of the liver ducts are exposed to infection with possibilities of disastrous complications and secondary conditions. The operation is no longer simple, easy and safe. The question which the patient must consider is whether he can afford not only to continue to suffer from the gallstones but also to be exposed to the serious danger of liver duct infection or to the more remote but nevertheless possible chance of carcinomatous degeneration. In regard to jaundice, Dr. Mayo said that the history will usually show that there was more or less icterus at the time the stone passed into the common duct, although stones may remain in the common and hepatic ducts for years, without jaundice, giving manifestations of digestive disturbance. If the jaundice comes on without pain and does not change more or less in the early stages and especially if a tumor be present, malignancy is to be feared. With stones in the common duct the jaundice will be variable and changeable in the early stages, although later it may disappear entirely or become permanent from obstruction.

DR. J. J. HAMILTON, Caldwell, Idaho, related a case of a Scotchman who had some trouble with his gall bladder. A surgeon operated on him and removed 9 gallstones. Several others coming away from the wound from time to time a year later, the gall bladder again swelling up. The patient requested a young physician to operate on him without an anesthetic, and he refused to do so; the Scotchman returned home and operated on himself with a pocket knife. He removed several stones, made a good recovery and has since remained well.

DR. JACOB FRANK emphasized the importance of taking up liver surgery and putting it on a plane with appendicitis. In all the experiments on dogs there was no attempt to control hemorrhage, but he does not know how this would be in the human being. If there was a tumor situated somewhere along the lower border of the liver, and the operation was done quickly he does not think that there would be any danger to the patient. The dogs showed no signs of anemia. It is strange that there should be very little hemorrhage in liver operation. It looks like a great deal, but it is not, and simply bringing the flaps together controls it. Dr. Grile has explained to Dr. Frank why this is, stating that the blood pressure is very low in the liver. In bringing the edges together the capsule of Glisson is brought together.

DR. W. D. HAGGARD said that when patients state they have passed gallstones, particularly those patients who have had the olive oil treatment, he always insist on seeing the stones, as these so-called olive oil stones are very frequent. The mortality is about 2 per cent. in stones of the gall bladder, and about 1 in every ten when the stones are in the common duct. It is not so much a surgical condition as one of cholemia. Operations should be avoided in acute obstruction of the common duct. Safety lies in the excellent preparation of the patient by preliminary treatment. Dietetic and other means must be employed, and the operation should be made a surface operation. If the gall bladder is used as a tractor, it is practically a surface operation.

DR. D. S. FAIRCHILD declared that it is the experience of many that some of the most serious difficulties arise in the cases in which there are no stones; the cases in which the infection extends from the gall bladder to the liver and pancreas, although this applies to only a very small percentage of cases. It should not be assumed that there are gallstones simply because symptoms are present which are referred to the stomach and gall bladder.

The "Vestiaire" of the Hospitals.—This is the name of a French society which recently held its first annual meeting. It was organized for the purpose of supplying comfortable and respectable clothes for persons just dismissed from the hospitals. As a rule, the poor reach a low ebb in their fortunes before they decide to enter the hospital, and they are financially stranded when they leave it, which interferes with their finding employment. The society already has over 4,000 members, and has collected 12,000 garments and a capital of nearly \$4,000. Subscriptions and gifts of clothing are sent to the central office at Paris, rue de Grenelle 42. Debove, dean of the Paris faculty, is president of the new society.

SURGICAL BACTERIOLOGY OF THE MOUTH.*

A. H. LEVINGS, M.D.

MILWAUKEE, WIS.

In this section, devoted as it is to stomatology, I think that we all must admit that the bacteriology of the mouth should play an important rôle. The subject is of importance to the physician because here we find local manifestations of many constitutional diseases, such as influenza, diphtheria, smallpox, varicella, measles, scarlet fever, tuberculosis, syphilis and scurvy, in some of which at least the specific micro-organisms may be found in the oral cavity. There are also a variety of pathologic processes which occur within the mouth or adjacent bones, many of which are due to pathogenic micro-organisms. Among these may be mentioned tuberculosis, actinomycosis, osteomyelitis, thrush, anthrax, erysipelas, ulcerative and gangrenous stomatitis, pyorrhea alveolaris, and caries of the teeth. To any one who is doing mechanical or surgical work within the mouth the subject is of interest because of the frequency and variety of germs encountered, and, as is well known, these germs may at any time, unless precautions are taken, infect the wounds made. This fact I have seen most painfully and forcibly illustrated by the death of two patients from a most virulent pyogenic infection following the extraction of a tooth.

