolaryngology was the busiest of all the surgical specialties. At the present time it remains moderately active, but the section of plastic and oral surgery, now called maxillofacial surgery, and the section of neurological surgery are receiving from overseas more of their special cases than the section of otolaryngology. The section of neurological surgery is receiving by far the most cases or, the majority of them being injuries of the peripheral nerves.

In the United States the two great medical problems of the war have been the control of sputum-borne diseases and the detection and cure of the carrier. The bacteria responsible for sputum-borne diseases gain their entrance to the body in most instances through the tonsils or the acces-

sory sinuses. Experience has shown that the best method of curing a carrier is to remove the tonsils and the adenoid. The war has shown also the supreme importance of accepting in the army only recruits who have a normal nose and throat.

The war has shown further the importance not only of discovering carriers, but of segregating contacts. It has brought out the significant fact that the hospital personnel often act as carriers. In dealing with air or sputum-borne diseases the great value of isolation and the use of substantial gauze masks has been proved. The probable efficiency of the routine spraying of the nose and throat with dichloramin-T has been shown. More experimentation, however, is needed to prove this point. The opinion now prevails that every recruit and every hospital patient should be looked upon as a possible carrier.

In the United States the dominant bacteria have been the pneumococcus and the streptococcus hemolyticus, the latter being by far the more important. The following fact has become more and more evident, namely, that assembling men in barracks, exposing them to cold, and drilling them to the point of over-fatigue has the power to change harmless bacteria into virulent strains.

In head surgery America's greatest contribution has been in the surgery of the jaw. Bridge splinting, the use of bone grafts, the implantation of cartilage to give form to plastic flaps, and the use of the skin graft folded over a plate of modelling compound have greatly advanced maxillofacial surgery.

The fact that so many tonsillectomies were performed with so few deaths from any cause, and only one death from tonsillar hemorrhage speaks well for the skill of the operators and the type of operation employed. The striking number of peritonsillar abscesses would seem to show that even a larger number of tonsillectomies could have been performed with advantage.

The influenza epidemic was a dramatic and deadly scourge, but the complications produced in the line of oto-

laryngology were not serious. It emphasized the fact, however, that a normal nose and throat is a great protection.

The otolaryngologists have faithfully and enthusiastically used their specialty for the prevention of disease as well as its alleviation. Their first aim was preventive surgery, and they largely realized it.

In looking backward over our war experience things are seen which could have been done better. The following are some of them. Recording them may help another time, if there ever is another time:

The draft examination should have been more thorough. Too many cases of chronic running were overlooked.

There could have been closer co-operation between the camp and the base hospital. There was no provision for an automatic interchange of special personnel.

Special instruments and supplies were late in getting to the hospitals.

Instruments, medical supplies and literature were late in getting overseas.

The hospitals at the port of embarkation should be thoroughly equipped and staffed. Soldiers destined for overseas often arrive at the port of embarkation seriously ill.

In the United States the power to act as consultant should have been given to the chiefs of the sections earlier.

Each medical and surgical section should have a medical officer to act regularly as courier between the home base and the base of operations.

REPORT OF

MAJOR THOMAS H. HALSTED, A. R. C.

On the organization of the Air Medical Service of the Army, I was made Chief Medical Examiner of the Service at Syracuse, N. Y., and continued as such until the service was discontinued. Later served as a member of a local Consulting Medical Draft Board until leaving for France in June, 1918.

In June, I enlisted in the American Red Cross, arriving in Paris July 11, 1918, where I was made Chief of the Medical Intelligence Bureau of the Medical Research and Intelligence Department of the American Red Cross of which department Major Alexander Lambert was the head. Headquarters were in Paris. Rank of Major, A. R. C.

This department consisted of four bureaus, Medical Research, Medical War Publications, Library and Medical Intelligence. The department organized and financed the investigation of many medical war problems, notably trench fever, under the leadership and actual work of Col. Strong, M. R. C., and his army associates, published a high class monthly medical journal, known as the Medical Bulletin and later as War Medicine, devoted entirely to war medicine and surgery, distributing it throughout the whole medical personnel of the A. E. F., as many as 15,000 copies a month. It published and distributed to the same source many timely treatises and pamphlets on surgical subjects of immediate importance. It organized and held in Paris regular monthly medical meetings for the Medical Corps, under the management of the Research Committee, at which meetings the most important members of our army as well as of British and French representatives were present for the discussion of practical problems.

The department maintained in Paris a first-class medical

library, both reference and circulating, for the use of the A. E. F. The Medical Intelligence Bureau, of which I was chief, was the 4th branch of the main department. This bureau undertook to investigate and make a research of the literature on any question or subject desired by any member of the Medical Corps, furnishing abstracts or original articles when desired. For this purpose a staff of librarians, translators, abstracters and stenographers was organized, subscriptions made to all the important medical journals of the Allied countries, access gained and co-operation secured with the rich medical libraries of Paris, and an immensely valuable index of war medical and surgical subjects was built up, and was being made use of to a most gratifying extent when the armistice called a halt to the progress of this, as well as to the other bureaus of the department. Six weeks before the armistice was signed, I was made Field Director of the whole department, my new duties taking me in an executive capacity to the Evacuation and Mobile Hospitals at the front and to the camp hospitals in the rear, as well as to the various headquarters of the different activities of the Medical Department of the army, the Surgeon General's office, the laboratories, sanitary schools, etc. A number of automobile and trips by rail were required in this work and afforded an excellent opportunity to see much of the magnificent work of our militarised profession in France.

My headquarters were in Paris, and a part of my duties was to render what surgical service I could to the French in whatever military hospital my service might be welcome. The result was that all my available time, mostly mornings, after the bureau was organized, and while I was not away from Paris, was spent in two large surgical departments of Val du Grace Hospital, the largest and oldest purely military hospital in Paris. I was so fortunate as to be accepted as an assistant by our Associate Honorary Fellow, Dr. H. Luc, in the otolaryngologic department of this hospital, and had the great pleasure and profit of assisting our distinguished confrere in many of his

operations. His operations on the mastoid, both simple and radical, and which were numerous, were all under local anesthesia, novocaine. His patients were all military. Dr. Luc is giving and throughout the war, has given arduous and valuable service to his country.

Much more of my time was spent in this hospital in one of the departments of general surgery, where I assisted in the service of Dr. Sencert. Dr. Sencert exemplifies the highest type of French surgeon. I have never seen his superior and rarely his equal as a surgeon. He will become famous in medical history because of the original work of himself and Prof. Nageotti, Professor of Physiology in the University of Paris, on the transplantation of animal sterile dead connective tissue to the living human. It was my great good fortune to see a number of these experimental operations on the dog, and to witness several (assisting in one) operations on French soldiers in which dead tendon or nerve, removed from the dog or calf four to six weeks earlier and since preserved in alcohol, was transplanted to the useless, tendonless arm, or to the excised sciatic nerve of the wounded soldier (weeks after the injury), the new and foreign transplant restoring function to the useless limb or limbs. In the dog I saw a number of similarly excised and transplanted carotid arteries, the experiment brought to a successful termination as shown weeks later. This work will prove to be epoch making and will open to surgery in all branches undreamt of possibilities,

Though never assisting, it was my good fortune to witness on many occasions, the marvelous facio-maxillary plastic surgery of that master of this difficult work, Dr. Morestin, who was at the head of this department in Val du Grace. Dr. Morestin was a surgical genius, a prodigious worker, a master of technique, a born artist and with all the most skillful operator I have ever seen. He was the head of similar departments in three of the largest military hospitals in Paris, having 365 beds in Val du Grace, and about a thousand in all three. Each patient usually required a series of operations. He personally,

with but little though highly skilled assistance, did these operations and watched the after care. When I saw him, he gave the appearance of being utterly careworn, completely tired and exhausted, as he doubtless was, so that I was not surprised to read a few months later his death at the age of 48.

I returned to America January 1st, 1919.

REPORT OF

MAJOR GEORGE B. WOOD, M. C., U. S. A.

My experience as an army otolaryngologist was obtained entirely at Camp Meade. I reported for active service there on November 1, 1917, and there I staid until my discharge on December 17, 1918. I was assigned for duty in connection with the Base Hospital, but was asked to be one of the board of special examiners and had charge of the examination of the ear, nose and throats of recruits. This latter work was done in the camp. The greater part of my duties, however, were connected with the Base Hospital.

At first there was absolutely no equipment, as when I arrived there the Base Hospital was far from completed, and only the frame-work of the building for Surgery of the Head started. In the latter days we had very excellent equipment both in the ear, nose and throat clinic, in the operating room, and in the accommodations for ward patients.

The greater majority of the otolaryngological staff were very excellent men. Almost all of them trained specialists and happily pleasant companions. Most of the staff who were there in the winter of 1918 were transferred to Base Hospital units for overseas duty, and at times the personnel became very much reduced. The proximity of the camp to Washington, however, may have been partly responsible for the comparatively short time when the nose, throat and ear work was handicapped by a lack of men, and towards the last, we really had more men on the staff than we could keep busy.

We had a large out-patient dispensary which in the busy season required the services of two men for the greater part of the day. We had from one to three wards filled with nose, throat and ear cases, and the consultation work

throughout the hospital usually kept one man pretty well occupied.

The operative work consisted chiefly of removing tonsils, sub-mucous re-sections and mastoid operations. We did very little sinus work for chronic conditions, as it seemed to us much better to discharge a man with frank chronic sinusitis than to attempt any radical curative treatment. This applied also to the cases of chronic suppurative otitis media; only four or five radical operations being done during the time that I was there, and these mostly because of acute complications. After the spring of 1918, the commanding officer ruled that none except absolutely necessary operations should be done. This cut out the greater part of our tonsil and septum work during the summer and fall of 1918. Minor operations, such as paracentesis of the ear drum, opening peritonsillar abscesses, and incising furuncles of the external auditory canal were, of course, very numerous, especially during the winter months.

Most of our tonsil operations were done under ether; dissection and snare being the usual method of operating. The Sluder method was used for a while, but we had so much difficulty in controlling hemorrhages following this procedure that the method was given up.

We had considerable difficulty with acute tonsillitis following sub-mucous resections, and occasionally, other operations on the nose. Some investigation was carried out to determine if possible the cause of the frequency of tonsillitis in these cases. It was found that the presence of the hemolytic streptococci or other organism of an individual to be operated on, if said individual was in good health, had no effect upon the post-operative infection. On the other hand, if the patient soon after the operation came in contact with another patient suffering from acute tonsillitis or other acute infection, especially if the hemolytic streptococcus was present, tonsillitis developed in over 50 per cent of the cases; the disease beginning either on the fourth or fifth day after the operation. We were not bothered by any other type of post-operative infections.

Mastoiditis requiring operative interference was much more in evidence during the epidemics of acute infectious disease, especially measles. Our scarlet fever epidemics at Meade showed a very mild type. As a rule, our mastoid cases did very well, though in a few, secondary curettements or closures were necessary.

The terrible epidemic of influenza was characterized, as far as Camp Meade was concerned, by comparatively few complications of the ear, nose and throat. We had some 11,000 cases of influenza at Camp Meade, and out of this whole number, only five developed mastoid infection sufficiently severe to demand operative interference. There was a fairly large number of cases of slight otitis media; the majority of which recovered without even paracentesis. In the cases of otitis media which were sufficiently severe to call for opening of the drum, there were usually hemorrhagic blebs, both in the wall of the canal and on the drum. We did not see these peculiar sub-epithelial hematomas except during the influenza epidemic.

Epistaxis was very frequent in the influenza cases. So much so that the large majority of cases were not seen by a specialist; in fact, in only the severe cases were consultations asked for.

Sinusitis was fairly frequent, but usually recovered spontaneously in a day or so, though in one case in which orbital abscess was threatened, anterior ethmoidectomy was done. Laryngo-trachitis was very common, though permanent destructive changes of the larynx were not seen. When the tracheal inflammation was severe, it was usually several weeks before the cough would clear up.

On the whole, the otolaryngological work was interesting and instructive, though it was difficult at times to keep a smooth working organization because of the constant changes in the personnel not only of the subordinate positions, but also of the heads of departments. As a mild criticism, I personally believe that the various branches of medicine making up the surgery of the head unit should have been separate departments, and the head of each of

these separate departments responsible directly to the Surgeon in Chief, and not to an interposed Head of Surgery of the Head.

REPORT ON SERVICE IN THE ARMY

CAPTAIN D. CROSBY GREENE, M. C., U. S. A.

I was commissioned as Captain in the Medical Reserve Corps, U. S. A., on April 8th, 1918, and received telegraphic orders assigning me to Camp Sevier, S. C., on May 13th following. On May 18th, I reported to the Commanding General of the camp and was assigned to duty with the Provisional Casual Battalion. At this time the thirtieth division which had occupied the camp during the winter and spring, having completed its organization and preliminary training, was in the act of moving to the port of embarkation, and the 81st Division, which was to complete its organization there, was already beginning to arrive as the last of the 30th were leaving.

My first active duty was on the examining board which was assembled for the physical examination of the recruits recently drafted who came in to fill up the personnel of the 81st Division.

I served on this board for three weeks. The unit to which I was assigned examined between three and four hundred men daily, and I made the oto-laryngological part of the examination.

The outstanding features of this work were the small proportion of those unfit for service as compared with the larger number who attempted to evade it by malingering. It may be assumed that the local boards had already rejected most of the drafted men who were unfit, but many who had been passed by them, claimed deafness. It was noticeable that there were waves of malingerers. There would be a group of them in one company, who had evidently discussed the matter among themselves. As a rule the detection of these cases was simple, but took a good deal of time in the aggregate.

