

# Dominion Medical Monthly

And Ontario Medical Journal

Vol. XXXVI.

TORONTO, FEBRUARY, 1911.

No. 2

## Original Articles

### SALVARSAN (EHRlich - HATA'S "606"; DIOXY - PARADIAMIDO-ARSENO-BENZOL.)

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In recent years much has been done in the preparation and pharmacological study of organic drugs. The outcome of the work has shown that in many cases it is possible to foretell the pharmacological action merely from the examination of the structural formula of the drug. It has also been found possible to alter, in a fairly definite way, the pharmacology of a compound by the introduction of a certain radicle or group of elements into its molecule. Thus a substitution product in which the acetyl group  $\text{CH}_3\text{CO}$  is introduced differs pharmacologically, as a rule, in a fairly definite way from the compound from which it is derived. This is illustrated in the relations of acetanilide to aniline, aceto-salicylic acid (aspirin) to salicylic acid, aceto-phenetidine (phenacetine) to phenetidine, the acetyl derivative being in each case more analgesic and antipyretic in character. One might give many other illustrations of similar relations, all of which tend to show that there is frequently a fairly definite relationship between the structural formula of a compound and its pharmacological action. The study of these relations, which is called by some "chemico-therapy," is a very attractive one, and occupies the attention of many investigators, among whom may be mentioned Ehrlich and his co-workers, Hata and Bertheim, who have, for several years, been especially

interested in the preparation and pharmacological study of drugs which shall possess the power to destroy trypanosomes and spirochetes without injuring the organs invaded by the parasites. I may mention that the general belief that malaria, syphilis, sleeping sickness and other affections caused by protozoa were not amenable to treatment by immune sera was a strong incentive to Ehrlich to pursue the work, and the fact that quinine and mercury were effective in the treatment of malaria and syphilis respectively augured well for the outcome.

The remarkable advance which has taken place in recent years concerning the pathogeny of syphilis has proved of great value to Ehrlich and his associate investigators. In 1904 a new era was inaugurated by Schaudinn and Hoffman's discovery of the spirocheta pallida. Shortly after, Metchnikoff and Roux demonstrated that syphilis could be communicated to apes, and later, Bartarelli found the rabbit was not immune to the spirochete. These discoveries made it possible to study the action of any drug on the spirochete in a rational manner. In this connection the work of Wassermann, Neisser and Bruck on the serum reaction of syphilitic patients should be mentioned as their test, which is now known as the Wassermann reaction, made it possible to determine whether or not a drug was effective in its action.

We shall now mention some of the reasons why Ehrlich experimented with arsenical compounds. First, it should be stated that arsenic is not a new remedy in the treatment of syphilis. Donovan's solution has been in use for many years, and, more recently, but prior to the reports of Ehrlich and Hata, attention was directed to the organic compounds of arsenic. Wolferstan Thomas, Koch and other investigators showed that atoxyl, which is the sodium salt of para-amidophenyl arsenic acid, was valuable in the treatment of a disease allied to syphilis, namely, sleeping sickness. Salmon, in 1907, called attention to the value of atoxyl in the treatment of syphilis.

The study of atoxyl may be said to be the first step in Ehrlich's research. He soon found that its toxic action prohibited its general use in the treatment of syphilis. Other preparations of arsenic were then prepared and experimented with, but, although many were less toxic than atoxyl, none came up to Ehrlich's ideal until the six hundred and sixth was produced. This compound is dioxy-para-diamido-arseno-benzol (Ehrlich-Hata's "606"). According to the experiments of Ehrlich this can be administered to a syphilitic animal in sufficient quantity to destroy the spirochetes without injuring the host. In other words, using Ehrlich's terminology it

is parasitotropic, but non-organotropic. In human beings the results have been almost equally good, as there have been only twelve deaths in 12,000 injections of the remedy. Moreover, it is believed that most, if not all of these fatalities, could have been prevented by proper technique and care in the selection of cases.

REMARKS ON THE CHEMISTRY AND METHODS OF ADMINISTRATION OF  
THE REMEDY.

Dioxy-paradiamido-arseno-benzol is an unstable solid, insoluble in water. It forms salts with both acids and alkalines, although it is usually described as a base—in this review this custom shall be followed. The salt formed with hydrochloric acid, dioxy-paradiamido-arseno-benzol dihydrochloride is the medicinal remedy ("606"). Recently this has been patented and is sold under the name of "Salvarsan."

Salvarsan is a yellow powder, which, on account of being easily oxidized, is sent out in sealed tubes, from which the air has been replaced by an inert gas. It dissolves slowly but completely in water, forming a solution, strongly acid in reaction. This solution is very irritating and should not be used intravenously, subcutaneously or intramuscularly.

The base is prepared by neutralizing a solution of salvarsan with sodium hydroxide. The neutralization point may be determined by means of litmus paper, a one per cent. alcoholic solution of phenol phthalein. The latter indicator is colorless with acids and red with alkalies, so, if after adding one or two drops of it to a solution of salvarsan, the solution of sodium hydroxide is slowly added, almost drop by drop, the first appearance of reddish color of the whole mixture will indicate that the liquid is neutral. The precipitate is unstable and should not be kept for any length of time. It should not, of course, be given intravenously, but may be administered subcutaneously or intramuscularly. If perfectly neutral it does not as a rule cause pain, but its therapeutical efficiency is questioned on account of slow absorption of the remedy from the area into which it was injected.

A solution of the sodium salt of dioxy-paradiamido-arseno-benzol can be easily prepared by adding a solution of sodium hydroxide to salvarsan dissolved in water, until the precipitate which is first formed is just dissolved. The product is usually described as an alkaline solution of salvarsan. It may be administered intravenously, subcutaneously or intramuscularly.

The intravenous injection, properly administered, is painless, but the subcutaneous and intramuscular may cause severe pain and a good deal of inflammatory swelling of the part.

The time required for the excretion of the arsenic administered intravenously is about three or four days, which is shorter than that after a subcutaneous or intramuscular injection. Indeed, after an intramuscular injection an arsenic deposit may form, which may not be absorbed for several weeks, a feature which is made use of by some physicians who advocate an intravenous injection, followed after two or three days by an intramuscular injection.

The writer's personal experience in the administration of salvarsan has only been with the subcutaneous and intravenous methods. In subcutaneous injections a perfectly neutral mixture of the base in suspension was used. After the injections the patients complained of pain and stiffness in the part, but the distress was not so severe as to require an opiate. All the local symptoms disappeared in from one to two weeks. The intravenous injections were made with an alkaline solution. These were carried out without causing the least pain, except in one case, in which, during the administration of the drug a small quantity was injected into the tissues around the vein, causing considerable inflammation and pain in the part. From this experience, and also from information obtained from physicians and medical literature, I should judge that either the subcutaneous or intramuscular injection of an alkaline solution of salvarsan would cause a good deal of suffering.

*(To be continued.)*

## CARE OF THE TEETH.\*

Prepared for the Canadian Oral Prophylactic Association.

### HISTORICAL.

It is quite evident, according to researches made through the history of ages, that it has always been considered of more or less importance that the teeth, as well as other parts of the body, should be cleansed, in order that the individual might enjoy good health and the esteem of his fellows.

The earliest Chinese works on medicine show that eighteen hundred years before Christ some attention was given to the care of the teeth.

