

take place; but if one burns one's finger with a poker it takes a week or more to heal. Nothing heals more quickly in the nose, as in other portions of the body, than a clean, sharp incision made with a knife. In hypertrophied conditions of the inferior turbinal he removes a little wedge-shaped piece, puts in one or two sutures, and in three or four days it is united, with little or no crust formation, and a permanent result. He noticed that the abstract of the paper states that eight to twelve incisions are often necessary to relieve the condition. To his mind the somewhat more radical procedure is really more conservative, as in one operation the condition can be permanently relieved.

DR. J. SOLIS-COHEN, Philadelphia, said that according to his recollection the introduction of the electric cautery into intranasal surgery was for the purpose of avoiding hemorrhage. The anatomic constitution of the turbinals, without vessel walls, and there being no retraction, renders them liable to hemorrhage. That was the danger feared, and in order to avoid it the electric cautery was introduced. In snaring posterior hypertrophies with wire there would be a great deal of hemorrhage, and there was difficulty in restraining it; but now we have found that this hemorrhage can be controlled, there is no longer the necessity for cauterization that previously existed. It is in the selection of cases we must trust for guidance to know when to use this agent and when not to use it. All these things swing like pendulums: everything was electric cautery at one time; then it subsided gradually, and now the pendulum is getting along the other way, and eventually it will stay where it ought to. There are occasions when this agent should be used and there are other occasions when it should not be used.

DR. E. FLETCHER INGALS, Chicago, said that he heartily agreed with the first speaker as to the time of repeating the cauterization; it should not be sooner than two weeks, and then it should be on the opposite side. He apprehended that the most trouble has come from oft-repeated cauterization. He has seen one patient die apparently as the result of the treatment, some one cauterized every day for two weeks. He sees no excuse for that kind of treatment. He fully agreed with the speaker, also, on the advisability of snaring off hypertrophies. One man thought the galvanocautery could not be controlled. He does not know of anything more easy to control. He readily understands that if he cauterizes the middle turbinate very often he is likely to get into trouble. Dr. Ingals knew of one case in which the cautery was used extensively in the upper portion of the nose which was speedily followed by a fatal meningitis. He has not seen numerous scars from cauterization. He has cauterized some cases four or five times on one side in the course of ten or twelve years, but in these cases little, if any, scar tissue is perceptible because we destroy very little tissue, so that there is always left as much healthy mucous membrane as normal. The paper states there was one case of tonsillitis in a hundred; he has seen more than one case and thinks such a sequel might be expected in 1 per cent. One man argues that the results of this treatment are not permanent. That depends on how much is done. As he stated in the paper, he does not cauterize any more than appears necessary at the time. The moment he thinks the nasal cavity is large enough he stops, hence the patient may be cauterized only once or twice before he gets sufficient relief and may not come again for two or three years or not at all unless more thickening develops. In our cases recurrence was very rare and in those it did not occur for a number of years. If in such patients he had cut off the whole turbinate there would have been no recurrence of the swelling, but they would probably have had many other difficulties due to abnormally large nares that could not have been remedied. He heartily agreed with Dr. Holmes as to the error in removing too much tissue. It is very easy to take out more than we ought. He said that he could not agree with Dr. Holmes that there is no place for the cautery in hypertrophy, because the line between intumescence and hypertrophy is not distinctly drawn and can not be. Intumescence is considered by many a true hypertrophy and in such cases the cautery is indicated, but there are some cases of hypertrophy where the cautery alone would not be sufficient.

CHEMISTRY OF SALIVA IN RELATION TO HAY FEVER.*

D. BRADEN KYLE, M.D.
PHILADELPHIA.

In my previous papers¹ I have taken up the general subject of the saliva and the importance of its chemistry in relation to disease.