With the inspired air, with the food and drink taken from our fingers and from foreign bodies introduced into the mouth, a great variety of pyogenic and pathogenic germs gain an entrance to this cavity. The natural warmth and moisture of the mouth, as well as the organic matter so frequently present, then make it a most favorable site for the growth of bacteria. This is true even in healthy persons who do not properly cleanse their mouths, but especially so in those whose oral cavity is the site of some pathologic process.

A very commendable work has been done in the bacteriology of the mouth by a number of investigators. Among these may be mentioned Miller of Berlin, Vignal, Fluegge, Sanarelli, Netter and others. These results have not been uniform, as one might readily expect, for even in the examination of healthy mouths there is a wide difference in the bacterial contents.

For the purpose of carrying on these investigations, the subject was divided into five parts. The first class included clean mouths; the second, ordinary kept mouths; the third, filthy mouths; the fourth, tobacco chewers' mouths, and fifth, mouths in which there were distinct pathologic processes.

In the examination of the first four groups, one hundred swabs were taken from different individuals, dividing them as equally as possible into the different groups. The first twenty swabs were taken from mouths which were sweet and clean and in which the teeth were well preserved and clean. These swabs were washed in a normal salt solution and then used as a medium for further study. First hanging drops were studied. In all instances the hanging drops showed thousands of bacteria of different forms and shapes. Micrococci were found in all of the mouths examined. These varied somewhat in size and number; the most frequent were staphylococci, which were present in every case examined, and in 15 of the 20 cases examined *Micrococcus tetragenus* was found, while in 6 of the cases sarcinae were discovered; of the bacilli, all shapes and sizes

* Read in the Section on Stomatology of the American Medical Association, at the Fifty-sixth Annual Session, July, 1905.

were found. Some of these were motile and others non-motile. Some of them were spore-forming and others non-spore-forming; of the spirillæ, both long and short were found. These salt solutions were then plated on agar and gelatin and incubated for further study. On all of the plates the colonies were too numerous for study and it was found necessary to make dilutions of 1 to 100 in order to get the colonies fewer for individual study. These colonies were stabbed off and agar, bouillon, gelatin and Dunham's solution, lactose and glucose bouillon, fermented tubes, lactose and glucose agar shake culture made, besides milk and litmus gelatin. By a minute study of these cultures it was shown that thousands of bacteria noted in the first examination were innocuous and that all but the streptococci (noted in two cases); *Bacillus coli communis* (found in three cases); *Bacillus subtilis*, *Staphylococcus* (found in all the cases), and the *Micrococcus tetragenus* (found in fifteen cases, were non-pathogenic. Of the non-pathogenic germs a large number were acid and gas producers. Many, though, were species of putrefactive bacteria. There were also a large number of micro-organisms which could not be identified, but which seemed to correspond with those described by Professor Miller of Berlin.

THE ORDINARY KEPT MOUTHS.

In making a study of thirty of these cases, they were found to differ from the well-kept mouths by the fact that the micro-organisms were much more numerous. This was especially marked where small pieces of putrefactive matter were present in the cavities of decaying teeth. The majority of micro-organisms in these cavities were, however, putrefactive germs, and, as they grow with great activity, they may kill out the other germs. In two of the thirty cases the bacillus of influenza was also found.

THE STUDY OF FILTHY MOUTHS.