About 1500 B.C., some of the Hindu sacred works, as well as those on medicine, contained, among other laws of health, rules for the cleansing of the mouth after eating.

The early Romans, too, had knowledge of the advantages to be derived from the cleansing of the teeth. J. Grasset St. Sauveur, writing of these people in "L'Antique Rome," said: "In order to keep their teeth clean and white, they used a great deal of a certain liquid of curious composition. They knew the use of *small brushes* and toothpicks of gold, of silver and of quill." Jacob von Faulke, in "Greece and Rome, Their Art and Life," referring to the matter of growing old, says: "She resisted to the last, concealed her wrinkles, helped her figure with judicious padding, and replaced lost teeth by artificial ones of ivory, fastened with gold."

As early as the second century dentistry was a recognized art, but during the dark ages, with many other of the arts and sciences, it languished, and had it not been for the monks, to whom the later generations are greatly indebted for preserving records, it might have been lost sight of entirely. In fact, it is believed they did more or less to relieve suffering due to diseased conditions of the teeth.

With the exception of references to cleaning the teeth, history shows that about the only form of dentistry practised by the ancients was the restoration of lost teeth by artificial substitutes. In those times artificial teeth were very crude affairs, and the wearers were usually objects of ridicule. If the dentistry of to-day were not of such a high order we would probably take more care to preserve our natural teeth.

\*With acknowledgments to Dominion Dental Journal.

The profession of dentistry has made very decided progress during the past fifty years, and has now reached a high state of

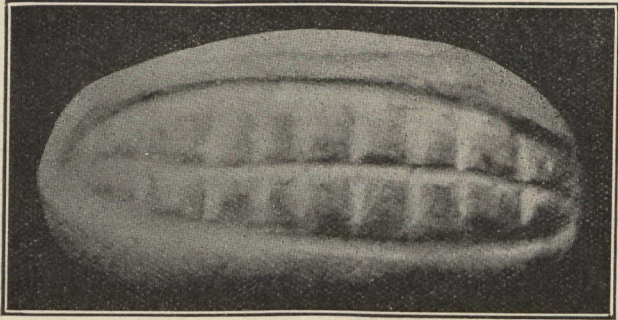


Fig. 1.—Worn behind the lips for appearance only.

perfection in the matter of repair of diseased teeth and the replacement of lost ones by artificial substitutes.

#### DENTISTRY OF THE FUTURE.

A great deal of attention is now being given by scientific men to the study of prevention of disease in all its forms, and much success has already been achieved along this line.

In dentistry to-day the trend of thought is especially directed toward prevention of decay and other pathological conditions by a system of cleansing of the mouth and teeth and the regulation of the quality of the secretions. Oral prophylaxis is the name applied to this particular branch of dentistry, which is receiving more and more attention each year. It is believed that in time the chief energy of the thorough and up-to-date dentist will be expended along this line, in order that destruction of the teeth may be prevented. He will take particular care, too, to instruct his patients in the best methods of caring for and cleansing their mouths and teeth. The dentistry of the future will be a preventive rather than a curative treatment.

As we become more enlightened upon the subject of cleanliness, we will begin to reap more fully the benefits of its practice; in fact, we are now able to control to a great extent the spread of disease, by vaccination against some forms, purification of drinking water, food, etc., prevention of accumulation of filth, and cleanliness of our persons and surroundings generally.

A great many forms of disease are caused by germs which enter the body, chiefly through the mouth, which latter has been aptly termed "the vestibule to the whole system." The members of

the profession of dentistry realize this fact, and are putting forth their best efforts to take advantage of the opportunity, which is theirs, as guardians of the mouths and teeth of the public, to not only prevent destruction of the teeth by caries, but also to control, in a large degree, many other forms of disease.

It is confidently anticipated that by the intelligent practice of oral hygiene more will be accomplished to prevent decay of the teeth during the next twenty years than in all the ages that have gone before.

#### FUNCTIONS OF THE TEETH.

The teeth have, among others, three most distinct functions, viz., mastication of food, assistance in articulation of words, and that of giving beauty and expression to the face.

**MASTICATION.**—This is the chief function of the teeth. The crushing of the food is not the only end accomplished in mastication, but during the process the glands situated in the mouth are stimulated to secrete large quantities of saliva; these fluids become incorporated with the food and perform the first step in digestion. If the teeth and other tissues of the mouth are in an unhealthy

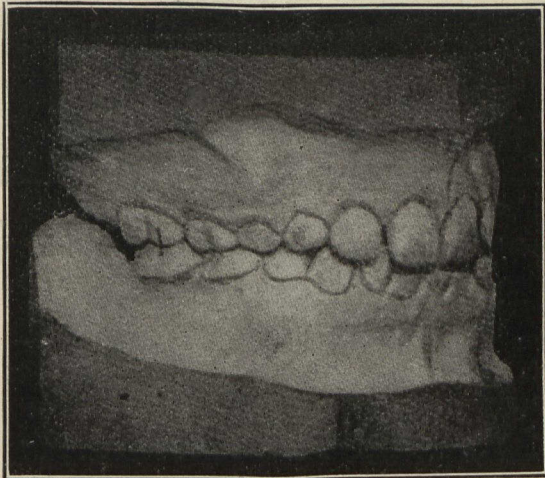


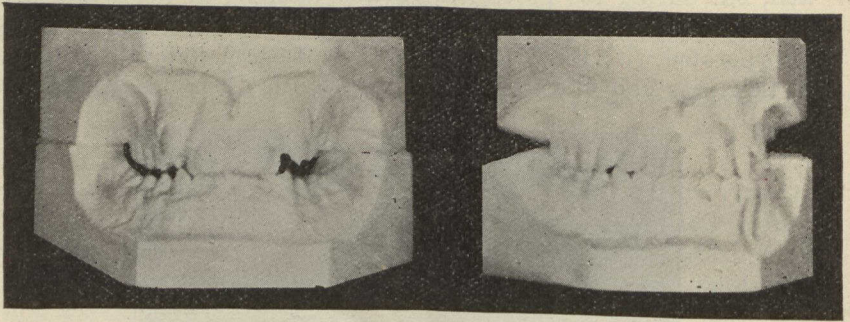
Fig. 2.—A normally arranged set of teeth.

state, their use is avoided, and the soft, pulpy articles of diet are chosen—those which will *slip down* with little or no mastication. In such cases the food is taken into the stomach without the normal quantity of saliva which is required in digestion. The food should be masticated until it is ground to the very finest consistency.

To give a little idea of what thorough mastication means, tender beefsteak should be crushed between the teeth about fifty or more times before swallowing; roast pork, thirty to forty times; tender chicken, thirty to forty times; bananas, which are usually bolted, and are very injurious on this account, should be chewed twenty times at least to give the salivary glands an opportunity to secrete sufficient saliva to help in digestion.

There is great power in the muscles of the jaws, some men being able to close their teeth together with a pressure of two hundred and fifty pounds. This power is there to enable the teeth to crush the food. Those people who have not such great strength in their jaws can develop it to a certain extent by thorough mastication, just as other muscles of the body are developed by exercise. Muscles in all parts of the human and animal anatomy are developed according to the demands placed upon them.

Mr. Fletcher's demonstrations of what can be done in the



Improper arrangement and closure of teeth.

Fig. 3.—Before correction.