This paper, then, will be devoted more to observations, conclusions, laboratory technic and treatment. That many deductions can be made, both from a standpoint of diagnosis and treatment, by the examination of the salivary secretion, I think, has been proved beyond a doubt. The information thus gained is not at all limited to hay fever and allied conditions. However, in hay fever, ragweed fever, rye fever, horse fever, rose cold, lithemic rhinitis, etc., the examination of the saliva is most useful from the standpoint of etiology and treatment. The three conditions, excess of alkalinity, excess of acidity, and the neutral condition, each play an important part and each produce a different line of symptoms. The treatment under such conditions also varies greatly. This physiologic and so frequently pathologic secretion which comes to the surface as such and then goes back into the economy to perform a physiologic function, is the only instance in which we have this advantage of study. In my study of the salivary and nasal secretions, I have made a few observations which, to me, are exceedingly interesting.

We may have excessive alkalinity of the saliva, with acid urine; or we may have excessive acidity of the saliva, with alkaline urine. On the other hand, the urine excreted and saliva secreted may both be either alkaline or acid, or neutral.

Another interesting observation is, that in saliva in which there is an excess of ammonium or sodium salts, before acids can be administered, the sodium and ammonium salts must be converted into potassium salt; or, in other words, the alkalinity changed to one due to potassium. The chemical reason for this I have not yet been able to demonstrate. However, I have seen this illustrated in a number of cases.

The chemistry of the saliva and its relation to the opsonic index is certainly an interesting subject. Unfortunately, I have not carried on the comparative experiments with the opsonic index, so can not draw conclusions, but there is no question that the chemical change in the secretion certainly would throw some light on the opsonic index; as the gland secretion is obtained chemically directly from the blood, there certainly could be established a relation between the index and the chemical change.

Another observation which I have made in four cases, which illustrated this chemical change in the secretion of the nose and mouth, after the secretion had reached

* Read in the Section on Laryngology and Otology of the American Medical Association, at the Fifty-eighth Annual Session, held at Atlantic City, June, 1907.

1. "The Etiology of Hay Fever. The Relation of the Chemistry of the Saliva and the Nasal Secretions to Diseases of the Mucous Membrane of the Mouth and Upper Respiratory Tract." Read at the Fifty-fifth Annual Session of the American Medical Association, in the Section on Laryngology and Otology. Also "The Chemical Pathology of the Saliva and Pharyngeal Secretions (Sialo-semiology) as a Means of Diagnosis," read before the Twenty-fourth Annual Congress of the American Laryngological Association, Boston, May 27, 1902. Also "The Import of the Salivary and Nasal Secretions in Hay Fever," read before the American Laryngological, Rhinological and Otological Society, Lexington, Ky., May 1, 1903. Also "The Relation of the Chemistry of the Saliva (Sialo-semiology) and Nasal Secretions to Diseases of the Mucous Membrane of the Mouth and Upper Respiratory Tract," read before the New York Institute of Stomatology, Nov. 6, 1903.

the surface, was that an irritating fume or vapor was produced by chemical change in the secretion from the structures mentioned. These irritating fumes were so marked that they were distinctly noticeable by the observer and any one coming in close contact with the patient. There was no disagreeable odor.

The sensitive areas of the nasal mucous membrane, as observed in certain individuals, no doubt render that individual more susceptible to irritants, but can not be the sole cause of the hay fever, as many individuals having no such sensitive area suffer from aggravated attacks of this malady, and others having equally sensitive areas do not suffer from hay fever.

The sulphocyanids, as well as the reaction, alkaline or acid, of the secretion, play an important part. All the cyanid preparations are poisonous, and the sulphocyanid is especially so. In some individuals, the nervous type, the low vitality, the low cell resistance, and general debility, which in themselves are predisposing factors—may such cases, often called neurotic, not be simply autoinfectious? Cases in which the sulphocyanids are present are necessarily autoinfected cases.

CHEMISTRY (SIALO-SEMEIOLOGY).