With a very few exceptions, the men rejected had chronic otitis media purulenta with perforations and discharge.

A considerable number of men were referred to the Base Hospital for tonsillectomy and septum resection.

I was impressed by the fact that with better organization and co-ordination, the same grade of examination could have been given in much less time. There was a great waste of time on the administrative end which could have been avoided by better arrangements of details. At a time when the supreme object of everyone was to build up the army as soon as possible, this seemed to me a defect open to serious criticism.

It appeared to me that it would have been better to keep together units of examiners for this special work for longer periods of time. In spite of the fact that this duty appealed less to the average medical officer than any other work of the department, it was none the less most essential and deserved the most efficient handling. Taking the unit to which I belonged as an example, it was obvious to all of us that at the end of three weeks we were capable of passing upon a much larger number of men in a given time, than we were in the beginning, and that without lowering the standard of our examination.

After three weeks on the examining board, I was transferred to the Base Hospital for duty in the Otolaryngological Department and remained there during the rest of my period of service in the army. During the first six weeks it was my great pleasure to have as immediate superior and chief of the department, Major George Fetterolf of Philadelphia. I look back on my association with him as the pleasantest and most profitable part of my army experience.

I was assigned to the duty of Ward Surgeon in charge of one of the two wards given up to the Head Section, and had thus the opportunity of learning through actual experience the routine of paper work in a Base Hospital.

On July 28th Major Fetterolf was transferred to Camp Hancock and I succeeded him in charge of our department, a position which I held until my discharge from the army on December 20th, 1918.

The Otolaryngological Department of the Base Hospital at Camp Sevier began its existence on Sept. 27, 1917, with the arrival of Major G. F. Coates who remained in charge until March 17, 1918. He guided the department through its difficult beginnings and at the time of my advent affairs were running smoothly and the ear, nose and throat clinic was comfortably established in the Head Section building with two wards of 46 beds each assigned to its use. The capacity of the hospital at this time was about 1600 beds.

A brief description of our routine may be of interest. The clinic hours were from 8 a. m. to 12 m. and from 1 p. m. until 4 p. m. on all days excepting Sundays and holidays when the hours were from 9 a. m. until 12 p. m. During these periods members of the staff were on duty at the clinic, examining, treating and operating.

Out-patients from the camp usually began to come in at an early hour. The chief of the service ordinarily made a visit to his wards at the beginning of the day, seeing with the ward surgeon those cases who were confined to their beds. Ambulatory ward patients for the most part came to the clinic room for treatment. Throughout the day calls for consultation on patients in the other services came in and one of the staff was detailed to respond to those calls. It sometimes happened as during the measles epidemic of the late 1917 and early 1918, and the influenza epidemic of September and October, 1918, that there were patients with ear, nose or throat complications in most of the wards and one officer spent the better part of the day going through them all, seeing and treating the patients. In this way we were in daily touch with these patients all over the hospital. When there were more than two officers on duty at the clinic it was found useful to detail one even in normal times, to make the round of all the wards, inquiring of each ward surgeon whether he had any cases which needed attention from our department, attending to such cases, and later making a report to the chief of the department. The following classification may be made of the routine work of the clinic:

- (1) Examination and treatment of patients.
- (2) Hearing tests and examinations of officers and nurses newly arrived at this post, of those assigned to overseas units, and of officer candidates for promotion.
- (3) Tests of candidates for the Aviation Corps.
- (4) Operations.

Occasionally individuals of our personnel were detailed to duty in the field as members of examining boards.

The variety of cases seen at the clinic was quite large and not unlike that of a civilian clinic of similar size. To one accustomed to the latter there was a noticeable absence of certain classes of cases such as patients with tuberculosis or malignant disease of the upper air tract. On the other hand certain cases rarely seen in civilian clinics were not uncommon in ours, namely: cases of malingering, hysterical deafness and hysterical aphonia in men. In spite of the effort of the authorities to keep out of the army men with chronic suppurative otitis media with discharge, a large number of these cases appeared in our clinic.

A few cases of pronounced hysterical aphonia and hysterical deafness were seen. Two of the former came under my care and were cured by re-education and suggestion. They were extremely obstinate cases and were most difficult to handle.

Two cases of hysterical deafness showed complete loss of hearing. Attempts to waken them when asleep by loud noises failed. In one case the patient was put under primary ether anesthesia. The only result of this was the production of a prolonged state of excitement lasting several hours which required the attendance of several orderlies to restrain the frantic struggles of the patient. The next day he heard no better, but the following night normal hearing returned. This patient had made no response to any tests of hearing. Turning tests were tried but were unsatisfactory on account of the fact that he was in such a state of trembling fright that it was impossible to judge of the nystagmus.

The other patient was cured by our psychiatrist by suggestion. Both of these cases were negroes.

The bulk of our work was concerned with cases of acute inflammatory diseases of the ears and upper respiratory tract. In the operative side of the work, tonsillectomy was as usual the most frequent operation. In nearly all cases this was done under local anesthesia by infiltration with one-half per cent novocaine solution and the prevailing method of operation was that of preliminary dissection followed by the use of the snare.

In connection with tonsil operating under local anesthesia, I should like to record the occurrence of abscesses of the lateral-pharyngeal wall following operation in three cases at our clinic. In one case this resulted fatally, though not under my personal observation. The only case which I saw made a good recovery after thorough incision and drainage.

The danger of post-operative complications of this nature is one which cannot altogether be avoided when deep injections are made at the periphery of the tonsil and constitutes an objection to this method of anesthesia. There were no immediate deaths from the anesthetic solution at our hospital but the report of fatal results in a few cases from other camps reached us. These in addition to one personal experience of my own in private practice four years ago, of a death within five minutes of the injection of $11\frac{1}{2}$ drachms of a solution of $\frac{3}{4}\%$ novocaine, have impressed the fact that infiltration anesthesia in this region is not without risk.

Statistics

October 11, 1917, to December 1st, 1918

The total number of cases seen at the clinic	
was	7,498
The total number of patients admitted to	
our wards	1,966
The total number of operations performed	1,347
The total number of tonsillectomies	523

The total number of Resections of the septum	93
The total number of Intra-nasal operations on Sinuses	77
Total number of Mastoidectomies.	83
Other operations included:	
Radical frontal sinus operation.	1
Resection of Jugular Vein for Sinus Thrombosis	3
Removal of tumor of upper jaw.	1
There were two cases of death following operation: one the case of abscess of the pharynx already referred to and one following radical frontal sinus operation.	

General Survey

During the late fall and early winter of 1917 an epidemic of measles brought in its train a large number of cases of acute purulent otitis media with consequent mastoiditis. The infection organism was in the large majority of cases the pneumococcus. The conditions created by the epidemic were aggravated by the severe weather of that winter, and the oto-laryngological staff were kept busy, the daily clinic attendance numbering as high as 150 some days. With the advent of spring the work perceptibly diminished, and during the summer became very light and continued so until the influenza epidemic in September and October. During this epidemic our staff was depleted to help make up for the deficiency in ward surgeons, but there were relatively few cases of serious complications involving the ear, nose and throat.

The outstanding rhinologic complication was epistaxis which was an early symptom.

Sinusitis was infrequently met with clinically, but was shown at autopsy to be present in over one-half the fatal cases in which the head was opened.

Otitis Media was an infrequent complication, occurring in less than 1 per cent of the cases. Rapid recovery was the rule, and only five cases came to mastoid operation.

Laryngitis of a severe and persistent type occurred in eighteen cases.

With the subsidence of the epidemic the work dropped off and up to December 1st the clinic attendance was slight.

The amount of tonsil and septum operating was governed chiefly by the advent of new troops to the camp. With the arrival of each group of recruits there was always an increase in the number of tonsillectomies and submucous resections. During the epidemic of influenza all operating except that of an urgent nature was suspended and shortly after the subsidence of the epidemic and the signing of the armistice, operations were likewise discontinued by orders from the Surgeon General's office.

The department profited at all times by the opportunity for free consultation with other departments. Of special value was the advice of the chief of the Laboratory Section. His suggestions in regard to the laboratory tests to be employed especially in patients who were critically ill were of great assistance and emphasized the importance of calling him in consultation in such cases. The field of a clinical pathologist is one which might be further developed to the advantage of hospitals, in which the tendency to crowd the laboratory with unnecessary tests often occurs at the same time that essential tests are overlooked.

In our own department we found that the plan of having one officer detailed to make a round of all the wards, scouting so to speak for cases, was productive of good results. This was, however, possible only when there were enough officers on the staff to provide at least two for duty at the clinic. The plan is suggested as one element in any comprehensive scheme to secure co-operation of all departments which means effectiveness of the hospital as a whole.

REPORT OF

MAJOR NORVAL H. PIERCE, M. C., U. S. A.

Commissioned Captain, M. R. C., April, 1917

Entered active service June, 1917, in charge of the Oto-Laryngological Department of Illinois Charitable Eye and Ear Infirmary Unit, for Examination of Aviators. Promoted to Major August 11th, 1918. August 31st, 1917, was appointed chief consultant in Oto-Laryngology, Camp Grant, Illinois. June, 1918, ordered to U. S. General Hospital at Cape May. Sailed for duty with Base Hospital No. 115 at Vichy until December, 1918, when I was ordered to St. Nazaire for duty, January, 1919, ordered to Camp Hospital at La Boule. At Vichy served for a time as chief consultant in general surgery for the Base Hospital center. Afterwards as consultant in Oto-Laryngology for the center, as chief of the Division of Surgery at Base Hospital No. 115. Ordered home February 11th, 1919. Time of service, nearly two years.

REPORT OF THE EAR, NOSE AND THROAT
DEPARTMENT, BASE HOSPITAL, CAMP
SHERMAN, OHIO

By

MAJOR C. R. HOLMES, M. C.

Major Christian R. Holmes, M. C., was assigned as Chief of this Department on August 15, 1917. He visited the camp on August 20, 1917, but as the Base Hospital still existed only on paper, he was not assigned to duty until September 1, 1917, when he reported to Lieut.-Col. Wallace DeWitt, Division Surgeon, and Capt. (now Lt.-Col.) K. W. Kinard, Commanding Officer of the Base Hospital.

At that date, the site of the Base Hospital was only a cornfield, with the exception of the pilings for the foundation of two or three ward buildings. Capt. Kinard and Major Holmes were quartered in Barracks B-33. As there were no patients in the Ear, Nose and Throat Department, Major Holmes placed himself at the disposal of the Commanding Officer, and rendered such assistance as he could in the supervision of the construction of the hospital buildings.

The first patient operated was Pvt. Joe Armas, Co. M, 331st Inf., September 26, 1917, for acute mastoiditis, by Major Holmes, assisted by 1st Lieut. (now Captain) L. R. Effler, and Capt. Kinard. The first patients were placed in Ward 9, together with other cases.

There being no equipment for the Head Section, excepting a few poorly selected instruments, it became necessary, in order to carry on the work, for Major Holmes to bring his own instruments from Cincinnati.

The original space set aside for the Eye and the Ear, Nose and Throat Department, was a small room, 10 feet by 20 feet, located in what is now the Pathological Laboratory. It was evident from the first that these accommodations would be entirely inadequate. About September 15,

1917, plans arrived from Washington for the splendidly laid out Head House. On the block plan, this building was to have been located to the north of the officers' ward, but as the county pike and a cornfield not belonging to the hospital occupied this intended site, it was necessary to change the location. Various sites were studied, but as this building was intended for ambulatory cases, not alone of patients from various wards in the hospital, but also for dispensary patients from the cantonment, it was finally decided to locate the building on the east side of the square in the center of the group. The accessibility of this centrally located building has since proven the wisdom of this location.

While the arrangement of the rooms in the Head House was admirably planned, there were many omissions which were necessary to make an efficient working place, as nearly all of the patients were "pus cases." These minor defects, however, were all remedied, as well as the necessary ventilation in the ceilings of the smaller rooms. The operating room originally planned had an ordinary plain wooden floor. This was changed to a composition floor, such as is used for standard operating rooms.

On November 6, 1917, Major General E. F. Glenn called a meeting of the Hospital Staff and asked if we were provided with the necessary equipment. The reply being in the negative, he ordered the heads of several departments to proceed to purchase what was necessary in order that the sick should not be neglected. On the following day, Major James A. Harvey, Major C. R. Holmes, Lieut. (now Major) Henry Stanbery, Capt. Henry L. Stick and Capt. D. P. Ray went to Cincinnati and made purchases for the several departments amounting to about \$10,000.00. These were delivered on November 10th, 1917, by trucks, as the railroad shipping facilities were entirely inadequate and would have entailed great delay.

The Ear, Nose and Throat Department has been enabled to render efficient service because of the splendid facilities and equipment placed at its disposal in the Head

House and the special wards. The professional qualifications of most of the men assigned here have been far above the average, thereby rendering the unit an efficient factor.

All new cases admitted to the hospital have first been thoroughly examined by either the Chief or the Assistant Chief. All cases requiring operation have received the final examination, and the most difficult ones have been operated by the Chief, but every man on the service was given an opportunity to act as assistant. Those who proved themselves qualified, were given major operations to perform, with the Chief as assistant, the latter watching and, at times, relieving the operator if it appeared best to do so in the interest of the soldier's welfare. Every Oto-Laryngologist sent here was first tried out in the Out-Patient Department, where his professional ability was studied and rated. By special demonstration of patients, blackboards and other drawings and lantern slide exhibitions, what might be termed a post-graduate course has been given throughout the year. Daily at 1:00 P. M., all surgeons in this department met in the Chief's office, each man reporting on cases under his care, with general discussion by those present, and criticisms and suggestions by the Chief.