Fig. 4.—After correction.

preservation of health and strength by mastication has gained the attention of the scientific world.

Digestion is dependent not only upon the normal working of the stomach, but also upon other organs of the body. If the food is clean, properly prepared and well masticated before entrance into the stomach, the other organs are materially assisted in the work of digestion, but if the food is bolted and not mixed properly with the saliva, it will not be thoroughly digested, and as a consequence, tainted breath, headache and a train of other ill effects will follow.

**ARTICULATION.**—The full complement of teeth in normally developed jaws is necessary for the distinct pronunciation of words, a matter of particular importance to public speakers and singers.

Nature is often interfered with in her work of development, resulting in malformations and irregularities of various kinds.



Cleft palate, for example, is a failure of the right and left halves of the upper jaw bones to unite in the median line; this leaves an opening between the mouth and the nasal cavity, and makes articulate speech and swallowing almost impossible. If the cleft is in the anterior portion of the bone, it may prevent the union of the tissues of the lip, a condition known as hare-lip, which is most disfiguring. Cleft palate is easily corrected in childhood by the



Fig. 5.—Cleft palate, before operation.



Fig. 6.—After operation.

surgeon, but may be remedied in some cases even in the adult. Where for any reason an operation to close the cleft cannot be performed, it is possible to have inserted by a dentist an appliance

which will cover the opening in the palate and improve articulation and deglutition.

Irregularity of the teeth also interferes with speech, particu-

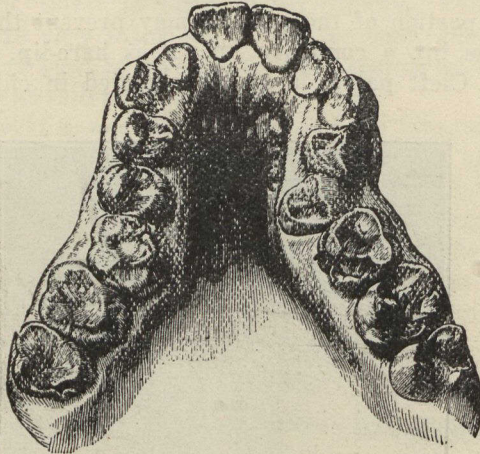


Fig. 7.—Narrow arch.

larly in those cases where the arch, or jaw, is very narrow. This narrowness of the arch is due also to lack of development of the bone. The work of correcting this condition is known as orthodontia, a science which has made rapid strides during the past

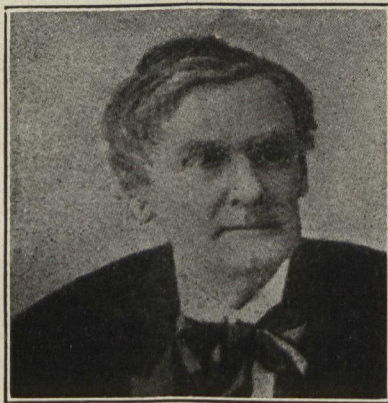


Fig. 8.—Depression of the mouth due to loss of the teeth.

ten to twenty years. In many of the large cities a few men are now devoting their whole time to orthodontia, but many dentists do more or less of it in their general practice. Irregularities of

the teeth should be corrected just as soon as they manifest themselves. The treatment is almost painless and fairly easy in the case of the child, but becomes more complicated and difficult as years advance.

The loss of even one tooth may affect the speech somewhat, and the result of the extraction or decay of several is sure to be disastrous. The posterior teeth are really more valuable than those in front, perhaps not from the standpoint of appearance or articula-



Fig. 9.

Fig. 10.—Typical mouthbreather.

tion, but in general usefulness. Their loss, too, has more effect upon the face than most people realize.

EXPRESSION.—No organ, or set of organs, has greater effect upon the expression of the face than the teeth. If they are decayed or irregular, an otherwise beautiful face may be marred very decidedly. King Solomon, whose court was the home of fashion and beauty, alluding to beautiful teeth, said: "Your teeth are like a flock of sheep, even shorn, which comes up from the washing." Ovid, a Latin poet, recommended as an antidote to love, "to make her smile who has bad teeth." He also said to a young lady, "I

can perceive your attention to the graces by the whiteness of your teeth."

The cleanliness of our teeth is indicative of our tastes. A particular charm in many faces is the regularity and beauty of the teeth, giving to the mouth a natural and pleasing expression. If any are lost, or do not lock correctly with their antagonists when erupting, the natural development of the entire structure will be interfered with and irregularity will follow, changing more or less the whole expression. When a tooth is lost, those adjoining gradually tip into the space, and soon their usefulness is interfered with; it is this shifting of the teeth which often causes an irregularity. There is a correct position in the dental arch for each tooth, and if

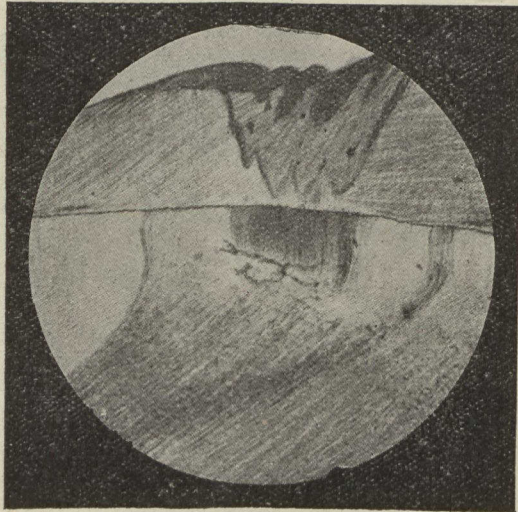


Fig. 11.—Decay of Dentine, the dark parts show masses of bacteria.

from any cause even one is misplaced, it is liable in time to affect the whole set. It is almost as great a loss to lose a tooth as to lose a finger.

Adenoids, an hypertrophy of the tonsil, situated at the back of the nose, a condition from which many children suffer, has often a very marked effect upon the teeth, and consequently upon the face. This enlargement of the tonsil closes the posterior openings of the nose, and the child is compelled to breathe through its mouth. If this abnormal respiration continues over a long period, the upper front teeth will protrude, and the lower lip roll in behind them. This disfigures the face very decidedly. The adenoids should be removed by the surgeon and the teeth drawn back to their normal

position by the orthodontist or dentist, so that the child can close its lips and breathe normally.

WHAT IS DECAY OF THE TEETH, AND WHAT IS THE CAUSE?

Dental caries is a disintegration or breaking down of tooth tissue, resulting from the action of certain species of micro-organ-

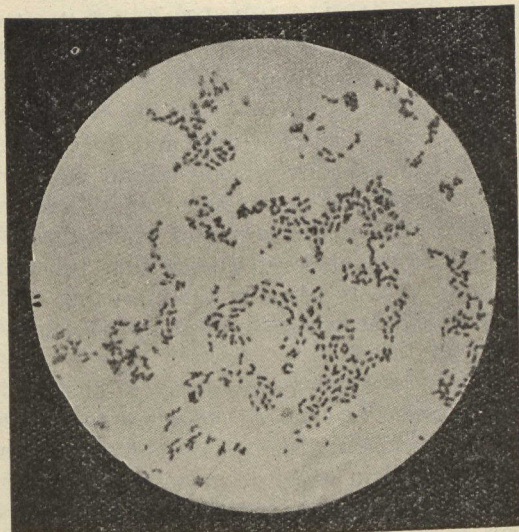


Fig. 12.—Germs of tooth decay, magnified 1000 times.