The chemistry of the normal saliva has been referred to in my previous papers. The principal soluble ferments, enzymes or diastases, exist in amorphous, albuminous substances. They can be separated by alcohol. The enzymes are not dialyzable.

The effect of acids and alkalis on the enzymes can be easily demonstrated in the laboratory, but in the systemic laboratory and in gland secretion, whether in intestinal, gastric or salivary, this action is not so easily demonstrable. Certain enzymes, amylase for example, only act in acid media, the degree of acidity also controlling the reaction. The slightest excess of the acidity, and the action is arrested. Certain other enzymes only act in alkali media, and others in neutral, and so on. Hyperacid saliva, on standing, changes in color from a golden yellow to very dark yellowish-brown. This is due to the change in the basic principle present. Frequently in excessive acid cases the presence of oxalic acid can be demonstrated in the saliva. When this is present any length of time there is likely to be caries of tissue or bone. In an alkaline saliva with sulphocyanids present, we frequently see the abrasion about the mucous membrane of the pharynx, tongue and cheek; in fact, a herpetic condition may occur. This is especially true in the excess of alkaline cases due to the potassium sulphocyanid or the ammonium form. Lactic acid and oxalic acid are frequently found in the saliva. The combination of uric acid and sodium phosphate will produce an acid sodium phosphate. In all such cases the mucous membranes are decidedly sensitive and irritable and the secretion acrid and burning. This is illustrated in various forms of rhinitis, and catarrhal conditions of the nasal mucous membrane, and also marked in the various forms of so-called hay fever.

LABORATORY WORK.

The following simple method of laboratory work I have used for a number of years, and is practically the same as used by Micheals and Dr. E. C. Kirk in his laboratory, and is the plan used by my laboratory assistant, Dr. J. M. Boice. I have used for a number of years in my office the color test in determining the presence and amount of sulphocyanids. The peculiar shade of pink obtained in this reaction can be determined by a

color chart. It is empirical largely, but will enable the observer to determine fairly accurately the amount of sulphocyanids present, and he can also make his deductions from such color tests. In other words, a scheme something like the Goldsmith color chart, or hemoglobinometer, could be established, which would be of great service in the rapid examination of specimens. I had hoped to present such a color chart with this paper, but was unable to complete it.

Dr. Kirk, in his work, uses extensively the polariscope, and I find it of great service in determining crystals and an excellent aid in the chemical analysis of this secretion.

SALIVARY ANALYSIS.

The following simple working method for the routine examination of the buccal secretion is followed:

Collection of the specimen should be conducted with care to avoid contamination either with tooth powders or washes, or with various chemical substances; if possible, a sterile receptacle should be used.

The ordinary porcelain test tablet with from four to a dozen shallow cells is used for the test. The reagents are: A 10 per cent. solution of ferric chlorid in distilled water, Nessler's reagent, a solution (about 5 per cent.) of potassium chromate, solutions of silver nitrate and sodium hydrate of similar strengths, and, finally, Von Jaksch's solution of iodo-potassium iodid.

Inquiry should be made of the patient as to whether or not the saliva has any definite taste in his own mouth, and a note should be made in this regard under the heading, "sapidity." A note should also be made under each of the following heads: odor, color, reaction, consistence, aspect and sediment.

A few drops of the secretion is then placed by means of a small pipette on each of four cells on the test tablet. The worker must familiarize himself with the action of his set of reagents on normal saliva, as his results are simply qualitative and the substance tested for is stated as increased, normal or deficient, depending on the nearness of the color or the reaction to that obtained in the average healthy specimen. One drop of the reagent is employed. Ferric chlorid produces from the faintest pink to the most intense vermilion color, the normal reaction must be mentally compared with that under examination and the result noted in reference to the sulphocyanid content. The ammonia content is seen and expressed in a similar way after addition of Nessler's reagent.