Out-Patient Dispensary. In order to systematize the work in the Head House, the following schedule has been in force: 8:00 A. M. to 12:00 noon. (a) Operations begin at 8:00 A. M., general anesthetics coming first, then those requiring only local anesthesia. (b) All ambulatory patients from the hospital wards report for treatment. 1:00 P. M. to 3:00 P. M. (a) Out-Patients from the line. (b) From 2:00 P. M. to 3:00 P. M., officers and their families come for consultation and treatment. 3:00 P. M. to 5:00 P. M., cleaning up of unattended cases.

Extra-Mural Service. One man was constantly assigned to this service. (During the epidemic, two or more men were assigned.) He was provided with a complete treatment "kit" in a specially designed metal case, and visited every non-otological ward in the hospital, beginning at 8:00

A. M., and reporting to the Chief the daily findings of each case. All cases not running a normal course were seen in consultation by the Chief or his Assistant. This service was invaluable in detecting cases early and operating before serious complications developed.

Study of Diseased Tonsils. In conjunction with the Medical Service and the Bacteriological Laboratory, this department began an intensive study of cases with infected tonsils. 2500 examinations have been made, and so far the tonsils of 400 operative cases have been intensely studied.

Diphtheria Carriers. Together with the Laboratory and the Medical Service, this department has treated and operated diphtheria carriers (removal of tonsils and adenoids). These tonsils were all subjected to bacteriological examinations, and several persistent cases were promptly cured by the operation. One unusual case, having been under observation in the hospital for six months, persisted in spite of the removal of adenoids and tonsils until a radical Kilian operation for chronic purulent sinusitis was performed.

The acute infectious diseases naturally furnished most of the cases involving the middle ear and nasal sinuses.

(a) *Influenza.* While many cases of acute otitis media with mastoiditis came to operation during the first eight months of 1918, we had not a single case of sinus thrombosis, but during the influenza epidemic we had four in 10 days, all with hemolytic streptococci in the blood. While last winter the mastoid cases were practically all of the non-hemolytic type, nearly all recent cases have shown positive hemolytic streptococci, with great virulence, requiring early operation—even as early as the fifth day—with pus filling all mastoid cells, with perisinus and extra dural abscesses.

(b) *Measles.* During the months of February and March, 1918, 725 measles cases were examined by this department upon their admission to the hospital, and 55 cases of acute purulent otitis media, or about 8 per cent, were discovered. There were also found two cases of oedema of the larynx, requiring tracheotomy.

(c) *Scarlet Fever*. During February and March, 1918, 245 cases of scarlet fever were examined by this department upon their admission to the hospital, and 30 cases, or about 12 per cent, showed acute purulent otitis media. However, it must be borne in mind that many more cases of purulent otitis media developed at a later date, both in the scarlet fever and the measles cases.

(d) *Mumps*. During March, 1918, 450 cases of mumps were examined upon their admission to the hospital, by this department, for ear complications. Seven cases of acute purulent otitis media were found, but not a single case of total deafness in either ear was encountered, as is sometimes the case in children.

Operations and Treatments. The first operation performed in the present Head House was made on November 22nd, 1917, and since then 2712 operations have been performed in the Ear, Nose and Throat Department, and 47,923 treatments have been given. The total number of cases admitted to wards on this service was 3694, and the total number of patients treated in the clinic was 6496 (figures to April 1, 1919).

Streptococcus Epidemic. During March, 1918, the hospital became greatly overcrowded with patients suffering from contagious diseases, compelling this service to place as many as 52 beds in wards intended for 32. During this period, the virulence of the streptococcus infection became very marked, no doubt, in part, due to the overcrowding. To offset the ill effect of this, all windows in the wards on this service were kept open 12 inches from the top, day and night, in spite of the cold weather, extra clothing and bedding being provided for the patients. During March, there were three deaths from meningitis and one from abscess of the brain in our service. We regret greatly that an order was issued at that time forbidding all post-mortem examinations.

Examination of Aviators. During the first three months of 1918, and previous to that time, many candidates for air service were examined in the Head House, under the

direction of the Chief of Head Surgery. After April 1st, 1918, examinations for aviation candidates were stopped at Camp Sherman.

From time to time, this department prepared for publication, papers on different subjects. So far but one paper has been published. The paper is entitled "A Presentation of Fifty Mastoid Cases Before the Base Hospital Officers' Club, April 4, 1918". The paper will appear in the forthcoming issue of *Annals of Otology*.

The following papers have been prepared, and will be ready for publication at an early date:

A Presentation of 128 Mastoid Cases, with Detailed History of Each Case and Statistical Report.

A Study of (about) 1300 Tonsil Cases, With Statistical Report.

A History of the Epidemic of Influenza, from the Standpoint of Oto-Laryngology.

A Paper on Sinus Thrombosis.

In addition to the above, interesting individual cases will be written up. Illustrations have been made for these articles, and the papers will be ready for publication soon.

REPORT OF

MAJOR GEORGE E. SHAMBAUGH, M. C., U. S. A.

One year's experience in keeping home fires burning.

Experiences at Camp Grant—Oto-laryngological work in the wake of the influenza epidemic. Mastoiditis following influenza, requiring surgical interference. Slow formation of mastoid abscesses without mastoid symptoms (latent mastoiditis). Type of acute sinus infection following influenza. Efficiency of intra-nasal drainage for cases requiring surgical interference. Peritonsillar abscesses as a sequel of influenza. Experiences in examining over-seas cases suffering from injury to the hearing.

The first year of America's entry into the world war was for me a rather strenuous one. What with teaching at Rush College, giving of special courses for surgeons who were taking up neurological surgery, writing of chapters for a war manual on Neurological Surgery, and not least, serving on a Medical War Board in the evenings, I found my time fully filled, and during this period I acquired a profound respect for those of our profession who were destined to stay out of the regular service in order to keep home fires burning. Nevertheless, as the year wore on I felt an increasing desire to enter service and in the spring of 1918 I began to make efforts to get my release from the list of essential teachers, where as the head of a department in Rush Medical College I had been assigned when the country entered the war. My release came during the summer, when, taking my examination, I arranged for my courses at the school and waited my commission and assignment.

It was not until the morning of November 11th, while watching the demonstrations from the window of my office on that eventful day, that the telegram came from the War Department notifying me of my commission and assignment for duty at Camp Grant. I arrived at the camp just after the epidemic of influenza passed over that place and

have been at work there until the present time. It was an interesting period when I began my work as chief of the department of Oto-laryngology at the Base Hospital. The influenza had brought with it a great many cases of acute otitis media as well as acute sinusitis and while there were a great many cases of acute otitis media in which distinct clinical symptoms of acute mastoiditis were manifest, there were indeed very few which presented the fulminating symptoms requiring surgical interference. There were but few exceptions among these cases presenting well-marked symptoms of acute mastoiditis during the early days of the otitis media which did not clear up spontaneously in the course of ten days or two weeks.

During the month immediately following the influenza epidemic we met with a rather large number of cases of mastoid disease where the trouble developed often without any external evidence of mastoiditis. These were cases where there was no tenderness over the process and no changes in the overlying soft structures. In a number of these cases there would be weeks pass with no elevation of temperature or at most 99 degrees once or twice during an entire week. The diagnosis of abscess cavity in the mastoid process was made by the persistence of a purulent as distinguished from a mucousy discharge, which may or may not be profuse. In some cases there was the characteristic flattening of the upper wall of the external meatus, and in some a more or less persistent pain in the temporal region of the same side. It was in just these cases where we found the skiagraph to be of greatest assistance in showing the areas of softening in the depths of the mastoid process. Usually there was but one abscess cavity, the location of which, as well as its extent, was distinctly shown on the plate. On the other hand, the shadow which is always shown in the skiagraph in the early stages of acute otitis media, especially where mastoid symptoms are present, was not of especial assistance, for we were aware without the assistance of the plate that the pneumatic spaces were filled with inflammatory secretions and the plates

themselves did not give us, as a rule, a definite clew as to whether an actual softening of the bone was taking place.

Our experience with acute sinus cases was very much the same. A great many influenza cases were complicated with well-marked symptoms of acute sinusitis. The skiagraph was not at all necessary in making the diagnosis in most of these cases. No local treatment other than the intra-nasal application of a weak solution of adrenalin and cocaine to the nasal mucosa was called for. In only a few, where the symptoms were severe and failed to subside promptly in a few days, did we resort to irrigation. In the case of the maxillary sinus this was carried out by means of the Killian tube puncturing the nasal fontanelle in the middle meatus. Later on there were a few cases where the sinus infection became chronic or where the lighting up of an old chronic process persisted in discomfort associated with a profuse purulent discharge from the nose. In such cases we proceeded to establish intranasal drainage, first by removal of the concha media associated with the making of a large opening into the maxillary sinus through the middle meatus, the exenteration of the anterior ethmoid cells and the enlarging of the naso-frontal duct, as the case might require. The skiagraph always gave a quick and satisfactory answer as to the sinuses involved. In a few cases the antrum alone was affected and occasionally the frontal sinus alone was involved. In none of the cases was an external operation necessary.

For a couple of months following the influenza we saw a great many cases of peritonsillar abscess and not a few post-pharyngeal abscesses. In most of these cases a pure culture of streptococcus was found. For a time we saw as many as five or ten such cases in a day. Not a few cases of systemic infection followed from these infections and from cases of acute tonsilitis. These complications were chiefly in the nature of rheumatism and endocarditis and occasionally, acute Bright's disease. These infections brought to our service a great many cases where the removal of the tonsils was required.

Later in the service, when the over-seas wounded began to pour into the camp, and as the demobilization of the over-seas units proceeded, we had opportunity for observing a great many cases of injury to the organ of hearing. The cases which presented symptoms of defective hearing gave opportunity for applying accurate methods of diagnosis, especially in the application of the functional tests to the organ of hearing and to the vestibular mechanism. Owing to laxity of examining boards in some quarters not a few cases were inducted into service which were suffering from chronic suppurative otitis media and not a few cases of defective hearing, especially of the oto-schlerotic type where the drum membrane was normal. These facts made it important that our examination of the retiring soldier should determine not only the degree of disability but should differentiate those cases where the disability had been incurred while in service from those where the defect was clearly due to pre-existing war disease.

The work has been on the whole extremely interesting. Not the least has been the stimulation which we all of us felt from coming into contact, as we did, with the finest specimens of manhood in the world, the American dough-boy. This experience has in itself been ample compensation for all the petty annoyances incident to military life.

REPORT OF

CAPTAIN J. GORDON WILSON, C. A. M. C.

I went to England in August, 1916, and was assigned on temporary duty to the Eye and Ear Hospital in Folkestone, established by the Canadian Army Medical Corps, in charge of war injuries to the labyrinth. In December, 1916, I was ordered to France to report on injuries to the ear from high explosive shells.

My report abbreviated, was published in the British Medical Journal, March and April, 1917 (later expanded into papers printed in the Transactions of the American Otological Society and the Harvey Lectures of New York, 1917).

When America declared war, I returned to Chicago and from that time on served on the Medical Advisory Board.

REPORT OF

LT. COL. BURT R. SHURLEY, M. C., U. S. A.

Dean Detroit College of Medicine. Member of the Committee of Three, in company with Dr. Chas. W. Richardson, and Dr. Harris P. Mosher, to represent the American Laryngological Association, the American Otological Association, The American Medical Association, and the American Rhinological, Laryngological and Otological Association for the purpose of conferring with Surgeon-General Gorgas as to the employment of Specialists in the Medical Corps of the U. S. Army.

Resigned from this committee, entered active military service and was commissioned Major, July 25th, 1917.

Organized and was appointed Medical Director of the Detroit College of Medicine and Surgery, Base Hospital No. 36. Sailed October 27th, 1917, arrived November 10th, and was stationed at Vittel, France.

Commissioned Lieutenant Colonel June 6, 1918.

Sailed from France February 8th, 1919. Arrived home February 17th, 1919. Honorably discharged March 12th, 1919. Duration of service 20 months.

DESCRIPTIVE AND STATISTICAL REPORT
DEPT. OF HEAD SURGERY, BASE HOSPITAL,
CAMP DODGE, IOWA

MAJOR M. A. GOLDSTEIN, M. C., U. S. A.

Surgery of the Head

The Section of Surgery of the Head as developed in Camp Dodge Base Hospital includes in its comprehensive scope, diseases of the eye; diseases of the ear, nose and throat; plastic surgery of the face; oral surgery as applied to injuries and deformities by gun shot wounds and disease; brain surgery requiring an investigation of all pyemic processes extending from the eye, the ear, the accessory sinuses; the surgery of the neck of infected areas, such as suppurating glands and cellulitis with original focal points in the tonsil and the ear; bronchoscopy tracheoscopy and esophagoscopy.

This comprehensive section of surgery at Camp Dodge Base Hospital has been placed under the direction of one Chief of Service and a staff of qualified and experienced special surgeons, nurses with special training, graduate opticians, and orderlies trained to such service.

The classification, Head Surgery, is arranged into the following subsections:

- (a) Clinical Service.
- (b) Hospital Service.
- (c) Consultant Service.
- (d) Special Examinations.
- (e) Care of Officers and Nurses.

Clinical Service

The most recent improvements in the Clinical Service in Head Surgery has been the completion and equipment of Ward 41, First Floor.

This Clinic has a capacity of active daily treatment of at least two hundred ambulatory patients.