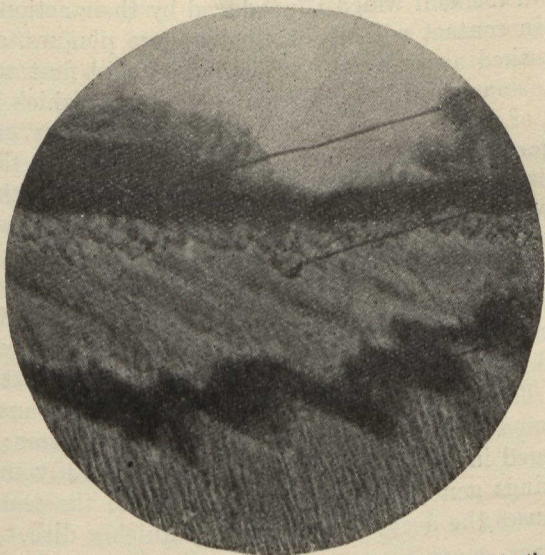


Fig. 13.—Showing Gelatinous plaque under which the acid dissolves the tooth structure.

isms. Tooth decay is persistent; it goes on very rapidly in some mouths, and more slowly in others, according to the condition of the secretions, the general health and the care taken in cleansing the mouth and teeth.

Neglect of proper cleanliness of the mouth is one of the chief causes of tooth destruction, as well as other diseases.

Each germ disease, whether it be decay of the teeth, tuberculosis, or any other, is the result of the action of specific forms of bacteria. The warmth, moisture and presence of food in the mouth make it a desirable habitat for germs. In the average mouth each drop of saliva may contain between four and five thousand germs, and in a neglected one as many as one billion one hundred and forty million micro-organisms have been found. In almost any mouth there may be present the germs of many diseases, such as diphtheria, typhoid fever, cholera, pneumonia, tuberculosis, etc., and yet if reasonable care is taken in the cleansing of the mouth, and the general tone of the system is kept up, the individual may never contract any of these.

The particular germs which cause decay of the teeth do so in this manner: They seem to attach themselves to the smooth surfaces of the teeth by means of little gelatinoid plaques, and if surrounded by a suitable soil in which to grow, such as a collection of food, and are not disturbed, their action upon the food causes the production of an acid. It is this acid which destroys the teeth. The colonies of germs cover themselves in with the plaques which they form, and the acid which is produced by their action upon the food is held in contact with the teeth by these plaques, and is not diluted or washed away by the saliva. The acid first softens the surface of the enamel and thereby makes it rough, which facilitates the lodgment of more germs and the food in which they grow. The destruction goes on until the enamel is penetrated and the dentine reached. This latter part of the tooth is less dense than the enamel, and is destroyed by the acid much more rapidly; a tooth which may have only an opening through the enamel large enough to admit the point of a pin, may have a very large cavity of decay in the dentine. The germs crowd into a cavity of this kind, and the food being constantly supplied to them, they grow luxuriantly.

Sweet and starchy materials form the best soil for the growth of bacteria. Their first action upon the food is to transform the starchy portions, such as bread and potatoes, into sugar; next the sugar is changed into an acid. It may thus be readily understood why sweet things generally are so destructive to the teeth, as the acid which causes the decay is formed very quickly direct from the sugar.

Lack of mastication is a cause of decay, as will be shown further on.

Biscuits, bread and butter, candies, etc., eaten by children at bedtime, without cleansing of the teeth afterward, are responsible for the destruction of millions of teeth.

#### WHAT ARE MICRO-ORGANISMS?

Micro-organisms, or bacteria as they are sometimes called, are not small animals, but are really species of the lowest forms of plants and require a soil in which to grow.

It is the function of the higher forms of plant life to build great structures, such as the forests, fruits, flowers, etc., and to the lower forms the arduous task of destroying them. These micro-organisms are everywhere to be found. Some species purify, to a certain extent, the water we drink, by destroying the organic substances in it.

The lower forms of plant life do not build largely as do the higher forms, yet they multiply greatly and change chemically—decompose—great quantities of matter that are built up by life, as exhibited in the animal and vegetable kingdoms, and return the materials again whence they came, generally speaking, to earth, air and water.

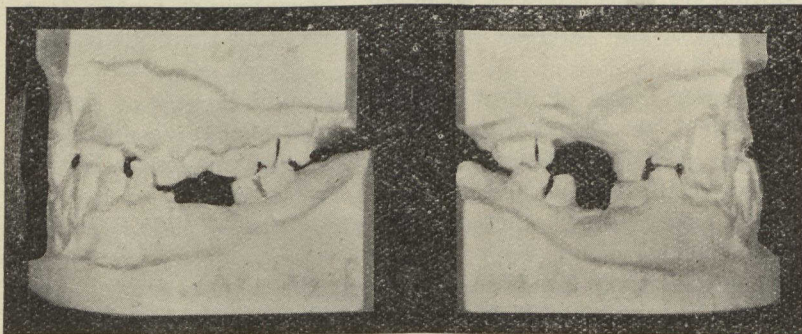
There are many gradations between the highest and lowest forms of plant life, and it is difficult to draw a dividing line between them.

Micro-organisms grow in organic matter. There are two distinct classes, those which generally grow only in dead organic matter, and those which grow ordinarily in living organic matter, such as in animals or plants. There is another division also, those that cause disease and those that commonly do not.

Each germ disease is caused by the growth of a particular form of micro-organism. Certain species will grow in man and some animals, and not in others. Cattle, for instance, may contract smallpox, but no other animal will, so far as known. None of the animals have typhoid fever, measles, and many other diseases so fatal to man, nor do any of the animals have destruction of the teeth by caries. Many of them have tuberculosis. If a person is exposed to a certain disease, and does not contract it, he is said to be immune, that is, there is something in his system which seems to protect him from this certain disease. The hog is immune to snake poison, the bite of a rattlesnake being of no consequence to that supposedly stubborn animal.

If a person survives an attack of what is known as a self-limiting disease, such as smallpox, typhoid fever, measles, yellow

fever, etc., he usually becomes immune to that particular disease. Children who survive diphtheria are immune for a time, but with this, as well as a few other diseases, immunity is not permanent. There are a few exceptions to this rule in some of the self-limiting diseases. This condition of immunity is brought about by the development in the blood, apparently by reason of contact with the particular virus, of an antidote to the poison which has produced the disease. If a person who is physically strong contracts any of these diseases, the antitoxin is developed very rapidly in the blood, the germs are thus prevented from growing, the patient recovers, and that antidote developed in the blood seems to remain usually throughout the life of the individual. If a person is already in



Figs. 14 and 15 show a case in which the temporary teeth in the lower jaw were lost too soon and allowed the first molars to tip forward. The dark lines indicate where the teeth should be.

delicate health, the system has not the power to cope with these micro-organisms and death comes more or less quickly as a result of their development.

It is possible, also, to become immune, or nearly so, to decay of the teeth, by continual battle against the germs which cause their destruction.