The chlorids are determined by the addition of a very small drop of the potassium chromate solution, followed by a drop of the silver nitrate solution—the resulting reddish silver chromate being soluble and disappearing in proportion to the quantity of chlorids present. A substance similar to glycogen is precipitated on the addition of Von Jaksch's solution, and, if to this mixture a drop of sodium hydrate solution is added, the presence of acetone is demonstrated by the odor of iodoform, which odor must be distinguished from that of the periodates sometimes formed.

The above laboratory outline does not apply to the quantitative analysis. The methods employed for this in organic chemistry are necessarily long and complicated.

I lay great stress on the determination of the predominance of sodium or potassium salts in the saliva. The process I use for this determination consists, first, in evaporation of the saliva to small bulk over a water bath, it being better to use for this purpose the dialyzed

saliva to rid the concentration of the otherwise glairy consistence. A faint crystalline precipitate on addition of hydrochloroplatinic acid is an indication of potassium, while a similar result, when potassium pyroantimoniate is added, indicates sodium.

A reaction may occur with both tests when a mixture of the salts is present, or for the same reason, or because of the very small amounts present, no visible reaction may occur. At best, the reactions are not pronounced and the tubes may have to stand some hours before a judgment can be given.

The use of the micropolariscope has made possible the recognition of many salts which, under the ordinary objective, have little or no distinctive character.

The absence of the normal salts, as well as the presence of abnormal ones, is of importance. For any degree of success here, the saliva must be dialyzed before being placed on the slide for examination; the slides are in best condition from three to ten days after they are made.

I am indebted to Dr. J. M. Boice, my laboratory assistant, for much valuable aid during the past year in this interesting laboratory work.

The so-called susceptibility of the mucous membrane is not a structural one, but is due to the irritation coming from within. The effect of these altered secretions is also seen in cases in which the mucous membrane is dry, with a sensation of burning and irritation, and yet there is practically no inflammatory process. This certainly is due to an altered secretion coming in contact with the mucous membrane surface and producing local irritation.

In many cases in which there is altered chemistry of the saliva, the patient complains of an excessive flow of this secretion, and in many instances of a soapy taste in the mouth.

CONCLUSIONS.

So-called hay fever varies in different individuals. The cause is not the same. In at least 60 per cent. of the cases I have been able to demonstrate that the local irritation is primarily due to an altered chemistry and an altered resistance, and these 60 per cent. of cases may be divided as follows:

1. The class in which the secretions when coming to the surface are non-irritating, but undergo chemical change and produce irritation. This may be either acid, alkaline or neutral.

2. Cases in which the secretion, when it comes to the surface, is irritating without any chemical change.

3. When the secretion comes to the surface it comes in contact with certain extraneous material and certain secretions coming in contact with certain materials produce by chemical change an irritant; hence the term ragweed fever, rose cold, etc.

Any individual having nasal obstruction in the form of deflected septum, narrow nostrils, polypoid growths, etc., or the neurotic type with lowered vitality, may suffer a more aggravated form than those not having such nasal obstruction or underlying systemic condition. I do not say that this is the cause of all cases of hay fever, but I do say positively that at least 60 per cent. can be worked out on this basis. Excessive alkalinity will produce really more irritation than excessive acidity. It is a well-known fact that strong alkalies are as caustic and escharotic as strong acids.

I do not mean to state in this paper that all cases of hay fever can be cured or, rather, are cured. Neither do I say that the altered chemistry is the cause in all cases, but I do state this emphatically, that, at least in

60 per cent. of the cases it has been my privilege to study, the underlying factor has been worked out on this basis, that the so-called susceptibility, the nervous element, the lowered vitality cases, all can be explained on the basis of altered secretion. One of the worst cases I have ever observed was in an individual who was suffering from autoinfection due to the enormous quantities of sulphocyanids present in his secretion. He was the typical neurasthenic and neurotic type, but it was purely acquired, and when once his general condition was restored to the normal his hay fever disappeared; but in restoring his general condition to the normal his secretion was freed from sulphocyanids and also excess of ammonia compounds in his saliva.