In the majority of these cases there were pathologic processes going on in the mouth, such as decayed teeth, suppuration of the gums or small ulcers. In two cases thrush was present. In all of these filthy mouths millions of bacteria were present and a much larger per cent. were virulent. The pneumococcus was present in ten of the thirty cases. In the cavities of decaying teeth large numbers of acid producers and putrefactive bacteria were present. In the cases of pyorrhea large numbers of both *Staphylococcus pyogenes aureus* and *albus* were found. In three cases of abscess *Staphylococcus pyogenes aureus* was demonstrated. In two of these there was also *Staphylococcus pyogenes albus*, and in one *Staphylococcus pyogenes citreus*. In a large number of these mouths *Micrococcus tetragenus* was also present. In a great many cases putrefactive germs were well pronounced and gas formation very marked. The foul breath in these individuals is probably due to these obnoxious gases given off by the activity of these germs.

TOBACCO CHEWERS' MOUTHS.

An examination of these cases shows that the tobacco chewer's mouth is more filthy than the ordinary filthy mouth. The examination also shows that the tobacco had no restraining influence on the growth of bacterial activity. The majority of these mouths were pathologic and contained decaying teeth, small ulcers and suppurating processes about the teeth. It was not apparent that the tobacco was the cause of the decay, only that the individuals were less careful of the condition of their mouths.

BACTERIA SPREAD BY COUGHING.

Examinations were made to determine the number of bacteria thrown from the mouth in ordinary conversation, forced, explosive expiration and in coughing.

A plate exposed for two minutes just in front of the mouth during ordinary conversation showed 235 colonies. A plate exposed for one minute at the distance of five feet during forced expiration showed 105 colonies. A plate exposed for one-half minute at the distance of five feet during explosive expiration showed 192 colonies. A plate exposed at a distance of ten feet showed 35 colonies after five forcible coughs. A plate exposed at a distance of 20 feet showed a development of 23 colonies after ten forcible coughs. These examinations were made in a bathroom which had no ventilation and was practically free from germs, so that a plate exposed for five minutes in quiet showed the development of but three colonies. In other experiments plates were exposed at the distance of five feet and coughed at five times forcibly with one, two and three thicknesses of gauze in front of the mouth. The plate exposed with one thickness of gauze in front of the mouth showed a development of 156 colonies. The plate exposed with two thicknesses in front of the mouth showed a development of 35 colonies, and the plate exposed with three thicknesses in front of the mouth showed a development of 8 colonies.

EXAMINATION OF BACTERIAL CONTENT OF SPECIAL PATHOLOGIC PROCESSES.

CASE 1.—A child 3 months old. A swab was taken one day after an operation for hare-lip, before cleansing the mouth. The swab showed the presence of *Staphylococcus pyogenes aureus* and *albus* and the *Micrococcus tetragenus* in large numbers. There were also many non-pathogenic bacteria. After the mouth had been cleansed by washing it out with peroxid of hydrogen in water, 1 part to 3, a swab was taken which showed the *Staphylococcus pyogenes aureus* still present, only in much fewer numbers.

CASE 2.—Epithelioma of the lower lip. Swab taken before cleansing showed *Staphylococcus pyogenes aureus* and *albus* and *citreus*, the *Streptococcus pyogenes* and large numbers of putrefactive germs, as well as many non-pathogenic bacteria. After a thorough irrigation with normal salt solution, a swab was taken which showed an absence of the streptococcus; the diminution in number of the other germs, although they were still present in great quantities.

CASE 3.—Carcinoma of the upper jaw producing ulceration of the gums. A swab taken before cleansing shows a large number of acid producers, putrefactive bacteria, *Staphylococcus pyogenes aureus*, *albus* and *citreus*, a number of streptococci and *Micrococcus tetragenus*. Large numbers of fungi of different kinds were also found on this swab. The swab taken after irrigation with normal salt solution showed little improvement in the bacterial content of the mouth.

CASE 4.—Epithelioma of the tonsil. Swab taken before cleansing the mouth showed thousands of bacteria of all kinds and shapes. There were present the *Staphylococci pyogenes aureus*, *albus* and *citreus*, large numbers of *Streptococci pyogenes* and also the pneumococcus. The swab taken after the cleansing with normal salt solution showed a great reduction in the number of germs, but the pus cocci were still present in small numbers. The pneumococcus could not, however, be demonstrated.