#### WHAT CAN BE DONE TO PREVENT DECAY?

The first requisite is that the mouth and teeth must be perfectly clean—the latter shining. *Cleanliness is the best known preventive of dental caries.* The teeth are not always perfectly formed when they erupt, and the development of the crown or exposed portion stops before they appear through the gum. The imperfections in the enamel, when any are present, are usually so small that they would not be noticed, except upon careful examination by a dentist. All defects should be repaired with fillings, and if there is any ir-



regularity of the teeth, this, too, should be corrected if at all possible.

If parents will take their children to competent dentists as soon as the temporary teeth have erupted, and see that every tooth is in perfect condition, then the little ones will have a fair start, and cleanliness will be the main factor thereafter in the preservation of the teeth. Of course it is desirable to have the teeth examined from time to time, in order that any new cavities forming may be repaired early, and to see also that the permanent teeth as they come along are erupting in their normal positions and are free from imperfections.

It is unwise to allow the first, or temporary teeth, to go to destruction without any effort at repair. The too early loss of these teeth is responsible for many irregularities. In order to get the very best results, the temporary teeth should be kept in perfect condition until their successors shove them out.

The most important teeth of the whole set are the first permanent molars, and these are often decayed beyond repair in the mouths of some children before a dentist is consulted. These molars erupt about the sixth year, immediately behind the temporary teeth, both upper and lower, being the sixth tooth from the median line of the mouth. Mothers very often mistake these for temporary teeth, and do not value them on that account, but if they realized how important it is to preserve the temporary teeth, as well as the permanent ones, there would be a great improvement in the masticatory apparatus of the rising generation, both in utility and appearance.

Teeth which are irregular are much more liable to decay than those that are normally placed, because the irregularity facilitates the lodgment of food, and it is difficult to cleanse them with the brush. Other very serious diseases of the teeth and surrounding tissues, such as pyorrhea, are often due to irregularities.

The teeth in some mouths seem to be more soft than in others and decay more rapidly, so much so that many people think their teeth are so "soft" that it is useless to try to save them from destruction. It is not the "hardness" or "softness" of teeth which governs their decay, but their environment. The saliva varies greatly in different mouths, and it is this variation, more than anything else, which has to do with the apparent resistance of some teeth to decay, rather than any quality of the teeth themselves.

In mouths where the saliva is very tenacious and stringy, decay usually goes on very rapidly, because the teeth become coated over with a viscid film, making a suitable abode for the germs which

cause decay. Good vigorous use of the tooth brush several times a day, accompanied by thorough mastication of the food, will in time change this condition of the saliva to that of a clear, healthy consistency. This "ropy" saliva is very often the accompaniment of a nervous disposition, and the teeth are usually very sensitive. When

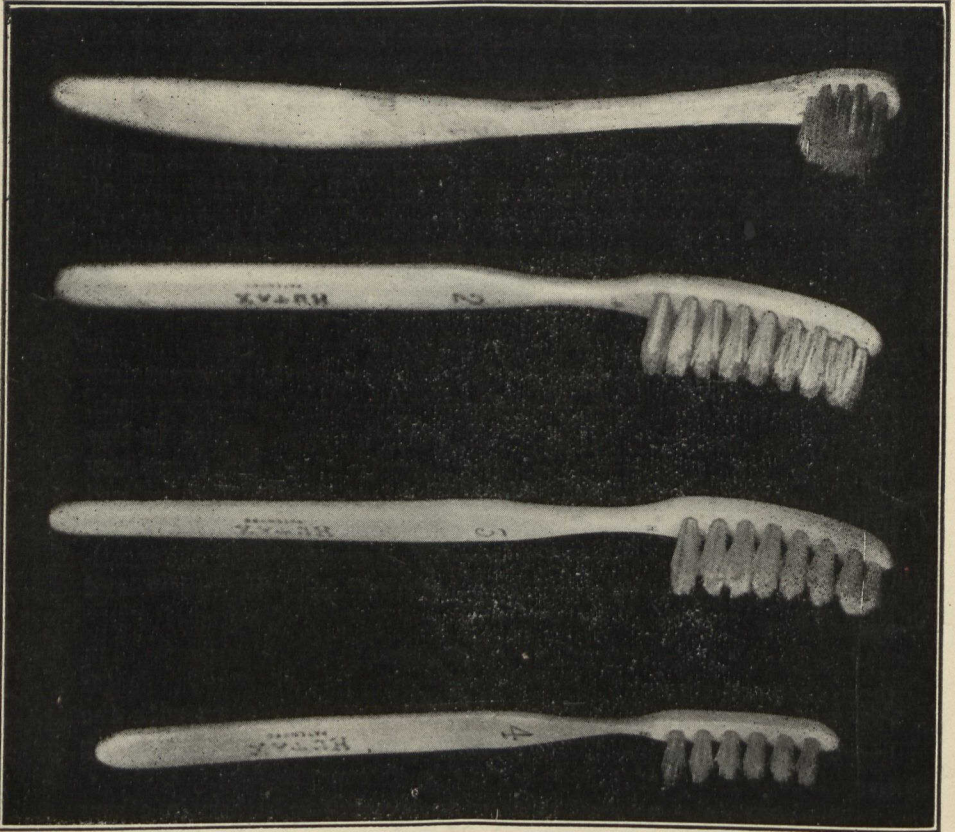


Fig. 16.

- 1 Is for children and those wearing orthodontia appliances and bridges.
- 2 Is the best sized for all purposes.
- 3 Is the three rowed brush, the largest sized brush that should ever be used.
- 4 Is for brushing the lingual surfaces of the lower teeth.

the saliva is gotten into a healthy state, the extreme sensitiveness of the teeth will disappear. When a person is in a delicate state of health, too, the saliva is not normal, and decay of the teeth goes on more rapidly. There are very many conditions which change the character of the secretions. To prevent the teeth from decaying,

one must keep up the tone of the general health, in addition to the proper use of the tooth brush; the poorer the health, the more carefully should the mouth and teeth be cleansed.

Mastication plays an important part in the preservation of the teeth. Any race of people who live upon a class of food that requires a great deal of mastication before it can be swallowed, invariably have little or no decay of the teeth, because during the vigorous chewing of the food the teeth are brushed and the gums massaged very decidedly. Watch a horse chew his food; his teeth do not decay, and rarely give any trouble, except when worn down by hard mastication or broken off by accident of some kind. The hay and oats are hard substances, and during the thorough mastication which they receive in order to be swallowed the teeth are beautifully polished. The oats contain a great deal of starch, the very substance upon which the germs of decay thrive best, and yet decay does not occur.

It is believed that our forefathers had better teeth than we, and this is accounted for chiefly by the fact that their diet consisted of plain materials that required vigorous chewing before they could be swallowed. They had not, as we have to-day, so many forms of sweet, mushy food; they did not, perhaps, bother very much with tooth brushes, either, but their food did the work which we must do now with our brush. It is well to have for each meal at least one article of diet which requires thorough mastication, and for a final dessert nothing better can be eaten than a good apple, as it massages the gums and clears away to a certain extent any food which has lodged in the interspaces between the teeth.