TREATMENT.

The treatment of hay fever has always been subdivided into local and systemic treatment. It is a well-known fact that there are many cases of hay fever in which any local treatment, instead of relieving the symptoms, seems to either aggravate them or to bring on an attack. Occasionally, however, the alkaline or acid douches seem to afford some relief. This is easily explained by the fact that the alkaline or acid would change the reaction of the irritating secretion; yet, if either solution was used in the wrong type of case, this influence would only be aggravated. Chemical experience has proved this to be true. Do not understand me to say that this is applicable in all cases. Some cases certainly receive considerable benefit from local sedatives, and if certain sensitive areas are removed the susceptibility on the part of the individual would be lessened. At the same time the underlying cause would still remain.

The plan of treatment which I have followed, and which has been based on the chemical analysis, necessarily varies in different individuals. The general plan, however, is attention to the secretions. I mean by that the elimination—active intestinal tract, stimulants to the liver, free action of the skin. In other words, increase elimination. The treatment will depend on whether the condition is alkaline, acid or neutral, whether it is due to the presence of ammonium salts, the sodium salt, potassium salts, or whether there are present sulphocyanids, lactic acid or oxalic acid. To meet these conditions citrate of soda, lactate of soda, benzoate of soda, which renders inert active compounds, boric acid, dilute hydrochloric acid, dilute nitric acid, various forms of salicylates, sodium chlorid—all may be used to counteract a certain chemical ingredient present in the saliva, so that the drug must be selected purely on this basis.

As stated before, I have seen several cases relieved by the administration of sodium chlorid, others by the administration of benzoate of soda, others by boric acid, and so on through the list, after first increasing elimination as much as possible, through the skin and intestinal tract. The patient should always be instructed to drink plenty of water. Following this basis, I have, without any application whatever to the nasal mucous membrane, succeeded in, as I have said before, about 60 per cent. of the cases. The other 40 per cent. I have been unable to relieve by either local or systemic remedies, and was also unable to analyze and separate the irritant and the secretion. Whether these 40 per cent. belong to some other type of cases I do not mean to say, but I do wish to make it emphatic that the cases relieved passed through the attacks year by year by taking the

medicine before the onset and occasionally during the period in which they have suffered from the hay fever. Some cases extended back over a period of eight to ten years, and others varying down to the last year.

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DISCUSSION

ON PAPERS BY DRs. KYLE AND CURTIS.*

DR. J. SOLIS-COHEN, Philadelphia, stated that he agrees with those who think that hay fever requires first, a nervous temperament; second, a want of elimination of the natural secretions, autointoxication, one might say; and, third, the irritant. There are very few poor patients who suffer with this disease, unless they happen to be servants of the rich who suffer a good deal, and are thus exposed. Hay-fever patients live in overheated houses, wear too much clothing, and in that way a great many things which should be eliminated remain in the system. Many public individuals who are prominent members of the Hay Fever Association and who have means to go away and get rid of the source of irritation, are men of intense cerebral energy. The nervous system has a great deal to do with it. Many patients with deformities of the nasal passages never have hay fever, while, on the contrary, many patients with hay fever have no nasal deformity. The deformities should be corrected as a matter of course, then every disturbing element possible removed from the patient. Dr. Solis-Cohen advised letting the patient wear light clothing, no more than is comfortable, and giving not a bite of food more than is necessary to keep from being hungry, avoiding highly dressed meats, and so on. To ease the air passages give a little lubricant night and morning; it will give comfort and supply the loss of the natural lubricant. There are many peculiarities of hay fever. Dr. Solis-Cohen mentioned the case of a patient, a prominent man in Philadelphia, who lived in the country thirty miles from the city. One year, when suffering a good deal, he had occasion to go down into the cellar, and at once found relief. This occurred several times, and eventually the man built a little office in the cellar and remained comfortable during the season. Dr. Solis-Cohen had two other patients, prominent citizens, a wife and husband, both subjects of hay fever. The husband, a large coal operator, had a good deal of business in the coal regions near Pottsville. It happened that, when the wife was in Pottsville, she was free from hay fever and when the husband was there he had it. When the husband was in Philadelphia he was free from hay fever, and when the wife was there she had it. Consequently they had to be separated.