There are engaged in this Clinic, one Chief of Staff with the rank of Major M. C., who is the responsible and executive head of the Section of Head Surgery; one Ophthalmic Assistant Chief of Staff; one Otolaryngologic Assistant Chief of Staff, both with the rank of Captain M. C.; two Ophthalmic Clinic Surgeons; four Otolaryngologic Clinic Surgeons with the rank of Captain M. C.; two graduate opticians; one Head Operating Room Nurse, three specially qualified assistant nurses whose services are rendered in both the operating room and clinic service; one Sergeant First Class in charge of the paper work and business routine of the Clinic; one Corporal in charge of the enlisted men personnel; one stenographer in charge of the Section's correspondence and official bulletins and orders; one operating room orderly to care for sterilizing plant and surgical equipment; two orderlies detailed to attend surgeons at all operations; one orderly acting as register clerk; one nurse or qualified orderly in the branch Dispensary; one orderly for clinic records and notations; and two orderlies for general cleaning and message service.

The Head Surgery Clinic is open from 8 A. M. to 5 P. M. daily (Sunday from 9 A. M. to 12 M.) for the treatment of patients sent from the regiments and infirmaries, cases referred from other services, or from the admitting office, and for the conduct of operations required in the course of such service.

Official reports of the Head Surgery Service to Washington are made monthly, as prescribed by General Orders No. — through the department of General Surgery, and include a detailed statement of all patients treated; of all operations performed; their character, result, technique, name of operator and anaesthesia; with the time of performance; name, rank and organization of patient, operator, etc.

When first organized the Base Hospital of Camp Dodge

occupied as quarters the barracks now used by the 313th Sanitary Train.

The Section of Head Surgery was housed in one room, used the equipment of a fixed hospital, and had a few beds scattered at random in the medical and surgical wards. The work was done by one Captain M. R. C. and ten Lieutenants M. R. C.; no members of the Army Nurse Corps were then on duty, and work was limited to operations and treatments absolutely necessary; no major operations and only a few elective operations (such as tonsillectomies) were attempted.

The new Base Hospital was occupied about October 25th, 1917, and the Section of Head Surgery moved into its new quarters at that time. It now occupies a building devoted to Head Surgery, a good sized lecture room, an eye operating room, refraction and dark rooms; an ear, nose and throat clinic room, and nose and throat operating room and sterilizing and linen rooms, these, with the office of the Chief and Assistant Chief of Service comprised the quarters occupied. The house was located at first in one and then two, and lastly, three wards.

Records

A specially arranged card-index record is kept of every patient admitted to the clinic service of Head Surgery. This record contains a brief statement of diagnosis, treatments given, progress, and final disposition of case.

Hospital Service

The Hospital Service occupied in its maximum capacity three two-story barracks comprising Wards 39-41 and 43, was constituted as follows:

Hospital Barracks No. 39 is composed of four wards, each of a capacity of sixteen beds and three isolation wards; Wards A and B used for clean surgery (tonsillectomies (septum resections, plastic surgery, etc.), Wards C and D (total capacity of 32 beds) for post-operative mastoids, acute accessory sinuses and acute ear cases; the iso-

lation rooms (of 3 beds capacity) were used for observation and isolation of infections developed during the post-operative care of these cases.

Ward 41; the entire first floor of Hospital Barracks 41 used as the Head Surgery Clinic. Wards A and B on the second floor (capacity 32 beds) used for eye cases. An unusual feature and adding much to the efficiency of the work in Head Surgery, was the establishment and the equipment of a Branch Bacteriological Laboratory Department. This Branch Laboratory is located on the second floor of Hospital Barracks No. 41, especially convenient to the making of all cultures in the clinic and the group of barracks assigned to Head Surgery.

Ward 43 (capacity 64 beds and 3 isolation rooms), given over to acute throat infections (pharyngitis, tonsillitis, Vincent's angina and operative pus cases).

To each hospital barracks is assigned a Ward Surgeon of the Head Surgery staff. The supervision of Head Surgery Hospital Service and all the work of the Ward Surgeons, is directly in the care of Assistant Chief of Service.

Consultant Service

The Consultant Service of the Section of Head Surgery consists of the supervision of all cases in the Base Hospital grouped under the department. An attempt has been made to systematize the work of this service and to economize in time and distance. A regular appointed Staff Surgeon is assigned to do this consultant work and each ward and barracks of the Base Hospital is visited daily.

In the office of each ward is a peg for Head Surgery and each Ward Surgeon and Supervising Nurse is instructed to leave memoranda on the peg of all patients requiring the attention of consult in the ward. This plan insures Head Surgery attention to every bed patient in the Base Hospital who is unable, because of contagion, isolation or other, and

more serious ailments, to be assigned directly to the department of Head Surgery.

Special Examinations

Special examinations may be classified: Aviation examinations, Eye, Ear, Nose and Throat work of the Recruiting Office and Demobilization Ward.

The Aviation work was done with full equipment and under the auspices of the Chief and Assistant Chief of the Department.

The Recruiting Office eye, ear and throat service has been carried out by members of this staff whenever required at the Recruiting Office. The examination of the eyes and ears of all students for the Nursing Corps are made by this department.

In the work of demobilization a number of the Staff Surgeons of Head Surgery have been assigned to an examination and tests of sight and hearing.

Care of Officers and Nurses

To the Chief and Assistant Chief of this department is assigned the responsibility and the service of caring for officers and nurses in the hospital and in the clinic whenever attention is required for professional work in this field.

Number	s	Bacteriological Findings	Final Disposition				Duration of Illness
			Pneumonia Ward	Convalescent Ward	Quarters	Duty	
1	*	*	3 da.
2	*	*	5 da.
3	onia.....	.....	.....	*	*	.....	3 wks.
4	um.....	.....	.....	*	*	.....	4 wks.
5	um.....	.....	.....	*	*	.....	3 wks.
6	*	5 da.
7	*	*	3 da.
8	*	5 da.
9	eum.....	.....	.....	*	*	.....	3 wks.
10	um.....	.....	*	.....	*	.....	2 wks.
11	eum.....	.....	*	.....	*	.....	3 wks.
12	eum.....	.....	*	.....	*	.....	3 wks.
13	eum.....	.....	*	.....	*	.....	4 wks.
14	u.....	.....	.....	.....	*	.....	2 wks.
15	*	18 da.
16	*	27 da.
17	*	3 wks.
18	Hem. strep. found..	.....	.....	*	.....	12 da.
19	*	6 da.
20	Hem. strep. found..	.....	.....	*	.....	10 da.
21	*	2 wks.
22	*	12 da.
23	*	6 da.
24	*	8 da.
25	Hem. strep. found..	.....	.....	*	.....	14 da.
26	*	8 da.
27	*	13 da.
28	*	5 da.
29	*	13 da.
30	*	6 da.
31	*	8 da.
32	*	9 da.
33	*	4 da.
34	*	6 da.
35	*	9 da.
36	*	9 da.
37	*	10 da.
38	*	6 da.
39	*	9 da.
40	*	8 da.
41	*	10 da.
42	Hem. strep. found..	.....	.....	*	.....	9 da.
43	*	12 da.
44	Hem. strep. found..	.....	.....	*	.....	15 da.
45	*	7 da.
46	Hem. strep. found..	.....	.....	*	.....	11 da.
47	*	11 da.
48	Hem. strep. found..	.....	.....	*	.....	10 da.
49	Hem. strep. found..	*	*	.....	.....	3 wks.
50	Hem. strep. found..	*	*	*	.....	4 wks.
51	Hem. strep. found..	*	.....	.....	.....	15 da.
52	*	*	6 da.
53	*	12 da.
54	*	6 da.
55	*	*	3 wks.
56	*	7 da.
57	*	8 da.
58	Hem. strep. found..	.....	.....	*	.....	6 da.
59	Hem. strep. found..	.....	.....	*	.....	9 da.
60	Hem. strep. found..	.....	.....	*	.....	10 da.

[illegible]

MILITARY SERVICE OF

HANAU W. LOEB, M. D.

St. Louis, Mo.

Commissioned Major Nov. 6, 1917

Commissioned Colonel April 12, 1919

I. Manual of Military Surgery of the Ear, Nose and Throat.

On Dec. 1st, 1917, I was assigned to duty in the Surgeon General's office in connection with the publications of the Section of Otolaryngology.

Under instruction of Colonel Parker, Head of the Division of Surgery of the Head, and of Lieutenant-Colonel Mosher, head of the section of Otolaryngology, I proceeded to prepare a manual on Military Surgery of the Ear, Nose and Throat, for the use of otolaryngologists in the service.

Inasmuch as it was felt that the commissioned otolaryngologist did not require elementary instruction in otolaryngology, it was determined to summarize the war literature of otolaryngology, and to condense and to prepare it in such a way as to make it available for officers in service.

It was found that a vast amount of literature pertaining to the otolaryngology of the current war had accumulated and it was necessary to consult more than 1100 books and papers in the accomplishment of the accepted task.

The text was completed on March 1, 1918, and the publication entitled "Military Surgery of the Ear, Nose and Throat" was issued about June 1st under the designation "Medical War Manual No. 8, authorized by the Secretary of War and under supervision of the Surgeon General and the Council of National Defense."

The book, which is of a convenient size for carrying in

the pocket, consists of 176 pages, printed on thin paper. The chapters comprise the following:

1. Injuries of the External Ear.
2. Injuries of the Middle Ear.
3. Injuries of the Internal Ear.
4. Psychoneuroses of Hearing and Speech.
5. Reconstruction and Re-education.
6. Miscellaneous.
7. Injuries of the External Nose and Nasal Cavities.
8. Injuries of the Accessory Sinuses.
9. Injuries of the Throat.
10. Injuries of the Pharynx and Esophagus.
11. Injuries of the Larynx and Trachea.
12. Paralysis in Connection with Wounds of the Throat.
13. Stenosis of the Larynx and Trachea.
14. Miscellaneous Nose and Throat Conditions.
15. Malingering.
16. The Ear and Aviation.

The subject matter is divided into two portions: The first contains a more or less dogmatic expression of the writers' opinion, gained from his previous experience and from his study of the war literature; the second, under the heading of "Comment" offers a review of the literature in detail.

The preface contains the following: "Due acknowledgment is here made to the medical officers connected with the Section of Oto-Laryngology in the Surgeon General's Office for their advice, interest and co-operation, which have been a source of great encouragement in the preparation of this little study of the Military Surgery of the Ear, Nose and Throat."

II. *Survey of Head Surgery.*

On April 12, 1918, I was assigned to prepare a monthly publication for the Division of Surgery of the Head, containing,

1. Abstracts of published articles on head surgery pertaining to the war.

2. Abstracts of published articles of special interest to the Division of Surgery of the Head.

3. Articles pertaining to this Division and reports of cases by members of the Medical Corps and of the Medical Reserve Corps.

4. Any other matter deemed of importance to the Division.

The purpose of this publication as expressed in the first number was:

1. To provide medical officers with a condensed survey of the war literature of head surgery and of non-military literature of importance to those interested in head surgery.

2. To stimulate the writing of reports and of papers giving the result of study and experience of officers assigned to this Division.

3. To provide a medium by which such reports and papers may take a place in medical literature and be made available for those concerned in this branch of medical science.

The "Survey of Head Surgery," as the publication was designated, made its appearance August 1, 1918.

There were altogether six numbers issued beginning with August, 1918, and ending with January, 1919, a total of 288 pages.

It was found very easy to secure the assistance of medical men, not commissioned, who gladly gave their time in the preparation of abstracts for this publication.

Special mention should be made to the following for their service in this regard:

Lieut.-Colonel Harris P. Mosher, Lieut.-Colonel G. de Schweinitz, Major Robert H. Ivy, Major G. V. I. Brown, Major Charles Bagley, Dr. Edward Jackson, Dr. Joseph Charles, Dr. Clarence Loeb, Dr. Wm. F. Hardy, Dr. Ernest Sachs, Dr. Sol. Hyman, Dr. Charles Elsberg, Dr. Holbrook Lowell and Dr. Albert Miller.

III. *Operative Surgery of the Ear, Nose and Throat.*

During this period, with Lieut.-Colonel Mosher, I was also engaged in preparing a manual on Operative Surgery of the Ear, Nose and Throat for the use of commissioned otolaryngologists. Almost half of the text was completed when the armistice brought an end to the work as well as to the necessity for continuing it. A number of drawings of unusual excellence were made by Corporal I. F. Summers who was assigned for that purpose by Col. W. E. Owen, Director of the Army Medical Museum.

IV. *Service at Jefferson Barracks Post Hospital.*

On October 1, 1918, I was assigned for duty at Jefferson Barracks, Mo., and was placed in charge of the otolaryngological department of the Post Hospital.

Shortly after my arrival, the influenza epidemic appeared and of the 7000 men on duty at that post over two thousand were affected, nearly 400 being attacked by pneumonia, with approximately 150 deaths.

The epidemic lasted three weeks, though of course, the complications continued for a longer period. Casuals came in from time to time but the post epidemic practically subsided in three weeks.

1. *Ear complications of influenza.* Altogether there were 50 cases of ear involvement, limited almost exclusively to the middle ear and external auditory canal.

Myringotomy was performed as soon as there was the slightest indication. Within two days the discharge had ceased in all but two cases and the tympanic membrane speedily resolved without complication.

In one instance the discharge continued for a week and in another case, a bilateral otitis media, it persisted for a month, in the typical way.

The acute middle ear condition was frequently accompanied by blister formation in the external auditory canal.

Mastoid tenderness occurred in one case for two days and in another for a week, both resolving without operation.

One case of meningitis followed by death occurred but

there was no evidence of aural origin either from the symptoms or from the myringotomy which was performed for exploratory purpose. No autopsy.

2. *Nasal complications of Influenza.* There was almost no nasal inflammatory accompaniment of the disease. In only a single instance was there a suspicion of frontal sinus involvement and this cleared up within a week without evidence of suppuration.