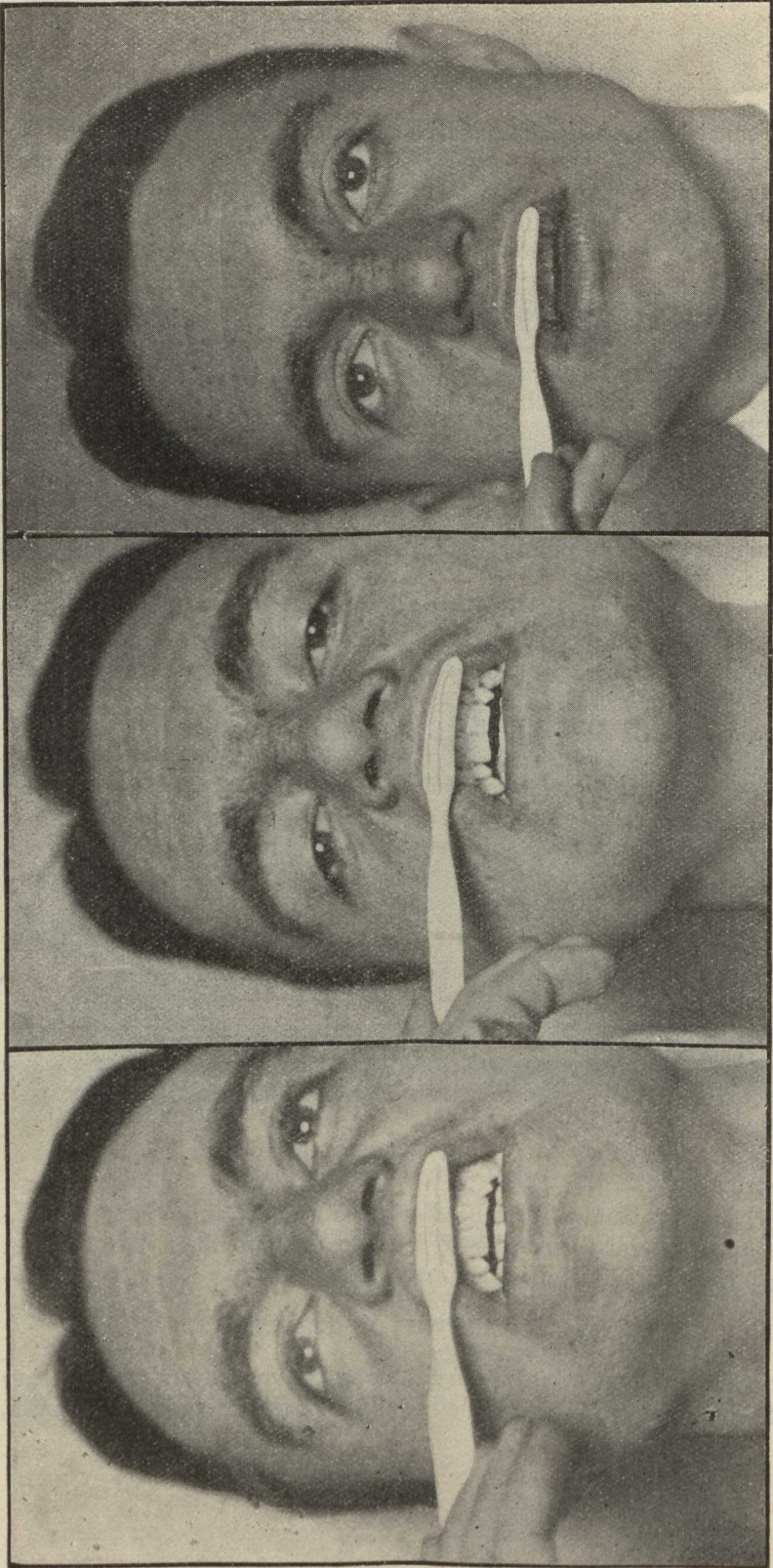
It is unwise to use liquids with which to "wash" the food down into the stomach. If one desires to drink during meals, he should do so when the mouth is empty.

Children should be given plenty of food that requires thorough mastication before it can be swallowed; instead of mincing it up for them, *let them do the mincing with their teeth*. It has been suggested that "if children could be sent to a chewing school, as they are now sent to a kindergarten, there would be a marked improvement in the race."

The teeth, and also the soft tissues surrounding them, require plenty of exercise, in order to develop them to their most perfect condition, just as do all other parts of the body.

#### HOW TO CLEANSE THE MOUTH AND TEETH.

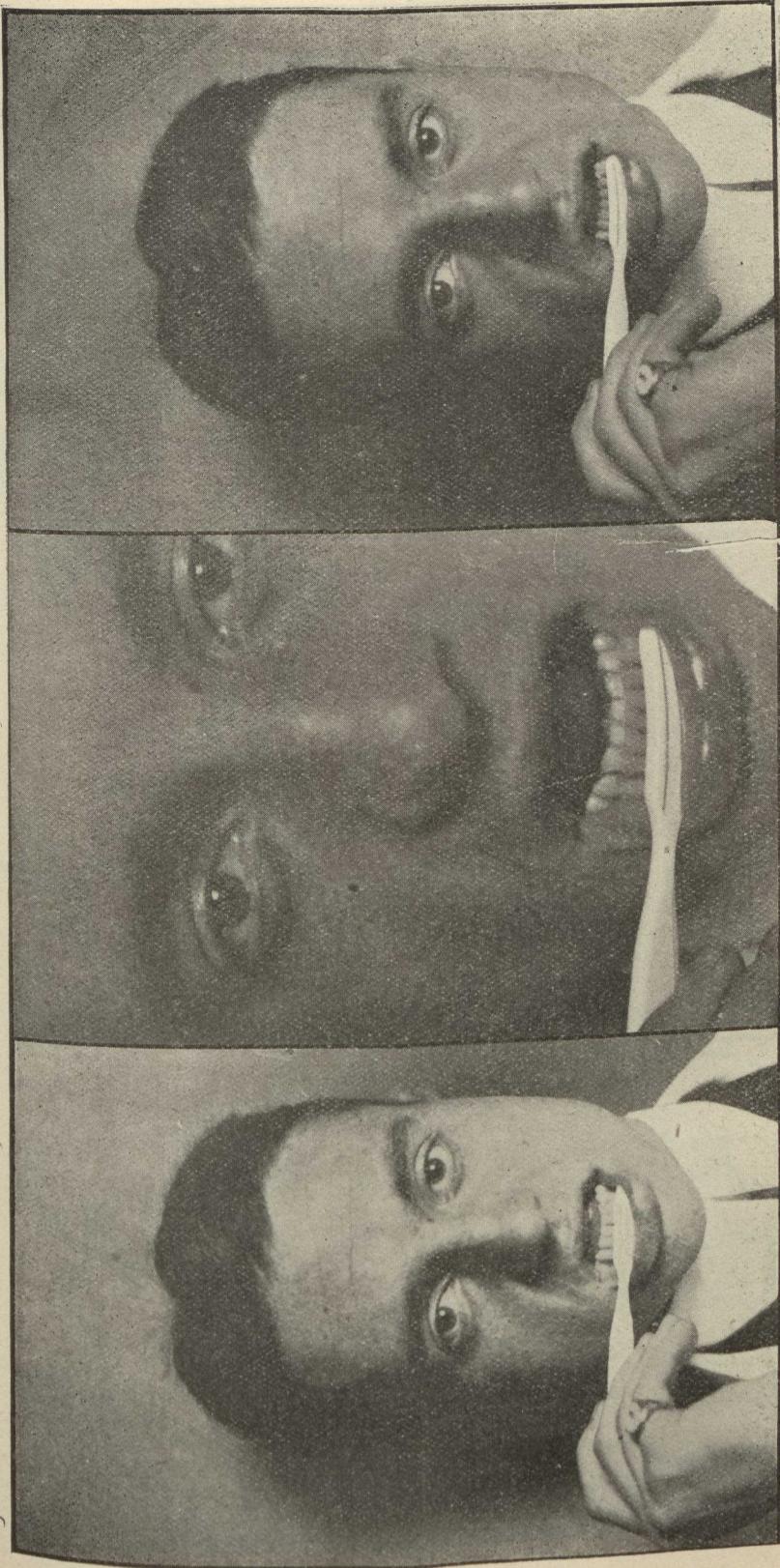
The best known means of cleansing the mouth and teeth, other than by mastication, is by the intelligent use of a good tooth brush,



Beginning of stroke.