DR. GEORGE L. RICHARDS, Fall River, Mass., said that he has not used the Dunbar serum, but that nearly all his well-to-do patients have used it, because they tell each other of it, buy it in the open market and follow directions; and as a rule they report it a failure. He has found that combination of some simple things, while it does not cure hay fever, does something toward relieving the attack, whether the particular cause be in the elimination of the secretions or due to a hyperesthetic condition of the nasal mucous membrane, or the result of spurs or hypertrophy of the turbinates. The patient comes with a nasal discharge, can not breathe, wants immediate results; and a good many patients can not afford to buy the Dunbar serum. The thing which seems to be necessary to give the patient relief is to get air to the nose and to lessen the degree of secretion, and Dr. Richards has been trying to find a simple method which will do that. He has found that adrenalin chlorid in strong solution harms the patient; in weak solutions, so weak that when first used there is not much effect, it is good. He has used it in a non-irritating solution of 1 to 14,000. The patients can use that themselves, and they do not get the subsequent hyperemia. During the last two or three years he has used for office work a method which gives better results, and that is the use of the original Armour powder of suprarenal extract. He takes a small quantity, in the proportion of 1 to 4, adds thymol iodid and uses it as a powder in the nose, sometimes with a preliminary cocaineizing and sometimes not. The adrenalin powder heals

the congestion, whereas the thymol iodid is a pronounced astringent in the nose and the effect lasts many hours. Simultaneously with that he uses some of the old-time remedies, belladonna and atropin, to the extent of getting dryness of the throat. One of the many forms of coryza tablet contains quinin and minute doses of morphin. He occasionally uses a tablet, beginning with 1 to 500 of atropin, and tells the patient to discontinue as soon as the throat begins to get dry. He has the skin cared for, the bowels thoroughly emptied and all the bodily secretions in good condition. That does not exactly cure hay fever, but it gives the patient relief so that he does not have to discontinue work, and it seems to Dr. Richards the nearest approach to a rational treatment of the symptoms.

DR. EMIL MAYER, New York City, declared that in his opinion the whole gist of this subject lies in its etiology. The suggestion that certain conditions of the saliva may be a cause is certainly an important one, as is the suggestion, also, of a particular nervous susceptibility on the part of the patient. That is well shown by the fact that these conditions occur at certain times in the year. If a certain chemical condition of the saliva alone were responsible, without susceptibility to foreign bodies of some kind, why do not attacks of hay fever occur in midsummer? In this country and in Germany there is a marked difference. Dunbar, when he sent his serum to this country, was thinking of the kind of hay fever which occurs in Germany some time in May and ceases with the beginning of hot weather; while ours begins in the middle of August and ceases with frost. So there must be an underlying condition besides the condition of direct local irritation. Dr. Mayer was under the impression that hay fever was primarily a disease of the well-to-do until he began work in this direction, and had some newspaper notoriety that brought a number of people to his attention. One patient was a coupler in the yards of the New York Central Railroad, about as far away from the rich as any one could be. Another was a track layer, and almost all who applied to Dr. Mayer for treatment were so poor they could not pay for anything. He thinks that the ultimate result of all work done by others, as well as by Dr. Curtis, will be that eventually more than a single etiologic factor will be discovered, and then we will be on the high road to cure this distressing condition.