CASE 5.—Epithelioma of the cheek. Swab taken before cleansing showed a great number of germs of all sizes and shapes and also a great number of fungi, including yeast fungus. The majority of these germs were putrefying bacteria. The pus germs in this case were present, but not so numerous. After an irrigation with one-half gallon of normal salt solution through a fountain syringe, the swab taken

showed but few pus cocci, while the putrefactive germs and the fungi were greatly reduced in number.

CASE 6.—Sore mouth in child. Swab taken before cleansing showed numerous bacteria, some of which I was unable to identify. There were also large numbers of actively motile bacilli, as well as acid and gas producers. After cleansing with a mild antiseptic, but very few bacteria were found.

CASE 7.—Sore throat. Swab taken before cleansing showed numerous staphylococci and long threads of streptococci. The swab taken after gargling for five minutes with a teaspoonful of an antiseptic solution in a small glass of water showed very few pus germs and these seemed innocuous, for they would not grow on culture media.

CASE 8.—Acute pharyngitis. Swab taken before cleansing showed a large number of staphylococci, streptococci, also the bacillus of influenza and Friedlander's bacillus. Swab taken after cleansing with antiseptic gargle showed numerous staphylococci and streptococci, but these seemed innocuous, as there was but a single, thin growth of *Staphylococcus pyogenes aureus*.

CASE 9.—Canker of the mouth. Swab taken before cleansing showed numerous forms of bacteria, including staphylococci and a large branching fungus. Swab taken after cleansing with peroxid of hydrogen was negative.

CASE 10.—Patient had had both tonsils removed several days before examination. Swab taken before cleansing showed great masses of staphylococci and streptococci. The streptococci could not be cultivated. The staphylococci on cultivation proved to be *Staphylococcus pyogenes albus* and *aureus*. Swab taken after cleansing with peroxid of hydrogen showed only a small number of staphylococci which were grown with great difficulty and did not fully regain their power or growth until they were transversed three times onto fresh nutrient agar and incubated at 37 degrees.

CASE 11.—Girl, 19 years of age. Patient has consumption and several cavities in one lung. Swab taken before cleansing mouth showed a large mass of bacteria, pus cells and epithelial cells. A simple covered glass smear stained for tubercle bacilli showed them to be present in large numbers. Besides, there were large groups of staphylococci and long threads of streptococci. There were also numerous ordinary forms of bacilli and fungi. The presence of pneumococcus was demonstrated. The swab taken after cleansing the mouth and throat with antiseptic showed staphylococci and streptococci, a few tubercle bacilli together with some pus cells. These germs, however, could not be cultivated.

CASE 12.—Girl, aged 10 years. Part of tonsil, soft palate and part of posterior wall of pharynx covered with an adherent, grayish-white membrane. Swab taken before cleansing showed, besides numerous other bacteria, the presence of the bacillus of diphtheria. Swab taken after brushing with peroxid of hydrogen and then cleansing by gargling with a teaspoonful of peroxid in a glass of water showed numerous bacteria, including staphylococci and many bacilli, but none of them would grow.

CASE 13.—Pyorrhea alveolaris. Swab taken before cleansing showed, besides large numbers of bacteria, most of which were gas and acid producers, the presence of masses of *Staphylococcus pyogenes albus* which was grown in pure culture. Swab taken after cleansing with lysol showed but very little change except in numbers, the bacteria growing quite as well after the cleansing as before.

CASE 14.—Swab taken from a cavity in a carious tooth showed a great mass of bacilli and fungi. On cultivation, the bacilli were found to be composed of masses of the proteus group, of which the *Proteus vulgaris* was isolated and the *Bacillus acidi lactici* obtained in pure culture.

CASE 15.—Sarcoma of the lower jaw with very little ulceration. Swab taken before cleansing showed, besides masses of pus cells and epithelium, large amounts of disintegrated tissue, also large quantities of bacteria, staphylococci and streptococci. The two latter seemed, however, to have lost a great deal of their virulence, for the putrefying germs soon outstripped them in growth. Swab taken after imperfect cleansing with a carbolic solution still showed the presence

of bacteria of different sizes and kinds, but they would not grow, owing probably to the presence of carbolic acid.