3. *Pharyngeal Complications of Influenza.* Most of the patients had a mild pharyngitis, some with mild tonsillitis, one with a peritonsillar abscess but in this case, the presence of influenza might have been doubted.

Shortly after the epidemic several companies of negroes came from Camp Funston. Within a few days a very large percentage of them were taken with an acute lacunar tonsillitis, quite different from the pharynx condition which accompanied the influenza epidemic.

4. *Laryngeal Complications of Influenza.* A few cases of acute laryngitis occurred but they were soon relieved in the usual way.

Two cases of laryngeal ulceration were observed greatly resembling those described by Major F. D. Owsley (Survey of Head Surgery, November, 1918, p. 94), one very mild lasting two days, the other bilateral persisting for a week.

5. *Impressions derived from a study of the otolaryngeal manifestations of the influenza epidemic.* The otolaryngeal manifestations of the epidemic as I observed them bore no resemblance to those of previous so-called influenza epidemics. The difference between them is so marked that I cannot see how they can be identical. If they have the same primary cause, it must be susceptible of great modification by circumstance, if the effects are considered. The otolaryngeal differences between this epidemic and those previously observed by me were:

1. Infrequency of otitis media suppurativa and its rapid resolution.

2. Absence of mastoid and intracranial complications.
3. Absence of paranasal sinus involvement.
4. Absence of lacunar tonsillitis and other manifestations of severe tonsil infections.

V. *Discharge.*

I was honorably discharged from service December 11, 1918.

VI. *Conclusions.*

Military service was an unexpected incident in my medical life. Even for some time after the declaration of hostilities, I had thought that my administrative duties in connection with the Deanship of the St. Louis University School of Medicine justified me in not applying for a commission, more especially in view of the Surgeon General's advice in this respect.

However, Drs. Richardson and Mosher soon convinced me that the school requirements should give way to the country's call and I can never fully express my gratefulness to them for the opportunity which they gave me to serve.

My experiences have been pleasant in every respect, my superior officers were considerate and helpful and my associates courteous and devoted to their duties.

It was three months after my application was made before I was commissioned. To obviate this in the future, I have accepted a commission in the Officers' Reserve Corps, which I hope to hold so that I may be ordered to duty hereafter whenever I am needed without waiting for the formality and delay which application for a commission entails.

BRIEF HISTORY OF THE EMORY UNIT

By

SURGEON IN CHARGE, MAJOR DUNBAR ROY, M. C., U. S. A.

The writer entered the service of the Surgeon General's office June 10th, 1917, as Contract Surgeon. This was in response to a telegram to Maj. T. R. Bratton (now Col. Bratton, Commanding Officer at Ft. McPherson, Ga.) requesting him to see if the writer would not form a voluntary unit for the examination of men for the Air Service. This was done on June 10th, 1917, and the writer's clinic rooms of the Medical Department of Emory University were utilized for holding the examinations.

The personnel consisted of my assistants in the Otolaryngological Department and those of the Medical Department in the University.

The Aviation Board was located at the Georgia School of Technology in Atlanta. The same personnel of the Unit continued until orders were received instructing us to examine no additional men. This was on Feb. 21st, 1918. The unit therefore, of which the writer was Commanding Officer, was in existence for eight months..

During this time we examined between thirteen and fourteen hundred men, the large number being due to the many cantonments which were located in this section and the fact that Atlanta was the center to which men could come in the shortest period of time and with the least inconvenience. It is permissible here for the writer to state that a higher commission was offered him but was refused on the grounds that his duties in the Medical Department of Emory University were urgently needed and it was understood with the Surgeon General's office that if he was willing to keep the rank of 1st Lieutenant, they would see that he was not transferred from Atlanta.

But few medical observations were made which differed from those already recorded by men working in the Avia-

tion Units in different parts of the country. One could not fail to have some practical ideas of his own after having had thirteen hundred men under observation and seen the results of the various tests recorded in these examinations.

The one outstanding observation presented to the writer was the neuro-psychic element which existed in all the men who presented themselves for the examinations and tests. There had been so much written and discussed concerning the severity of these tests that the large majority of men approached them with fear and trembling. I am fully convinced that many good men were rejected because this influence on their nervous mechanism was not considered. To take these men into the examination room, yell at them in bombastic tones, upset their whole nervous mechanism with fear, what could be expected from them when delicate tests were applied? As Commanding Officer I always attempted to rectify these defects in the Examining Unit and I personally saw to it that each examiner showed mild courtesy to every applicant. In many cases I allowed the man to be examined again the next day especially if he was of a nervous temperament and had lost sleep in an all night's travel upon the train. This report, however, is not for the purpose of discussing the methods used in these examinations nor the consideration of the importance of one test over that of another. This has been done quite extensively by others, perhaps better qualified by reason of their longer service in the Medical Corps. The writer believes that the eye tests were of more practical value to the man than those of the ear.

Three of these eye tests stood out most prominently, (1) Acuteness of vision, (2) Orientation by means of the stereoscopic test and field of vision, (3) Color perception.

On April 2nd, 1918, the writer was placed on the inactive list and the Emory Unit was discontinued.

REPORT OF

MAJOR GEORGE FETTEROLF, M. C., U. S. A.

Denver, Colo.

Commissioned Major, M. R. C., U. S. A., May 21, 1918.
Chief of Department of Oto-Laryngology, Camp Sevier,
Greenville, S. C., June 9th, 1918, to July 27th, 1918.

Chief of Department of Oto-Laryngology, Camp Hancock,
Augusta, Ga., July 29th, 1918, to February 12th, 1919.
Received discharge February 12th, 1919.

The only notable feature of my service was the opportunity and handling the Oto-Laryngological phases of the influenza epidemic at Camp Hancock. A report of this was sent to the Surgeon General and was read before the 1919 meeting of this Association.

OTO-LARYNGOLOGY AT CAMP LEWIS

By

MAJOR ROBERT LEVY, M. C., U. S. A.

During the first few months at the United States Army Base Hospital at Camp Lewis I served in a subordinate capacity. This gave me an excellent opportunity of observing military practice and contrasting it with that of civil life. The former has much to recommend it, and many of the trying and often trivial annoyances of civil practice are not met with, much to one's relief.

The keynote of military service is accuracy. Doubtless many others were struck with the vast problem the medical department had to contend with in an attempt to systematize with accuracy and uniformity the service of a large number of medical men, some of whom were insufficiently trained. This was especially apparent in the difficulty encountered in recording case histories. It is my firm conviction that in this as well as in all other branches of the medical corps, our final reports and ultimate conclusions are of much less value because of insufficient and inaccurate recording of clinical observations.

Operations.

In order better to control and systematize the question of operations it was found advantageous to adopt the following form, known as "Request for permission to operate." This was made out by the officer recommending the operation.

Date.....19....

Registered No.....

Name and Rank.....

Request permission to operate for.....

.....

(Diagnosis)

Indications for operation.....

 Quarantine Ward or Company.....
 Evidence of Acute Inflammation.....
 Laboratory report:
 Urine..... (Signed)

 Throat Culture

 Admitted to Hospital.....

The laboratory report was initialed by the Ward Surgeon. The "Received" stamp was dated and initialed by the Chief before the request was sent to the ward; an "Approved" stamp was dated and initialed by the chief after all requirements had been complied with, and an "Operated" stamp was dated and initialed by the officer operating.

Owing to exposure to contagious diseases incident to recruiting and camp conditions, it frequently happened that soldiers operated for minor ailments were stricken with one of these affections shortly after operation. Careful inquiry as to quarantine and thorough examination for acute inflammatory manifestations did not always prevent a case of scarlet fever, for example, from occurring in an operated patient to the obvious detriment of the patient as well as to the previously clean ward. In order to avoid this no case was operated until after three days of observation in the hospital.

The importance of preliminary urinary examination in all cases, even in those of minor character and requiring only local anæsthetic was illustrated in a serious result following a simple operation in which it was subsequently determined that the patient was a diabetic.

Variety of Cases seen.

It is worthy of note that an unusually large variety of

diseases of the ear, nose and throat reported at the clinic and hospital for treatment. There was not the dull monotony one had reason to expect in such a service. Rare affections were occasionally seen; of especial interest was an unusual case of *angioma* of the uvula of very large size and extending to the soft palate. A radical operation cure. *Othaematomata* were commonly seen and an opportunity to try out various methods of treatment was given us. A unique treatment which was here adopted following the suggestions of a Seattle man was the following: the othæmatoma was incised and a firm metal or hard rubber tube was inserted; the entire ear was then enveloped in a box of plaster Paris, the tube remaining exposed. Suction was applied to the tube daily and at the end of two or three weeks the dressing was removed, with most gratifying results.

Tonsillectomy and Adenoidectomy.

As elsewhere, diseases of the tonsils constituted an extremely large portion of our service. The question of tonsillectomy and its complications and the question of the tonsils as foci of infection came in for the usual extensive consideration. The method of operation carried out at Camp Lewis was by dissection and snare; local anæsthesia was the rule. Slight differences in technique both as to operation and anæsthesia were in accordance with each officer's practice. In no instance was local anæsthesia followed by serious affects. Post-operative complications were infrequent. In a series of 540 tonsillectomies and 146 adenoidectomies only 31 post-operative complications were reported with sufficient accuracy to warrant consideration. Of these, 23 were post-operative hemorrhage and 9 presented some infection; one case having both. Hemorrhage as a rule was "delayed secondary," true secondary hemorrhage being rarely seen. One serious case of secondary hemorrhage occurred following adenoidectomy; bleeding was very profuse, and was only controlled by a post-nasal plug after all other methods had failed.

Infection was manifested by rise of temperature, stiffness of neck, and abscess. There were no fatalities.

Focal Infection.

An attempt was made to arrive at some definite conclusion relative to tonsils and accessory sinuses as foci of infection, particularly as regards arthritis. It must be confessed that the unsatisfactory character of many of the records was a decided handicap to this study. However, a sufficient number of conclusive cases was recorded to make the study worth while. In a series of 200 cases of arthritis, 50 per cent were believed to have some relation to the tonsils as a focus of infection. A conservative view of this question was always maintained. An average example is the following:

Diagnosis:—Articular rheumatism; History:—recurrence for past thirteen or fourteen years; in hospital 51 days. After 38 days of general treatment, during which time the patient was on crutches, tonsillectomy was performed. 13 days after operation crutches were discarded and patient sufficiently improved to be discharged.

A review of all cases justified the following conclusions:

1. Tonsillectomy may affect improvement or cure in arthritis.
2. The number of cases cured were few compared to the total number of cases of arthritis treated.
3. The most satisfactory cases were the acute or recent cases, which generally gave a history of sore throat, although this was not invariable.

Meningitis Carriers.

An interesting study of carriers of meningococci was carried out to determine the pathology if any that might be found in the nose and naso-pharynx. It was an interesting observation that in no case was the meningococcus recovered from the nose or tonsils, but in all instances the habitat of these micro-organisms was solely the naso-phar-

ynx. The highest average number of days in the hospital occurred in those cases showing adenoids, these being small or of moderate size, although it was worthy of note that 38 per cent of the cases studied presented no lesion in the naso-pharynx. These remained in the hospital an average of 45 days as compared with an average of 61 days for those showing some pathology.

Vincent's Angina.

A diagnosis of this disease was frequently based upon laboratory reports, and even though no clinical signs were presented, these cases were isolated. It is believed that this practice was in a large measure unwarranted, for it is a well known fact that the fusiform bacilli and spirilli may both be recovered in the throat and around the gums of clinically normal mouths. Sore throats, even of slight degree, showing the presence of these organisms should, however, be considered potentialities for the spread of this infection. No serious cases of Vincent's Angina were observed although many were detained in hospital two weeks or more until negative cultures were obtained.

Mastoiditis.

During the early part of the year an epidemic of scarlet fever and measles being prevalent, a large number of ear complications occurred. Of these, although a greater part occurred in the progress of measles, fewer developed mastoiditis than did the scarlet fever cases. The most notable feature of these cases was the rapid and extensive destruction of bone. Dura and lateral sinus were often exposed, and peri-sinus abscesses evacuated. Convalescence was prolonged, secondary suturing being necessary in several instances.

In infectious diseases much can be done to prevent ear complications and to modify them should they occur. The following prophylactic measures were instituted:

1. Daily survey of all cases of measles and scarlet fever.

2. Careful cleaning of nose and naso-pharynx. The establishment of good drainage by reducing the swelling of the nasal mucosa by the use of cocaine, adrenalin and argyrol.
3. The patient was instructed as to the proper method of blowing his nose.
4. Prompt myringotomy.
5. Early mastoidectomy.

Influenza and Broncho Pneumonia.

The following ear, nose and throat affections were noted:

Otitis media, Suppurative acute.
 Mastoiditis, Suppurative acute.
 Otitis media, non-suppurative acute.
 Epistaxis.
 Rhinitis, acute.
 Sinusitis, acute.
 Pharyngitis, acute.
 Tonsillitis, acute.
 Tonsillitis, Follicular acute.
 Tonsillitis, Suppurative acute.
 Laryngitis, acute.

The most distinctive features of these diseases was their comparatively mild character. It was, however, worthy of note that those cases showing ear, nose and throat complications developed these after admission to the hospital, giving the impression, especially in the more severe cases, that these manifestations occurred as late complications. Many reported for treatment after discharge from the hospital.

Early and free incision of membrana tympani was the rule, and it is firmly believed that rapid convalescence and the comparatively few mastoid complications were the direct result of early myringotomy.

In order early to detect ear complications a daily survey of the influenza wards was carried on with gratifying results. Not only did the special survey officer detect unsuspected cases, but the ward surgeons were on the qui vive for their development.