DR. H. W. LOEB, St. Louis, stated that some years ago he published the results of a considerable number of cases in which the Dunbar treatment was used. Since that time, as a matter of course, he has made careful observations of the cases treated then, and those coming on since. The patients with rose fever, which is similar to the hay fever of Germany, have all been relieved, at least all who have remained under his observation, by the use of the Dunbar serum. This is particularly noted in a number of cases under observation for three or four years in which the attacks had been regular until the serum was used. The next year after the treatment had been successful the patient came to the office once and was told to use the serum as he did before. In some instances Dr. Loeb experimented by having the patient wait until the attacks came on, but ordinarily suggested that the serum be used before the attack. This has reference to the June fever cases. In the fall fever the results have not been so good; even with the serum Dunbar prepared before he came to this country, the results were not so good as with the spring serum, so-called. The serum prepared from rye and other grass pollen was used. However, Dr. Loeb found a tremendous difference in the method of application, in the quantity that was used. The patient should be kept under observation so that only the minutest quantity of the serum be used. It is necessary that the individual dose be determined by the individual case. Dr. Loeb has found in the majority of cases the patients either were not getting any serum in the nose on account of the spurs or swellings, or were getting too much. The serum is irritative when the quantity is too great. Acting on that, he took patients who had secured the remedy and used it themselves with negative results, and by carefully adjusting the dose, using nothing else, he was successful in many of the cases. He believes that the final word has not been spoken. He does not believe that the serum as now made

*The paper of Dr. Curtis appeared in THE JOURNAL July 13, 1907.

is expected to be successful on account of collateral features. He thinks that enthusiasm on the part of the physician has much to do with the case. It may be that is what cures the patient.

DR. GEORGE N. JACK, Buffalo, N. Y., said that he has done some original work along these lines, and while somewhat encouraged, yet he has found a great many discouraging features. He has worked with the idea that hay fevers are constitutional diseases, and that the local irritation and local condition is of minor importance, and he is receiving some support. He considers that hay fever is asthma of the mucous membrane of the head or nose and throat, and that asthma is the same condition carried down into the larger air tubes. It is not the fault of the mucous membrane; the fault is in the blood. The saliva has nothing to do with it. The normal secretions are altered when a person has hay fever, but that does not make hay fever. The altered condition of the secretions and the saliva, like the analysis of the urine, teaches a great deal, but it does not teach that the condition arises from the pollen itself, and it never will. Dr. Jack agrees with Dr. Kyle that the saliva in these secretions comes from the blood. If a physician knows the cause of a condition he can go ahead and give the patient an intelligent prognosis.

DR. FRANK M. CUNNINGHAM, Macon, Ga., said that if it is admitted by the maker and originator of the Dunbar serum that it is not yet in a perfected state, then we can accept the condition. The fact is, he said, that in every medical journal the Dunbar serum is advertised as a positive cure for hay fever. The position should not be taken by this Section that approval is given to this product, when it is not, and while the product is an unfinished, imperfect affair.

DR. CULLEN F. WELTY, San Francisco, said that as predisposing factors in the causation of hay fever he would mention first, pathologic changes, particularly of the middle turbinate; second, malformation; third, systemic disease and its influence on the nasal mucous membrane. In all these conditions the mucous membrane is more or less inflamed, and is made more susceptible by anything of an irritating nature in the atmosphere. About five years ago, while in Vienna with Hajek, he wished to do some experimental work with Dunbar's pollutant. Hajek said that they had no hay fever there; however, there were patients who had symptoms similar to those of hay fever. They all had pathologic changes or malformations, and when these were corrected the patients made uninterrupted recoveries. The climate of Vienna is similar to that of the middle West, and Dr. Welty can not see why the same conditions should not prevail. In San Francisco he has had a few patients with symptoms similar to those of hay fever. In every case he has seen the symptoms entirely relieved by removing the cause. He is of the opinion that the majority of the so-called hay-fever patients have a pathologic lesion, malformation or adenoid tissue, which leaves the nasal mucous membrane much more susceptible to any form of irritation. In those cases in which he has not been able definitely to locate one of the aforesaid conditions, he has removed the anterior half of the middle turbinate, in the hope of uncovering something. At times islands of tissue have made their appearance and were removed. At other times the middle turbinate so impinged on the lateral wall of the nose as to cause the trouble. In all the cases with which he has had to deal the recovery was complete. However, he does not believe that the aggravated forms of hay fever are found in San Francisco.