CASE 16.—First stage of pyorrhea. The swab taken before cleansing showed considerable blood and enormous masses of bacteria of all descriptions. These included *Staphylococcus pyogenes aureus* and *albus*.

CASE 17.—This patient had his lower jaw resected two days previously on account of a sarcoma. Swab taken before cleansing showed masses of pus cells and epithelium, also masses of bacteria of all shapes and sizes, together with long threads of fungi. There were *Staphylococcus pyogenes albus*, also *Micrococcus tetragenus* and *Bacillus pyocyaneus*. A swab was taken after cleansing by rinsing with an antiseptic solution, and showed some diminution in the number of microorganisms.

CASE 18.—Same patient. Swab taken before cleansing four days after operation showed about the same condition as previous instance, but the swab taken after thoroughly syringing the mouth with peroxid of hydrogen and then washing out with a normal salt solution showed no visible growths.

A study was then made of the comparative number of bacteria present in healthy mouths before and after different methods of antiseptization.

First.—Thoroughly scrubbing the gums with a stiff brush and warm soap water, afterwards rinsing thoroughly with a normal salt solution and rubbing with a sterile gauze from two to five minutes. This will render the mouth sterile in two out of five cases and will reduce the number of germs in the other mouths from thousands to only a few colonies.

Second.—Rinsing the mouth with mild antiseptics, such as boracic acid, thymol, 30 per cent. solution of alcohol or a weak solution of chloroform. It was found that simply rinsing the mouth had little effect on the bacterial content. This seemed to be due in a large measure to the secretions of the mouth, which come rapidly and neutralize the antiseptic used. If the mouth was first scrubbed well and then an antiseptic used, a practically sterile condition was obtained.

Third.—Disinfectants were next tried and the mouth thoroughly rinsed with either 1 per cent. carbolic acid solution or 1 per cent. solution of formaldehyd or a solution 1 to 10,000 bichlorid. After the rinsing, the mouth was scrubbed, using the normal salt solution, the result was found to be practically the same as in Number 1, that is the mouths were rendered practically sterile.

SUMMARY.

In twenty examinations of clean mouths, the greatest number contained staphylococci, 15 *Micrococcus tetragenus* and 6 sarcinæ; of the bacilli, all shapes and sizes, both motile and non-motile, spore-forming and non-spore-forming, and long and short spirillæ were found. Streptococcus was noted in two cases. *Bacillus subtilis*, *Bacillus acidi lactici* and *Bacillus butyricus* were also found.

In one instance *Bacillus prodigiosus* and in three *Bacillus coli communis* were found. In all the cases large numbers of gas and acid producers were found, also several species which could not be identified. In eight of the cases, the pneumococcus was found.

The study of ordinary kept mouths shows more bacteria than in well kept mouths, the putrefactive microorganisms being especially numerous. In two cases of this group the bacillus of influenza was found.

In the third group, the filthy mouths, are found many pathologic processes. In two there was thrush and the organisms of this disease demonstrated. In these filthy mouths millions of bacteria were present and a large

number were virulent. The pneumococcus was found in ten of the thirty cases. In the cavities of teeth large numbers of acid producers as well as a great many putrefying bacteria were found.

In the tobacco chewers' mouths, no new organisms were found. In two special pathologic conditions, the *Staphylococcus pyogenes albus* and *aureus*, and the *Streptococcus pyogenes* were found. The *Micrococcus tetragenus* was frequently present. Acid and gas producers, putrefactive bacteria, sarcinae and fungi were found. Numerous cocci, the yeast fungus, the bacillus of influenza and Friedlander's bacillus were isolated.

In diphtheria and in consumption the germs of these diseases were shown to be present in the mouth.

From the foregoing experiments, it is apparent that the number of micro-organisms, both pyogenic and pathogenic usually present in even healthy mouths is considerable. While in filthy mouths and in those which are the site of pathogenic processes, the number and variety of micro-organisms are greatly increased.

These experiments, though very incomplete, seem to indicate that mechanical means are most to be relied on in an effort to render the mouth sterile, and that the disinfectants, with a possible exception of peroxid of hydrogen, are of only secondary value.