Progress of stroke.  
Fig. 17.

Finish of stroke.



Finish of stroke.

Progress of stroke.  
Fig. 13.

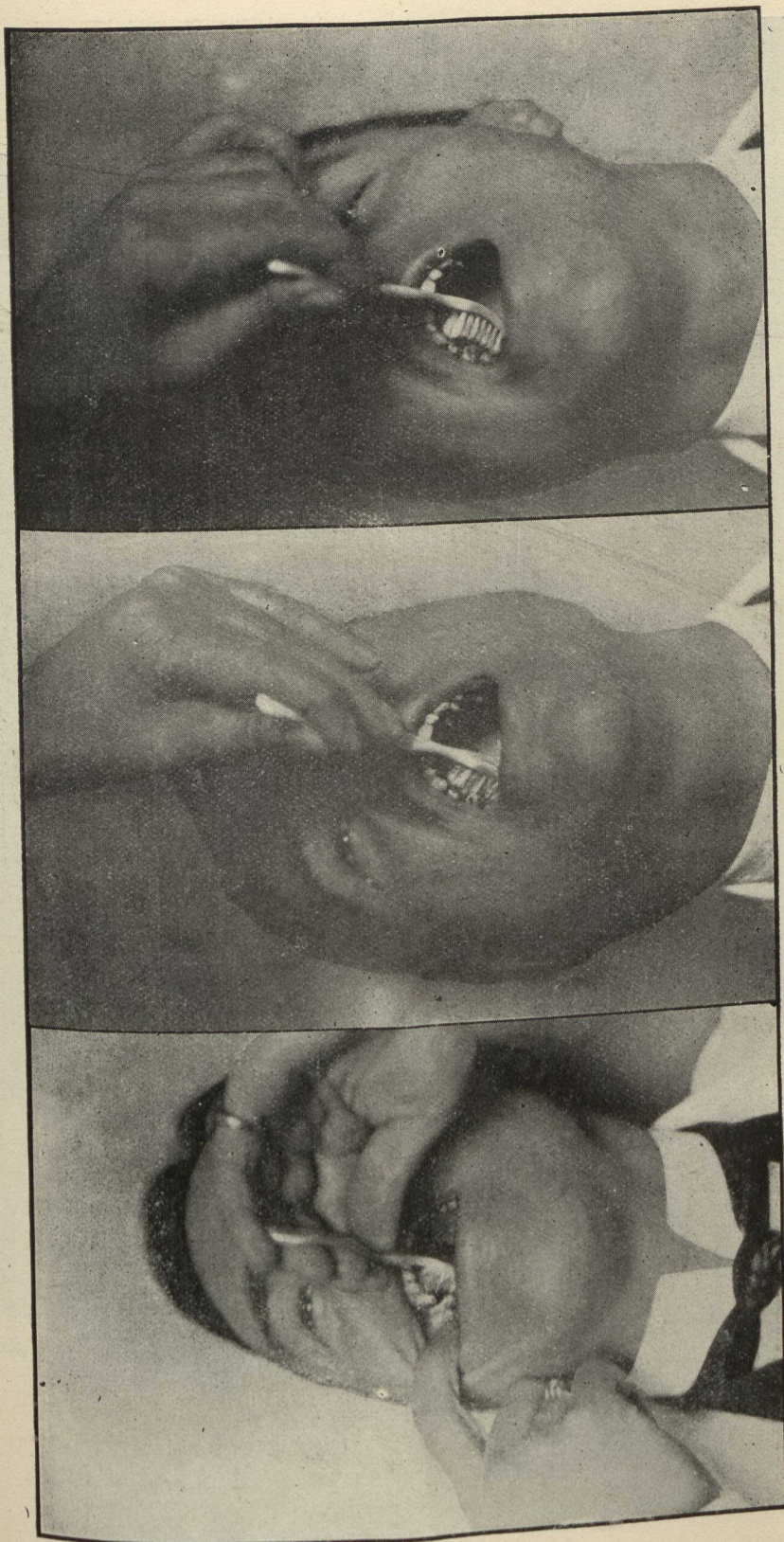
Beginning of stroke.



Beginning of stroke.

Progress of stroke.  
Fig. 19.

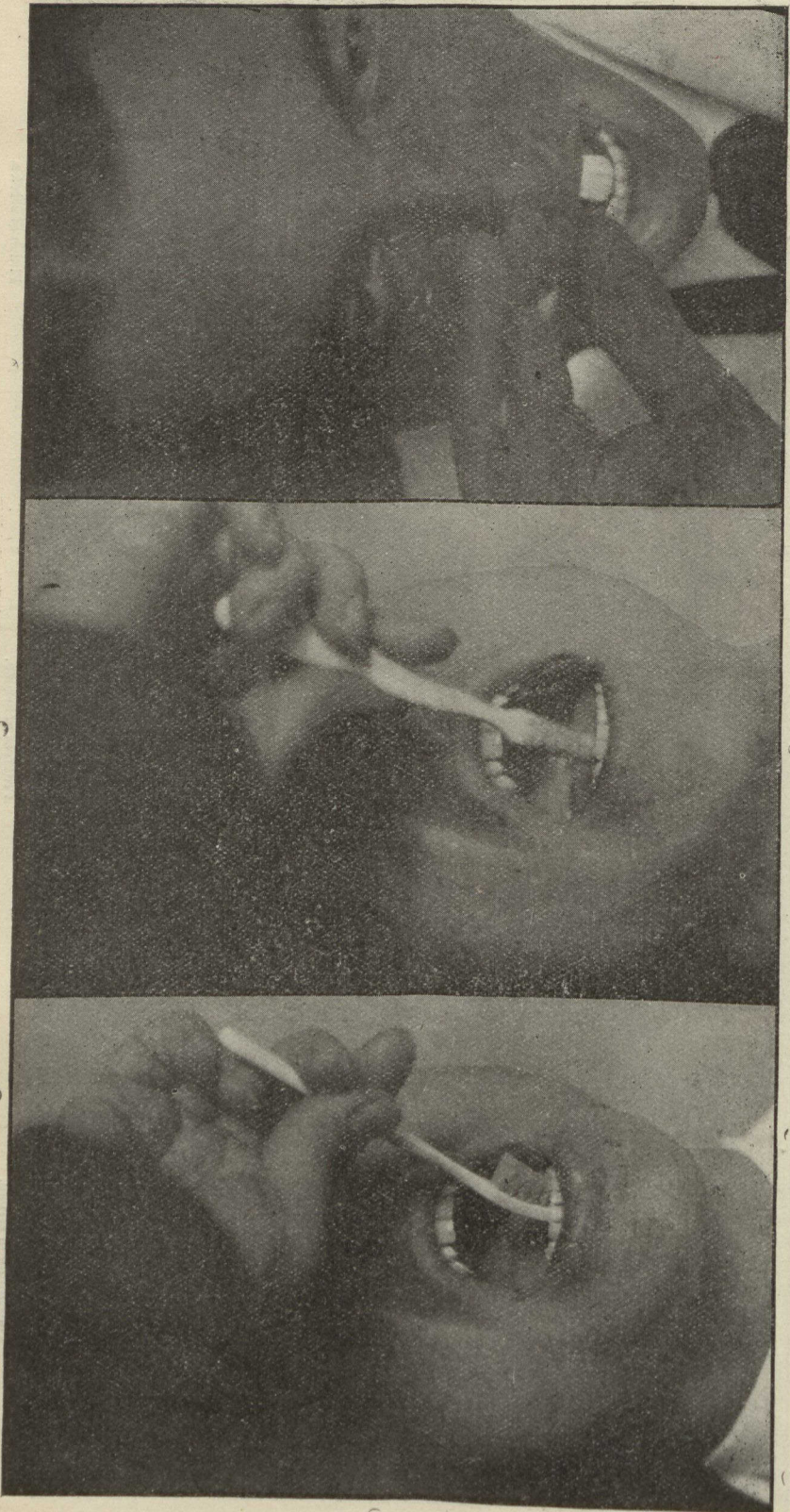
Finish of stroke.