Post-Mortem study of cases of influenza and broncho-pneumonia without mastoid signs was undertaken in twenty

instances because it was believed that in certain instances local symptoms were so mild as to be overlooked. In these cases both mastoids were examined. In eight one or both mastoids showed changes such as congestion, softening, milky or purulent fluid. Cultures of these mastoids showed bacteriological growth in only two, one being staphylococcus hemolyticus and the other pneumococcus.

Conclusion.

At the United States Base Hospital, Camp Lewis, every opportunity was given for thorough study of every case; original research was encouraged and hearty co-operation of chiefs of every department and that of the commanding officers was the rule.

406 Metropolitan Bldg.

REPORT OF

CAPTAIN HARRY A. BARNES, M. C., U. S. A.

I should be glad to give you a detailed report of my observations as an army doctor were it not for the fact that I was assigned for service in the Surgeon General's office. My work, therefore, was entirely administrative. I do not wish to imply that for that reason it was uninteresting; indeed, I shall be surprised if the report which my Chief, Colonel Mosher, makes concerning the organization of the Oto-Laryngological Section of the Division of Head Surgery, does not prove the most interesting presented to the Society.

At the same time it makes a report from me unnecessary, and I am sending you simply the data of my service in the army.

Date of entering service, June 26, 1918.

Rank on entering, Captain.

First duty, Surgeon General's Office, Washington, D. C.

Promotions. I was recommended for a Majority one week before the Armistice, which put a quietus on all promotions.

Demobilization, November 26, 1918.

REPORT OF

MAJOR R. BISHOP CANFIELD, M. C., U. S. A.

Major R. Bishop Canfield, M. C., U. S. A.

Received commission September 6, 1917.

Entered active service October 20, 1917.

Ordered to Camp Custer, Michigan, to take charge of the Ear, Nose, and Throat Service at Base Hospital. Remained at this post until May 5, 1918. During this period the Base Hospital was completed to a capacity of about 1800 beds. The Ear, Nose, and Throat Service occupied a building erected for that purpose in the center of the Base Hospital grounds, and grew steadily to a service of about 30 to 40 beds, besides the consultation service carried on throughout the hospital. During the early months of this period the work was handicapped by lack of equipment, which was supplemented by the members of the staff. Later an adequate equipment was secured. The service differed in no way from the average service in a civil hospital, as the epidemics experienced later did not appear until toward the end of my service. The policy laid down by the Commanding Officer of the Base Hospital was to the effect that, in as much as the men in this camp had been passed as fit for service, there was no need of attempting to build up a clinic, nor to take care of the minor conditions for which patients seek care in a civil hospital. This precluded the idea of doing any large amount of routine work, or of studying the question of prophylactic surgery of the nose and throat conditions from the standpoint of preventing the epidemics of measles, mumps, scarlet fever, and streptococcus infections which appeared later.

During the latter part of my service these conditions began to make their appearance, and opportunity was given over a brief period for study of their relationship to acute infections of the nose and throat, to fatigue, and to ex-

posure. It became clear to us that, without exception, these diseases were preceded by acute infection of the lymphoid tissue of the nose and throat, and that they were but rarely seen in men whose noses and throats presented no surgical conditions.

Experiments carried on in the laboratory demonstrated that those men whose tonsils had been removed in civil life, were but rarely carriers of the streptococcus, while those who had not been so operated and who became ill with streptococcus infection, invariably showed the same infection in the lymphoid tissue of the throat as in the blood stream. This brought up for discussion the value of a standardized nation-wide examination of the noses and throats of men eligible for military service. It is believed by us that such an examination and treatment by qualified specialists would have a marked effect in controlling such diseases, as proved of greatest importance in the camps in this country and overseas.

Aside from serving as chief of the Ear, Nose, and Throat Service, I served as Registrar of the Base Hospital, President of the Special Examining Board until May 5, 1918, at which time I was ordered to its Neuro-Surgical School at New York City, remaining there until July 15. I was ordered to Rockefeller Institute for work on the Surgical Treatment of Wounds. July 29, 1918, I was ordered to report as Chief of the Surgical Service of Base Hospital 76, then mobilizing for overseas service. We received overseas orders August 31, 1918, and proceeded to Vichy, France. Here we took over 20 hotels in which we conducted a Base Hospital of about 2500 beds. We failed to receive our quota of nurses or our surgical equipment during my service with this hospital. This fact interfered considerably with our efficiency, although borrowed equipment made it possible to carry on a certain amount of surgical work, mostly of minor character. During this period we suffered severely from influenza, from which we lost five of our personnel.

December 1, 1919, I was ordered to report to the Com-

manding Officer of Base Section 3, as consultant in Otolaryngology. Pursuant to these orders I visited the various hospitals of this section and was able to report that but one man was too ill to be transported home. The Ear, Nose, and Throat work in this section was practically over. I then sailed for home December 29, 1918, and upon arriving at New York was ordered to Camp Dix for discharge, January 10, 1919.

REPORT OF WAR SERVICE

CAPT. HILL HASTINGS, MEDICAL CORPS, U. S. A.

At the 1917 meeting of the American Laryngological Association, at the request of Colonel Lister, Dr. Hastings volunteered to organize a unit for medical examination at Los Angeles of aviation candidates. This unit was formed in September, 1917, and candidates were examined from all the Southwestern States until the end of the war.

Dr. Hastings was particularly interested in the ear examinations made in accordance with the army regulations in which the functional examination of the internal ear was carefully kept. After examining a thousand candidates a report was made by means of a contribution to the Western Section of the American Laryngological, Rhinological and Otological Society (February, 1918). This paper was afterwards published in the Annals of O. R. & L. (June, 1918). Briefly, the otologic findings showed that the vestibular response in the normal individual as regards nystagmus is as standard a reflex as the knee-jerk reflex. Also, with proper care in its performance the past pointing and falling test developed by turning and checked up by douching is equally as consistent. No candidates, even those who had flown considerably, failed to show a well recognized after-rotation nystagmus. It was concluded that a routine internal ear examination should be made by otologists in all suspicious nerve deafness cases, and that the army procedure had proved to be a good standard to go by. Certain remarks were made regarding precautions that the examiner should consider in order to make the standard tests.

Dr. Hastings received his commission as Captain October 29, 1918; was stationed at Camp Kearny and later at March Field Aviation Camp, Riverside, California. He received his discharge January 11, 1919. His service work was confined solely to aviation work.

REPORT OF WAR SERVICE

of

LIEUT.-COL. GEORGE MORRISON COATES, M. C., U. S. A.

The writer entered the United States service on September 15th, 1917, as Major in the Medical Corps U. S. Army, coming from the National Guard of Pennsylvania, and was immediately assigned to the Base Hospital at Camp Sevier, Greenville, S. C., arriving there September 18, 1917. His previous military service consisted in having served as Assistant Surgeon, United States Navy, during the war with Spain, and having been a medical officer of the National Guard of Pennsylvania for fifteen years. In May, 1917, he was on the retired list as Lieut.-Col. but returned to the active list at that time as Major. On arrival the hospital itself was found to be only partially constructed and not yet in condition to receive patients. The Staff also was incomplete, only about fifteen having assembled so far under the command of Major T. E. Scott, M. C., regular army.

In passing through Washington, Colonel Mosher had outlined the plans of his department for the establishment of a Section of Head Surgery to be independent of the Section of Surgery, although this was later modified so that our section became a Division of General Surgery. We found almost immediately that no adequate quarters had been provided for head surgery, one small room being designated as the Eye, Ear, Nose and Throat room and a small joining room to be used by the dental surgeons. As this was the best that could be obtained at the time, I proceeded to organize my department there having by the 1st of October two assistants in the Ear, Nose and Throat Department and two in the Eye Department, besides two dentists. One of our initial experiences was in convincing the Commanding Officer and the Camp Surgeon, both regular army men, of the necessity for and value of specialists

in army work. Apparently they had no conception of the type of work that was to be done in the base hospital and expressed the opinion a number of times that specialists were out of place in the army; that army surgeons should be qualified to do any and all kinds of work. Still further difficulty was experienced in getting the Head Section recognized as a separate entity presided over by a chief of service, but this was accomplished later after considerable effort.

Equipment was very scarce and hard to get and of poor quality when obtained. This difficulty was partially overcome by each member of the staff sending home for his own instruments. Practically no co-operation in this respect could be obtained from the C. O. Within a few hours after opening of the wards, the Section of Head Surgery began to functionate, being called into consultation for various medical and surgical cases, and for opinions for the Disability Board. Within two weeks it became evident that both the Eye, and the Ear, Nose and Throat Departments could not work in one room so the original room was turned over to the Eye Department and a small room in one of the wards fitted up as an Ear, Nose and Throat treatment room. The whole ward likewise was turned over to the head service and within a short time filled to overflowing.

The lack of supplies became more acute all the time as work increased and further expedients became necessary. Piano wire for tonsil snares was obtained from musical stores and Dr. E. W. Carpenter of Greenville kindly helped out the department when it ran short of some of the necessary equipment. Wooden tongue blades and applicators were manufactured by the patients wholesale, some of them becoming very expert. Applicators were also made from pieces of discarded wire and aural specula from rolls of tin. These are mentioned simply to show the dearth of supplies.

The assistants in the department were for the most part men of ability, conscientious and loyal. As the department

increased and two wards became necessary, a ward surgeon was assigned to each; one oto-laryngologist and one ophthalmologist were assigned to consultation work and spent the best part of the day seeing and treating cases in the wards, always by request sent through the medical chief. Co-operation between the different services was of a very high order and made one appreciate the great value of this type of group-medicine. In our own work, an expert consultation, medical or surgical, could be obtained at a moment's notice. The laboratory was always available for diagnosis, vaccine preparation, etc. The X-ray Department cordially gave us reports at any time and in any quantity.

Owing to the rather poor equipment in the general operating pavilion all the local anesthesia operations were done in the Ear, Nose and Throat ward dressing room. Other operations, however, were performed in the general operating room. As the weather became cold, and 1917-18 developed into a very cold winter even in S. C., heating facilities in the operating pavilion proved totally inadequate. As most of the mastoid cases were complicated by measles and bronchitis, being potential pneumonia cases, operation was frequently deferred as long as possible and even then was undertaken a number of times with the operating room heated only by a small wood-burning stove which smoked atrociously and scattered wood ashes all over the room when the wind blew down the chimney.

The characteristics of the service here were those usually found in a large civilian hospital. Practically every type of acute trouble was encountered although there were many more ear infections than infections of the sinuses. Early in November, an epidemic of measles occurred which included almost half of the personnel in the division. A great many acute ear complications were seen and treated. Prompt notice was brought to the department of any case suspected of incipient ear trouble and in nearly every case of acute otitis media the ear drum was freely incised at a very early stage. In spite of this, and thorough after treatment, a number of mastoids developed.

The soldiers of the 30th Division, which was served by this base hospital, were mountaineers from western North and South Carolina and eastern Tennessee. Contrary to the usual conception of mountaineers, they were for the most part very poor physical specimens, having had few of the diseases of childhood, having apparently little stamina or resistance, 30 per cent of them being hook-worm hosts and mentally being very much below the average in intelligence and education. These conditions made them rather poor surgical risks, but the results of treatment were on the whole satisfactory.

During my six months' service at Camp Sevier, about seventy cases of mastoiditis were operated upon with two deaths. One of these was a case that came in from the field with meningitis well advanced and a dual cerebral abscess. The second one was a case of lateral sinus thrombosis who died after lingering for about three months. Three other cases of lateral sinus thrombosis were successfully operated upon. Healing in most of these mastoid cases was slow and with considerable deformity owing, I think, to the apparent impossibility at that time of obtaining the proper asepsis either in the operating room or the ward. The blood clot dressing was uniformly a failure and the standard packing of the wound had to be resorted to. The use of Dichloramine T towards the end of my service there, or Bismuth paste, materially helped in shortening convalescence in these cases. Hearing was as a rule good after convalescence. Two mild pneumonias developed probably as a result of etherization, but both made quick recoveries. Many times during that winter all patients in the wards had to be kept in bed for several days at a time in order to keep them warm as woolen clothing was not issued until the winter was well advanced; and coal stoves did not appear until late in the season. Furthermore during a period of acute congestion in the worst weather that was experienced it was necessary to place many hundreds of patients on the open porches simply screened off with canvas. This was undoubtedly very detrimental to our

acute ear, nose and throat infections. Many tonsillectomies were done all under local anesthesia, 1/10 of 1% cocaine being used by injection. The method used was that described by Lewis of Philadelphia and consists in incising the tonsil, everting it and snaring it off. It is a quick, comparatively bloodless and painless operation. No secondary hemorrhages were encountered and very little primary bleeding. A certain number of acute sinus cases were seen but the number was very small and we used conservative treatment. Also of chronic sinus cases there were very few, a few ethmoidectomies and intranasal antrum operations sufficing to clear them up. Myringotomies were, of course, very frequent, as many as twenty a day being done at times, mostly in the measles wards. Illumination could only be obtained by using pocket flash lights which were unsatisfactory at the best. Direct sunlight also was utilized when possible. Local anesthesia to the drum (cocaine, menthol, carbolic acid) was invariably employed with more or less satisfactory results. Tonsillar abscesses were very frequent, sometimes four or five being incised in one morning. Following the measles epidemic mumps appeared and later chicken pox, and there was at all times epidemic meningitis, pneumonia and a few cases of scarlet fever. Two of the latter were operated on for mastoiditis in the isolation wards.