DISCUSSION.

DR. J. MARSHALL, San Francisco, said that those having any experience in handling fractures of the jaw, note that about 90 per cent. of all compound fractures of the jaw suppurate. He has operated on those patients without any more disinfecting than washing out the mouth, but has learned from experience that if the mouth is thoroughly cleansed and all salivary deposit removed, and the mouth thoroughly washed with an antiseptic solution, the appliances put in, followed by antiseptic treatment throughout, it is possible to reduce very materially the number of cases in which there is suppuration after the injury. He performs many operations for fractures of the jaw by suturing the jaw, and when he first began he did it with fear and trembling, thinking that in all probability he would get infection through the openings in the bones for the wire sutures. At first he thought that he had, but later found that the trouble originated before that. In most of these cases the patient is not seen for from a few hours to several days after the injury, and infection has already taken place. In cases lasting but twenty-four hours, he has only had 4 or 5 per cent. following compound fracture. He emphasized the fact that if mouths could be kept absolutely clean, dental caries, pyorrhea, inflammations, gingivitis and stomatitis of any kind would be impossible. He does not think we have yet reached the point where we really understand the value of clean mouths. He thinks that if more time were spent teaching patients the value of prophylaxis more good would be done. The work should be begun with children. It would prevent much trouble later on. In his work in the presidio at San Francisco Dr. Marshall found the mouths of the soldiers in a most horrible condition. He had some placards printed and put up in public places "Clean teeth do not decay," and others, "Do not ask the dentist to treat your teeth until you have brushed them." The difference in the condition of the teeth of those men who were there for some time was surprising. Many of them had never owned a tooth brush. After educating them awhile they came with clean mouths and with less disease.

DR. G. V. I. BROWN, Milwaukee, said that in the first place it is an interesting fact, known perhaps, but not considered sufficiently, that if one had been performing a surgical operation in those several mouths and could not or did not use antiseptics, he would probably, so far as pus germs are concerned, have better results in the dirty mouth than in the clean one. With Dr. Brown it is a grave question sometimes how much or how little good antiseptic measures do. Until someone can demonstrate that it is not valuable to disinfect he, of course, will continue on that line, but if those who have

demonstrated that there are properties in this saliva or this mixed secretion that have a beneficial action in health, then of course it must be admitted that by the dilution of that fluid injury is done rather than benefit. Dr. Brown made some tests years ago in the following manner: Taking cultures from mouths that were not disinfected in any way—so-called dirty mouths—he, of course, got a great deal of bacteria. Disinfecting with bichlorid for a considerable time in some instances gave practically no result in cultures taken. Following this a solution of carbolic acid was used, stronger than he should want to use for operative purposes, and some essential oil, and after all this he was able to get growths from cultures taken from the same mouth by scraping away some of the superficial cells; he found living germs underneath. He found that he could get good results by using peroxid of hydrogen, which is also a germicide, but is superficial. By using this and then a germicide, he got better results. Mechanical cleaning, H_2O_2 , and then a germicide gives the very best results. It is a foregone conclusion that a state of pure asepsis cannot be reached. Even if it were, at any moment it is likely to be disturbed by secretions of one kind or another. The only thing left to do, therefore, is to use as much mechanical force in cleansing as possible, and then to depend on the frequent use of dilute solutions of antiseptics and germicides.

DR. M. I. SCHAMBERG, Philadelphia, said that this paper should be a valuable adjunct to medical as well as to dental literature for the reason that it will recall the general surgeon to the urgent need for protecting the patient in laparotomies, brain surgery, etc., from infection from the mouth. Careful operators, who have spent much time in preliminary preparations are frequently seen to stand over a patient with open abdomen and describe the conditions there, and it is quite likely that they frequently cause infections with germs from the mouth.

DR. M. L. RHEIN, New York, said that Dr. Levings' views differ materially from our clinical experience with tobacco mouth. It has always appeared to Dr. Rhein that the consensus of views is that a tobacco mouth, other things being equal, will present a decidedly smaller number of colonies on examination than another mouth. It is known that however sterile the oral cavity is made the durability of that condition is extremely limited. The one practical point to Dr. Rhein has always been that with the average practitioner, whether he be distinctly a stomatologist or a medical man, failure in this respect is due to a lack of cleanliness. The advantage of a method approaching a condition of sterility as closely as possible is of undoubted value, and the whole point resolves itself into a question of time. The practitioner has not the time to devote to this purpose.