DR. D. BRADEN KYLE, Philadelphia, said that in a paper which he read at Boston, and in one read at Washington, the effects of climate and changes in altitude are fairly well explained. He believes that there is no one cause of hay fever, but a number of underlying causes. The condition is said to be more aggravated in patients of the neurotic type, but he does not think so. He has seen the worst hay fever in a cold-blooded man who was not a neurotic in any sense, and he has seen it almost if not quite so bad in a patient of neurotic temperament. What, he asked, is the underlying cause? Is it ragweed, the fumes from animals, or roses, or hay, or what? The line of work he is trying to follow out is to find not one cause, but a number of underlying causes, for that gross condition known as hay fever or hyperesthetic rhinitis. Probably

when the underlying cause is reached a great many more names will be added.

DR. H. HOLBROOK CURTIS, New York City, said he has spent much time in an analysis of hay fever trying to get an intelligent explanation of his own failures, and also of the peculiar conditions in regard to the Dunbar treatment, because from some sources he has received the most fulsome letters saying that every case in which the patient was operated on was a perfect success. Then the next might state that in twenty cases there was not a single success. Dr. Curtis has had 8,000 replies to letters sent out in regard to his fluid extract of ambrosia, which has given him remarkable confidence. At first 60 per cent. were favorable, but in the end the thing sifts down and he sees that the effect of suggestion is so great that he has come to consider the climatic treatment of hay fever the only reliable and sensible one. The secretions of the mouth are different in disease. The secretions of the parotid glands are different from those of the sublingual gland. It is known that hay fever changes these secretions, but it is not known that these secretions as changed cause the condition which produces hay fever. Other things also change these secretions. There is a susceptibility, but is it of the secretions or the system? This is a remarkably interesting subject, he said, and the more one studies it the less he knows about it.

SLOW FEVER.*

H. F. HARRIS, M.D.

ATLANTA, GA.

Synonyms: Typho-malarial fever; simple continued fever; remittent malaria fever; Willaccochee fever; continued fever; bilious fever; typhoid fever.

Definition: A continued fever occurring almost exclusively during the warm months and lasting from one to ten weeks.

From the above list of names, by which this disease has at times been designated, it will be seen that there has been in the past most divergent views as to its causation and real nature. Many physicians living in the swampy regions of southern Georgia maintain that this affection is but a severe form of malaria, while others of equal capacity and intelligence are quite as positive that it is a mild form of typhoid fever; there are not wanting still others equally as capable who hold that the malady is neither one nor the other, but is a separate and distinct disease. These varying views have been maintained by their several advocates probably since the settlement of the country, but proof of their truth has been, so far as I am aware, based only on the clinical aspects that the disease presents and, more recently, on blood examinations for the malaria parasite.

The subject is then seen to be at present in a hopelessly confused state; there was no possibility of an agreement being reached except by actual proof of the truth of one of these opinions by the demonstration of the causation of the disease in question. With this object in view the present investigation was undertaken.

METHOD OF OBTAINING DATA.

It is much to be regretted that the assistants who aided me in this investigation comprised such a small working force that it was out of the question to secure full and complete clinical data in the cases of "slow fever" investigated. The material for the work was collected over a wide area embracing the entire southwestern portion of the state. In a number of instances specimens were sent by the physician in charge—the localities from which they were obtained being too inac-

* Read in the Section on Practice of Medicine of the American Medical Association, at the Fifty-eighth Annual Session, held at Atlantic City, June, 1907.