Another activity of the Section of Head Surgery was the examining of candidates for aviation. Naturally the Eye, Ear, Nose and Throat Department had the bulk of this work to do though cordial co-operation was obtained from the rest of the Staff. Of the first twenty examined most of the candidates were rejected for eye, ear or throat conditions or for failure in the equilibrium tests. Owing to the curious responses in the latter, especial investigation was made and it was discovered that most of these candidates came from the artillery regiments of the division, that they were ordered to take the examination against their will and were very averse to flying. In consequence they were trying to bluff us out which accounted for any curious re-

sults obtained. Later on a better class appeared and the rejections came down to a normal figure. Many examinations and reports were made for the "S. C. D. Board," most of them having to do with aural conditions. A great many chronic running ears were discovered which should not have been admitted into the service, and these were always recommended for discharge as being unfit for combatant troops. Quite a large number of malingerers were also discovered. These usually consisted in claims of unilateral deafness, at times the individual having normal hearing but more frequently having impaired hearing which was exaggerated into a total loss. Owing to the low mental average of these men it was usually a very easy matter to detect this malingering by simple methods such as shouting into the bad ear with the good ear only partially closed when total loss of hearing was claimed; also the usual trick of closing the good ear firmly and getting no response to ordinary questions but immediate response when asked to change position, turn around or get up. For the more astute cases the binaural stethoscope test or the tuning fork always sufficed. Great care was taken not to accuse of malingering anyone innocent and at least two observers examined the case and obtained similar results before a report was made.

During almost all of the six months the prevailing micro-organism was the pneumococcus. This was found in the acute otitis medias, the mastoids, accessory abscesses. It seemed to be almost universal. Towards the end, the streptococcus hemolyticus was appearing more frequently. During the fall and winter of 1917 we noticed a great many cases of a pneumococcic pharyngitis. These cases were all mild, complaining simply of a scratchy sore throat or hoarseness with occasional aphonia. The pharynx was very much congested and there were shallow ulcerations on the soft palate, pillars and the tonsils and also occasionally on the posterior pharyngeal wall. These ulcerations were covered with a semi-translucent, pearlish gray membrane which could be wiped off usually without difficulty. They

looked in some respects not unlike mucous patches and occasionally there was some difficulty in making a differential diagnosis. These cases all cleared up promptly, the period of disability being only a few days on the average. The aphonias, however, were more persistent, at times lasting for a couple of weeks or more. In these the neurotic element was plainly marked.

Captain George F. Gracey was my Chief of Clinic and my main stay, a most capable, energetic officer who later attained his majority most deservedly in the A. E. F. Captain Eugene Orr was a clever operator and a fine otolaryngologist; Lieut. W. T. Bruner and Lt. Burnside were ward surgeons, as well as Lieut. Weiss for a while. My gratitude to all of them for loyal service, and to all the members of the Eye Staff as well.

About the last of March, 1918, the writer was transferred to the Base Hospital at Camp Hancock, Augusta, Ga. He had held the title of Chief of the Section of Surgery of the Head at Camp Sevier Base Hospital and was nominally under the direction of the Chief of the Surgical service, although in most respects the Section of Head Surgery had an independent existence. The same condition of affairs existed at Camp Hancock except that here the Head Section was entirely independent although classified as a sub-section of the general surgical service. Later on, indeed, as Chief of this section, I was offered the position of Chief of the entire surgical service and only declined on account of my imminent departure for overseas.

On my arrival at Camp Hancock, I found that the Head Section had been through identically the same difficulties in organizing and equipping as we had at Camp Sevier and that my illustrious predecessor, Major John F. Culp, had used similar methods and expedients with excellent results. While the department was not in first class shape, he also had suffered from the antagonism of the C. O. and had been unable to secure needed supplies and facilities. The oto-laryngologists on the Staff there were excellent, consisting of Captain Edward W. Collins, one of my

former assistants at the Pennsylvania Hospital, who was my Chief of Clinic, Lieut. (later Captain) John H. Doyle of Fall River, Lieut. Eli K. Porch of Philadelphia and Lieut. M. Raskin of Baltimore. All gave me loyal, faithful and effective service. Very shortly after my arrival, the head surgery building was completed and fully equipped under the able direction of Captain Collins and Lieut. Doyle and in every respect the work proceeded smoothly.

During the six months at Camp Sevier when we were doing many mastoid operations, Major Culp had only had one at Camp Hancock. This was probably due to the fact that the troops of the 28th Division were seasoned and in superb physical condition. In consequence there were no epidemics of measles or anything else and every little acute oto-laryngological work. Subsequent to my arrival, during the next three months and for the most part after the departure of the 28th Division a small number of mastoids developed needing operation, about twenty in all being done. Several of these were double and one was a case of lateral sinus thrombosis. But healing was rapid in every case without exception, in almost all of them a modified blood clot dressing being employed with the same technic that had absolutely failed at Camp Sevier. Curiously enough, also, the prevailing organism here was the streptococcus hemolyticus, while at Camp Sevier it had been the pneumococcus.

Most of the activities of the Clinic consisted in tonsil operating and corrections of deviated septa. The work was systematized so that four operators could easily work at once, the average time for tonsillectomy, after anesthesia was obtained, being about two minutes and for submucous resection varying from 5½ minutes to one-half hour. At Camp Sevier the anesthesia for tonsillectomies had been 1/10 of 1% cocaine for injection, nothing else being obtainable. At Camp Hancock for the most part apothesine 1% solution was used with identical results as far as anesthesia was concerned. No toxic effects were ever noted from either of these drugs. During a period of perhaps a

month in the Spring, 1918, every submucous case developed a severe pharyngitis or tonsillitis on the first or second day after operation, due probably to some infection in the ward. This was controlled by masking suspicious ward cases and by spraying the throats of the operated cases with 2% Dichloramine T and when this technic was followed no further infection resulted. The patients before operation took a bath, shaved, put on clean pajamas and brushed their teeth. On arriving in the operating room, they were required to wash their hands and faces with soap, water and either alcohol or bichloride solution. They were then put in sterile gowns and sterile caps on their heads and sterile sleeves pulled over the arms of the operating chair. If the case was a tonsillectomy, the site of injection was painted with iodine before the needle puncture was made. In a large number of tonsillectomies done, no infections or untoward results were observed. Most of the submucous resections were done on almost inconceivably battered-up noses, every type of deviation being present and all equally bad. Some tears necessarily resulted in these cases but owing to careful asepsis, after treatment and very light packing, no perforations resulted and good results were obtained in nearly all cases. Dichloramine T solution was found to be most satisfactory in any type of infection or abscess cavity where it could be applied directly to the suppurating area, small infections of the mastoid wound or partial decomposition of the blood clot in a few instances clearing up immediately after the Dichloramine T-Chlorcozane Solution was employed. It was also used as a routine in the treatment of chronic suppurative ears waiting the Disability Board and with results that we felt were better than any other method of conservative treatment. The method of employment was to fill the external auditory canal full with the solution, a probe was then passed to the bottom to release air bubbles and pressure on the tragus employed to force the solution into all parts of the cavity. The ear was then plugged with cotton and allowed to remain this way for twenty-four hours, all odor disappearing

and discharge being very materially diminished although in the short time that these cases were under observation, none of them became entirely dry.

Another activity of the Head Section was the cure of chronic diphtheria carriers by tonsillectomy. There were probably about eight of these cases operated on, all of whom had shown continuous positive culture for periods running from 4 to 10 weeks and who had resisted every other means of eradicating the organism. Tonsillectomy was done on all these cases with the result that their cultures immediately became and remained negative.

As at Sevier, hearty co-operation was always obtained from the rest of the Staff, and after the first few weeks from the C. O. also. Major (later Lieut.-Col.) Fred J. Barrett of New York assumed command a few weeks after my arrival and was always most cordial in his support and most helpful in every way.

Late in July, I was ordered to Camp Wadsworth, Spartansburg, S. C., to join Base Hospital 56, being organized for overseas service.

Shortly after my arrival I was directed to assume command and undertake the work of organization. Here again the same difficulties were experienced as in the organization of the departments in the two previous mentioned base hospitals, namely, lack of co-operation, chiefly in the supply departments. The work was pushed vigorously, however, and equipment obtained in one way or another so that the organization entrained for Camp Merritt on August 22nd with 188 men and 36 officers. At the very efficient embarkation camp which we reached in a few days, conditions were entirely reversed and everything was done to facilitate completing our equipment and preparation. The organization passed a splendid inspection two days after arrival and was ordered into the transport on the third day. Base Hospital 56 sailed from Hoboken on the Transport Kroonland in a convoy of nine other transports, and carried 3000 troops, 1500 of whom were Southern colored soldiers equipped as pioneer infantry who had been in the

service but a few weeks, had no non-commissioned officers and were commanded by three First and three Second Lieutenants. It was my bad fortune to be placed in command of the two compartments containing these soldiers as well as our own organization. They were very tractable men but knew nothing whatever of army or ship life and it was difficult to keep proper sanitation in these troop compartments where the ventilating fans were constantly breaking down and out of commission and where the plumbing leaked badly. Influenza developed when about one week out of port, several hundred cases, all told, being reported but no deaths occurred while at sea. The port of Brest, France, was reached on September 12th, debarkation took place September 13th, and three days were spent in the so-called rest camp at Pontanazen Barracks. Thereafter a three days' railway trip took us to the Hospital Center at Allery in the Department of Saone et Loire. This Hospital Centre was in process of organization and was already occupied by three Red Cross base hospitals, ours being the first Army Base to arrive. It was constructed for ten organizations although at no time did it ever have more than seven.

Base Hospital 56 took over an area in which work had been started by a sub unit of Base Hospital 49 (University of Nebraska) and there were at the time of our arrival about 500 mild cases there. Our hospital was at once designated as the Contagious Hospital for the Center and was also to have charge of all dermatological cases. Surgery was to be held at a minimum. Within a few hours after our arrival, one hundred nurses belonging to our unit appeared, 60 of these being immediately transferred to another organization. Soon twenty nurses became sick from overwork so that during the most strenuous days of the hospital's existence, we had no more than twenty female nurses on active duty. We arrived with 180 enlisted men which was 20 below our quota and 60 of these were at once detailed to other organizations. Within a few days another hospital section was put in our charge and staffed largely

from our unit although small details of officers and men were added to it from time to time from other hospitals. Hospital trains from the front kept pouring in with the sick and wounded from the Meuse-Argonne offensive so that our surgical wards were soon filled with serious cases, over 500 dressings being done daily and from 10 to 15 operations. The total capacity of the hospital section was designated to be 1000 but this was increased by orders from the centre C. O. to 1550 in 56 and to 1700 in 56 A, giving a total combined capacity of 3250. This was only accomplished by crowding 70 to 75 beds in wards designed for 50 and that should not have had over 40. Every necessity for running a hospital was difficult or impossible to obtain. The roads were deep in mud and transportation not available. Stoves did not go up until late in the fall, coal was very scarce as also was food at times and drugs nearly always. Every available corner of the hospital had beds and patients in it and the general mess had to work almost continuously to keep them fed.

During these trying times of endeavoring to organize in the face of these difficulties, we were further hampered by constant inspections and criticisms, not of vital things, but of unwashed window panes, cigarette butts around the ward back doors, muddy walks, etc. Such criticisms and occasional minor punishments, such as confinement to the area, made it difficult to keep the morale of the Staff at its highest point. In the contagious department, which was speedily reduced to one ward owing to the frequency with which the wounded came in from the front, the problem was how to efficiently isolate a dozen different kinds of contagious disease. It was so successfully accomplished, however, that although the ward contained at one time epidemic meningitis, measles, scarlet fever, diphtheria, mumps and erysipelas, only one case of cross infection resulted during the three months the hospital functioned and this was in a case of measles who had been definitely exposed to diphtheria before he arrived in our care. This result was accomplished by strictly cubicling every bed and masking

every patient as well as the attendants, nurses and medical officers, and by carefully sterilizing by boiling or burning every article that was carried into a cubicle. In addition each group of cases was divided from the others by moist sheets strung across the ward and individuals passing from one group into another were required to change gowns each time as well as wash up in cresol solution. This required an enormous amount of work and attention to detail, but owing to the perseverance of Major Pilcher and his able assistants, it was successfully accomplished. An epidemic of diphtheria broke out in the Center and was made worse by the difficulty in making the diagnosis between laryngeal diphtheria and membranous laryngitis in the gas cases. The symptoms were practically identical and in a number of instances gas laryngitis was diagnosed as diphtheria from the culture but at post mortem no evidence of membrane was found. In a number of cases also distinct diphtheritic membranes were found at post mortem where they had not been suspected in gas and pneumonia patients. There were two or three deaths from laryngeal diphtheria in spite of tracheotomy being done, no intubation set being available, and the supply of diphtheria antitoxin having become very low and no more obtainable. Energetic measures were instituted throughout the entire Center with the active co-operation of the laboratory and the epidemic was soon under control.

Barron and Bigelow of the Center Laboratory in reporting on the situation believe that the influence of delayed diagnosis on the spread of diphtheria for the reasons mentioned above was quite large. This was controlled by an examination of the throats of all patients and personnel daily, together with the isolation and culture of all showing any suspicious signs and these were isolated, until the result of the culture was known, in wards that were strictly cubicled and masked. Barron and Bigelow believe that the two probable modes of the introduction of diphtheria bacillus into the Center were gassed carriers and chronic carriers. Factors in the spread of the disease were undoubt-

edly crowding (direct droplet infection), contaminated hands and fomites (indirect droplet infection), and delayed diagnosis partly explained by the similarity of symptoms between laryngeal diphtheria and membranous laryngitis due to gas. Overcrowding was believed to be the most important. In addition to the other methods of control the Schick test was done followed by immunization of all susceptible individuals when antitoxin could be procured.