DR. G. V. I. BROWN, Milwaukee, declared that the value of experiments with regard to infection from mouths covered with gauze is far reaching. In clinics in some of the best institutions in this country, surgeons and nurses with rubber gloves may be seen and every possible precaution against infection is taken, and the surgeon, perhaps, may have a beard or moustache uncovered; at any rate his mouth has no special cleaning, and yet he will discuss the cause and talk right over the open abdomen. Some surgeons are more particular and do cover their mouths. The piece of gauze already prepared to drop over the mouth is advisable. Dr. Brown covers his face with several thicknesses of gauze. He thinks that this is a very important point and a great credit to the section.

DR. JOHN MARSHALL, San Francisco, stated that for the last few years in most of the large hospitals these precautions have been followed, the surgeons covered their mouths not only with one or two thicknesses, but with four or five, particularly when performing laparotomies.

DR. VIDA A. LATHAM, Chicago, asked Dr. Levings how he overcame the tremendous ingrowth of the sacromycetes group. Dr. Latham has just finished a number of experiments in the oral cavity and said that she has been practically overwhelmed with the yeast growth, and that the yeast organism is a prominent organism in the mouth. She also asked Dr. Levings what position he gives to the *B. coli communis*, and whether he is inclined to class it as an allied form to the streptococcus. It has been shown that the coli communis is allied to the pus

group. If this is so, this is a cause of peritonitis, cellulitis, etc.

DR. H. P. CARLTON, San Francisco, asked what is the use of having training schools for dental nurses if there are no medical dentists.

DR. A. H. LEVINGS stated his belief that the bacteriology of the mouth is better understood, as it should be, by the dentist than by the physician, and that the former is a better judge of the bacteriologic contents of the mouth than are physicians ordinarily. He is not aware of any experiments that bear out the statement that the tobacco mouth has fewer organisms than any other mouth. He believes that these arguments are advanced by persons who use tobacco. He classes *B. coli communis* simply as a pus germ—as a pyogenic germ—one of the germs that are most frequently to be dealt with in the intestinal canal and in the abdomen, and certainly it is largely a pus germ. It is the cause of nearly all the pus abscesses in the abdomen. Dr. Levings has found it in many cases in pure culture in abscesses about the appendix, intestinal canal and gall bladder. The yeast germ, he believes, is not found in sufficient quantity to interfere with investigations. If experiments prove anything, they prove that all mouths are filthy, in the sense that they contain pyogenic or pus-producing micro-organisms. In order to render a mouth reasonably aseptic, it is necessary to do something more than gargle or wash; it must be scrubbed out, and on this point he disagreed with Dr. Brown that after rinsing and gargling the mouth masses of bacteria can be scrubbed off from the gums. These particles of foreign materials containing the micro-organisms must be detached by mechanical means, and after that the mouth can be made aseptic and can be kept practically clean by the use of antiseptics. In the education of the dentist, Dr. Levings believes that there are many branches of medicine which are practically useless, and that the prospective dentist is the only individual to be considered. What is good for the dentist is going to be good for the public. When the dentist is properly educated, he is in a position where he can deal most satisfactorily with the public.

THE ORAL MANIFESTATIONS OF DIABETES MELLITUS.*

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Within the last twenty-five years, a vast amount of literature has been produced concerning the etiology, pathology and therapeutics of pyorrhea alveolaris, and, with it all, to-day we are about as far away from its true etiology as in the days of Celsus, who probably was the first medical writer to call attention to this ailment. To J. M. Riggs of Hartford, Conn., American dentistry is indebted for first calling the attention of the profession to this disease in 1869, although it must have been recognized by him as early as 1844. Rehwinkel is usually quoted as being the first (1877) to use the term pyorrhea alveolaris, a name which he borrowed from Albrecht of Berlin. This term, however, is of French origin and is employed for the first time in an article published by Toirac-Desirabode¹ in 1839, in which he speaks of the disease as *pyorrhea alveolodentaire*. Fauchard, in 1746, described this disease as a "kind of scurvy" and Jourdain (1778) seemed to be of the same opinion, although he more particularly emphasized the fact that a pyogenic destruction of the gingivæ and alveoli is concomitant with the other symptoms. Ever since innumerable names have been suggested by the various writers, usually christening the ailment according to their conception, with the most prominent symptoms, such as "cemento-periostitis" (Magitot), "arthro-dental gingi-

vitis" (Galippe), "gingivitis expulsiva" (Marechal de Calvi), "caries alveolaris" (Essig), "interstitial gingivitis" (Talbot²), "*atrophia alveolaris præcox*" (Baume), "phagedenic pericementitis" (Black), "syphilitic locolosis alveolaris" (Curtis), "caries alveolaris idiopathica" (Greve³), "caries alveolaris specifica" (Arkoevy⁴), "blennorrhea gingivæ," etc., etc. At the last Union meeting of the American Dental Societies of Europe, held at Basel in December, 1904, W. J. Younker of Paris suggested these two names: "Alveolitis calcophagia" and "alveolitis calcica."

For convenience sake, we may define pyorrhea alveolaris as a chronic destructive inflammation of the pericementum, with more or less necrosis of the alveolus of the affected tooth. The causative factors of the disease, according to Miller, may be classified as follows: Predisposing causes, local disturbances, and bacterial infection. The predisposing causes are such factors which lessen the resistancy of the tissues to injuries, viz.: constitutional or local diseases, metabolic disturbances, tuberculosis, rachitis, scorbutus, syphilis, locomotor ataxia, chronic dyspepsia, malaria, diabetes mellitus, metal intoxications, and other disturbances. Some of these enumerated diseases do not produce definite symptoms in the oral cavity; others, again, manifest themselves in the causation of a distinct form of pyorrhea alveolaris, which, according to some clinicians, is classed as a prodromal sign of the primary disease. This seems to be especially true of diabetes mellitus.

Diabetes mellitus is a disease of impaired nutrition. Faulty metabolism, resulting from the materially reduced power of the body to burn up grape sugar, is the causative factor. Postmortem examination of diabetics usually shows very few or no morbid changes of the organs, with the exception of the brain. The sequence of this inhibition of chemical changes in the body is the presence of sugar in the blood of the diabetic which results from the diminished destruction of the sugar, and, as a consequence of this incomplete oxidation, oxybutyric acid, aceto-acetic acid and acetone are formed, which, with the sugar, are excreted with the urine. The nervous system being the controlling factor of the chemical changes in the muscle tissue, it seems proper to suspect certain disturbances which originate in the central nervous system as the primary factor of diabetes mellitus, the more so as certain pathologic signs point in this direction. The fact is verified by performing the classical experiment of Claude Bernard, which consists in puncturing the floor of the fourth ventricle mid-way between the auditory and the pneumogastric nerves. Thus, an artificial diabetes, which is to say, passage of large quantities of sugar with the urine, is produced which may last for several hours. It is a long and well-known fact that pathologic disturbances of the pancreas are responsible for the production of diabetes; von Mering and Minkowski operated on more than fifty dogs, and, when the complete extirpation of the pancreas had been successfully carried out and the animals had survived more than twenty-four hours, well-marked and severe diabetes was produced. If small pieces of the gland remained, however, no symptoms of diabetes are manifested.

According to our present conception of oral pathology, we may take this axiom for granted: There is no

* Read in the Section on Stomatology of the American Medical Association, at the Fifty-sixth Annual Session, July, 1905.

1. Toirac-Desirabode: Gazette des Hôpitaux, 1839.

2. Talbot: Interstitial Gingivitis.

3. Greve: "Caries Alveolaris Idiopathica." Oesterreich. ung. Vierteljahrsschrift f. Zahnheilkunde, 1904.

4. Arkoevy: Caries Alveolaris Specifica Fulminans. Stomatologial Koziony, 1905.