Practically all deaths were autopsied. In the pneumonia cases it was my privilege to see a good many of the post-mortems and in each case the accessory sinuses and the middle ears were carefully investigated. In a very large proportion of the cases, over 80 per cent, if I remember correctly, pus was found in one or more accessory sinus or in the middle ears, or both. In nothing like this proportion was it found in cases other than pneumonia cases, which would seem to be significant.

As there was no Oto-laryngologist connected with Base Hospital No. 56, other than myself, our Ophthalmologist, Captain Mackin, very capably filled the position with help also from me from time to time as my administrative duties permitted. Aside from the laryngeal cases, however, there was not very much work of an acute character, all operations, such as tonsil and submucous resections being forbidden by special bulletin from G. H. Q. Peri-tonsillar abscesses were very frequent and occasionally acute middle ears were seen but even during the epidemic of influenza, there were very few and only two mastoids developed in our combined hospitals of over 3000 beds in three months' time. Vincent's angina, either in the form of trench mouth or patches on the tonsils and pharynx, was quite common and yielded more or less readily to pure phenol, this being the only drug obtainable which would have any effect upon it. Most of our war injuries were in the body and extremities, those of the head being sent to other centers. We had a few perforating wounds, either from shrapnel fragments or machine gun bullets, of the nose, ethmoids and maxillary antra and one case where fragments of shrapnel

were lodged in the mastoid. These came to us as a rule with Carrell-Dakin tubes in position but usually very dirty. The Carrell treatment was continued in most cases but where progress was not satisfactory, a switch was made to Dichloramine-T with the result that they cleared up nicely. No other sequel than an occasional aphonia or an epistaxis was noticed during the influenza epidemic.

Base Hospital 49 was designated for the care of head cases just as ours was the "contagious" organization for the Centre, although 56 for the most part looked after its own head cases. Equipment in 56 for nose and throat work was very meagre, consisting entirely of one canvas field roll so that again I personally supplied all instruments which I had brought with me. In Base Hospital 49, however, there was a fair equipment. It was a Red Cross organization which obtained its equipment by private subscriptions. This was augmented at Allery by drawing on the Red Cross Units and their surplus nose and throat material. Here good work was done and considerable acute operating on mastoids and sinuses.

After being assigned to several posts for short periods of time, I became Surgeon in Charge of Oto-laryngology at the Bordeaux Embarkation Camp, where there were two Camp Hospitals. During my three months' stay there the service was very light. Two daily clinics were run, one in each hospital, by my assistants, Captain Gregg and Captain Pearlman, but the cases were just the usual type of dispensary case.

The greatest asset I found in my work in the army was the very efficient and loyal personnel that I had the good fortune to work with. This was true of all the departments of the Section of Head Surgery and also applies to the Staff of Base Hospital 56, A. E. F. The chief difficulties that we had to contend with were the antagonism of the regular officers towards specialists of all kinds and the difficulty in getting supplies. At the time I left the United States in August, 1918, that difficulty had been overcome at home but it was encountered again immediately on land-

ing in France and remained so until the end. It is probable that by this time most of the personnel of the regular army, Medical Corps, has been educated to a greater or less extent in the value of employing specialists even in the army. But it would seem important for this Association to take some action looking towards the continuing of this viewpoint so that if another such emergency occurs, the battle of the Section of Head Surgery will not have to be fought over again.

EXPERIENCES AND OBSERVATIONS IN THE SERVICE

By

MAJOR STANTON A. FRIEDBERG, M. C. U. S. A.

The experience of the writer was entirely confined to Base Hospital activities and was almost equally divided between service in the U. S. and the A. E. F. It was not limited to the practice of Oto-laryngology for "in addition to his other duties" on various occasions, he engaged in medicine, surgery, epidemiology, laboratory and administrative work. On the unscientific side he qualified as a builder of mess huts and taking advantage of a slight acquaintance with plastic surgery and endoscopy, he was enabled to close perforations in lead-pipes and do a little tube work in steam-fitting. The remaining portion of his time was occupied in a critical review of medico-military matters in general and sometimes in particular. Inasmuch as these observations were "not in line of duty" and, as time has proved, were not necessary for the proper conduct of the war, they will be omitted from consideration and only those features relating to our specialty will be discussed.

Base hospital conditions during the winter of 1917 and 1918 were no doubt more or less similar in the various cantonments. A million men may spring to arms overnight. In the course of a week, however, the elasticity of the spring is apt to be considerably impaired by the development of diseases incident to the grouping of large bodies of individuals. Base hospitals do not spring into existence overnight under the most favorable circumstances and the problem is still a little more complex when a camp is located off of the main line in a part of the country that God forgot.

The writer received his commission in the Medical Corps Nov. 6, 1917, and was assigned to duty at Camp Doniphan, Ft. Sill, Okla., January 8, 1918. The base hospital was far

from completion in spite of the fact that a division had been in camp since the previous autumn. Owing to the various epidemics the hospital was greatly overcrowded. Equipment was lacking and patients in need of surgical aid were transported by ambulance to the Post hospital some little distance away. After operation, as soon as their condition permitted, they were returned to the base. Sanitary conveniences were inadequate. There was a paucity of nurses and the care of the patients devolved upon the corps-men, many of whom had had but little training. In spite of all of these handicaps the amount and quality of the work done was, to say the least, extraordinary. To have had even a small part in this accomplishment is a source of the greatest satisfaction and one of the most pleasant remembrances of the service to the writer.

In the department of Head Surgery, the problem of instrumental equipment was easily solved by sending for our own. Previous to its arrival it was found that a Goodsell uterine dilator was a useful aid in resetting a fractured nose. Abdominal retractors properly held will allow ample exposure of the mastoid cortex. An overworked dull gouge is a matter of indifference to an anesthetized patient. By carefully directing the blows of the mallet, the danger from concussion may be obviated. As a substitute for snare wire, hairpins proved their efficiency in something over 25 operations. A peculiarly negative result followed all our efforts to obtain wire. All these efforts were made through "channels" as the G. O. against unofficial communications was strictly observed and the distance to be covered was too great to allow of a personal interview.

Two wards were assigned to the department, one of which was partly occupied by the out-patient clinic rooms. With overcrowding about 60 beds could be placed. From 50 to 150 patients from the field visited the clinic daily. The calls for consultations in other wards were numerous and insistent. In one morning the writer examined 41 patients in other departments of the hospital. With the limited help and facilities the outside demands made it

difficult to give proper attention to our own patients. The overcrowding of the out-patient department with men in different stages and varieties of disease was recognized to constitute a serious situation. Not a few patients visited the clinic as it furnished them the opportunity of relief from drill for the day. Others came with minor ailments that could be cared for equally as well in quarters. By eliminating these classes we were able to establish the hospital work on a more satisfactory basis.

Climatic conditions were very trying as there was a wide variation in temperature and frequent dust storms. As a consequence there were many infections of the upper respiratory tract and middle ear. The policy was adopted of hospitalizing all acute middle ear cases and it was demonstrated beyond question that this served to the greatest degree to prevent complications. Patients on other services who required special treatment were transferred when possible to our own wards. In this way a rather extensive hospital service was built up and the department had at one time 185 beds at its command.

A large portion of the work in the department was in Otolgoy. A considerable number of patients with mastoiditis requiring operation was found. From the middle of January up to May 1st, something over 80 mastoid operations were performed. At one period an average of 60 dressings were being done daily. The prevailing organism in our mastoid cases was the streptococcus hemolyticus. The prevalence of cross infections made it particularly necessary for close observation following operation. Patients would be making satisfactory progress and then suddenly develop temperature. In a day or so the additional diagnosis of scarlet fever, measles, mumps, diphtheria, malaria or erysipelas would be added to his clinical record. We also had the experience with two patients who apparently were pursuing a normal course for several weeks after operation and then suddenly developed meningitis. Post mortem examinations failed to show any connection between the ear and the meningeal condition. Several cases

of serious labyrinthitis were observed. As a complication in the acute stage of otitis, facial paralysis was found a number of times. The condition cleared up following operation. Cranial complications were rare. One patient developed severe symptoms after operation and on re-operation the diagnosis of extra-dural abscess was confirmed.

Simulation of deafness was not uncommon. Not a few of these cases were in patients who had had a mastoid operation. The usual tests uncovered the deception. Several men with burns of the external auditory canal were seen. The condition was so unusual that it led to the supposition that they were made with deliberate intent.

In the diseases of the nose and throat, the usual variety of cases were seen. The acute accessory sinus infections were relatively fewer than would be expected under the circumstances. The most common throat conditions met with were tonsillitis, peritonsillar abscess, diphtheria, and Vincent's Angina. One patient with an edema of the larynx was observed. Hysterical aphonia was not at all uncommon. The condition that caused us much concern and consumed quite a good deal of our time, was the carrier problem. A full report of our investigation has been published and it is therefore unnecessary to go into any further detail. Over three hundred diphtheria carrier patients were operated upon with, in the main, gratifying results. To show the extent of the infection, in approximately 20 per cent of the patients admitted to the Head Surgery Department, diphtheria bacilli were found to be present. One meningococcus carrier was cleared of the organisms by the removal of his adenoids.

In the early part of August, 1918, the writer was relieved from duty at the Base Hospital and assigned to Base Hospital 85 for overseas service. The organization left Ft. Sill Sept. 1st and arrived in France Sept. 23rd. We were assigned to duty in the district of Paris and proceeded to organize the hospital. The class of patients assigned to us were chiefly convalescents from other hospitals. We did not receive battle casualties as we were not in a position

to take care of them. Various members of the staff were assigned temporarily to other units and thus were fortunate in obtaining some experience in War Surgery. In the Head Surgery Department, the work consisted largely in the treatment of acute ear, nose and throat infections.

About the middle of December, 1918, the hospital was discontinued and the unit sent to relieve Base Hospital 27 at Angers, France. The hospital at this place had a capacity of over 3000 beds. Post-influenzal conditions and the acute infections furnished the larger part of the work. Climatic and billeting conditions were responsible for a great number of acute otitis media cases. Immediate hospitalization again brought about the desired results in preventing complications. The greatest number of patients in the department at any one time was about 175. About a dozen mastoid operations were performed. Practically all showed the hemolytic streptococcus. Acute infection of the frontal sinuses was very frequent. Involvement of the antrum was relatively uncommon. Vincent's Angina was prevalent and in some instances ran a severe and protracted course. Wassermann tests were made in all cases and was invariably negative in the absence of syphilis. Several cases of faucial and laryngeal diphtheria, which owing to delay in diagnosis, had reached a critical stage, were seen. Fortunately they all recovered. One foreign body case came under treatment. The patient gave a history of having had a piece of meat lodge in the esophagus 24 hours before. Under local anesthesia esophagoscopy was done and the mass of meat found impacted in a stricture of the esophagus. The foreign body was removed without special difficulty.

There was but very little operative work done as we were restricted to emergencies only. Here too during the spring months we had an influx of patients with trivial ailments and complaints. It was curious to see how rapidly symptoms could be transferred from one organ to another in patients who desired admission to the hospital. A veritable epidemic of hemoptysis developed in some of the wards,

but singularly enough it was never possible to obtain a specimen of blood from a patient. Two patients with laryngeal tuberculosis were found and returned to the U. S.

A word or two may be permitted in comparing the organization of our special department in the U. S. and in the A. E. F. On this side the Officer in charge had a number of assistants assigned to him. This was not the case in the units sent abroad. One Officer, irrespective of rank, was assigned to special work. A condition of organization that allows a surgeon to have a number of assistants in one place and then relegates him to the position of a ward surgeon in another, is somewhat unsatisfactory and not conducive to the best results. The writer was relieved from duty with Base Hospital 85 April 12 and ordered to return to the U. S. He was discharged from service April 29th, 1919.

All in all a great deal of satisfaction was derived from his military service and he considers it a fortunate privilege that he had the opportunity to be of some assistance to the country in its time of need.

REPORT OF

MAJOR GERARD HUTCHISON COX, M. C., U. S. A.

Dr. Gerard Hutchison Cox was called to active service in the United States Army on May 10th, 1917, and served until January 16, 1919, over twenty months.

His time was spent, for the most part, at No. 1 General Hospital, Williamsbridge, New York, and in France with the Presbyterian Base Hospital Unit, which took over No. 1 General Hospital, British Expeditionary Force.

Dr. Cox has written two articles on war-time subjects, one entitled, "Gas Poisoning in Warfare." "A Study of the Effects of Mustard Gas Upon the Upper Respiratory Tract," and a second paper in conjunction with Captain Harold S. Neuhof on "Gunshot Wounds of the Mastoid."

Dr. Cox was commissioned First Lieutenant in the Medical Corps May, 1917. Captain, July, 1917. Major, September, 1918.

REPORT OF

SENIOR LIEUTENANT JOSEPH B. GREENE, M. C., U. S. N.

I was first ordered to recruiting duty in the Navy on April 25, 1915, with the rank of Junior Lieutenant and continued on this duty until April 10, 1918. Then I reported at the Norfolk Naval Hospital and was placed in charge of the nose, throat and ear work with two assistants. The hospital at Norfolk was the largest one in the naval service.

On March 28, 1918, I was promoted to the grade of Senior Lieutenant, (corresponding to the grade of Captain in the Army). On April 1, 1919, I was ordered to the Transport Finland, and sailed for France on April 10, 1919, returning to America on May 1st. I was then ordered to Norfolk where I remained until I was discharged from the service on January 23, 1919.

The service at the hospital in Norfolk was large and interesting. The regular naval officers afforded me every facility and co-operated with me heartily in the work.



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