Finish of stroke.

Progress of stroke.  
Fig. 20.

Beginning of stroke.



Beginning of stroke.

Progress of stroke.  
Fig. 21.

Use of Lingual Brush.



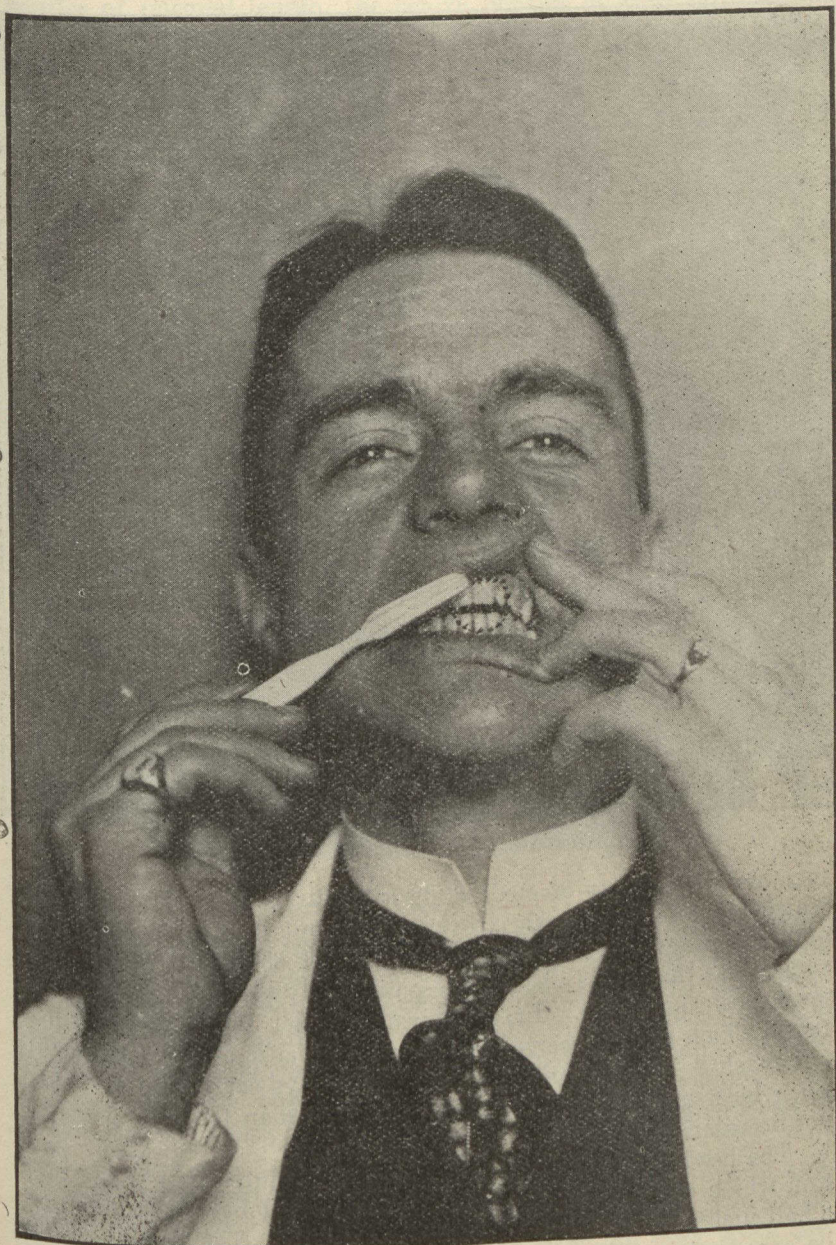


Fig. 22.—Circular movement in brushing, the bristles following the arch of the gums as indicated by the dotted lines.



Fig. 23.

Fig. 24.

together with plenty of moderately cold pure water. Most brushes which are offered for sale are too large, but it is possible now to obtain brushes which are nearly ideal. One should use a brush of such a size that it may be readily passed between the cheek and the most posterior tooth. In the permanent set this is the wisdom tooth, which rarely receives proper care, because a large brush will not reach it handily, and thus it often decays early, and is looked upon by many as a tooth of poorer quality than the rest, which is not necessarily the case.

The head of an ideal tooth brush for an adult—that is the portion which carries the bristles—should not be longer than one and a half inches or wider than one-third of an inch. The bristles should be arranged in two rows, each of about seven good-sized tufts of equal length, and one tuft additional to round off the end. The tufts of each row should be directly opposite each other and the

bristles of unequal length, the centre bristles in each tuft transversely being slightly longer than the rest, giving a serrated face to the brush. The bristles should be no longer than half an inch, and of medium stiffness for the average adult. Where the gums are inflamed, softer bristles are indicated for a time, until the tissues become normal and healthy.

Young children, or those wearing orthodontia appliances, should use a brush with but one row of six or seven tufts, the bristles being shorter than those in the adult's brush.

For those persons who may prefer a slightly larger brush than the one described as the ideal for adults, one of three rows of about eight or nine tufts would be the extreme size to do the work properly.

The head as well as the handle of the brush should be slightly curved, the head a little more than the handle, with the concavity on the side containing the bristles. This curve in the head should



Fig. 25.

be just sufficient that the ends of the bristles will nicely fit against the front teeth. The handle should be somewhat flat so that it can be held comfortably without slipping in the hand, and be easily controlled. All edges of the head and handle should be rounded and the bristles set within one sixteenth of an inch of the end and sides of the head. The whole brush—head and handle—should not be longer than five to six inches, and should not have a long tuft at the end.

There is a right and a wrong way to use a tooth brush, and most people employ the latter method. The old see-saw manner of using the brush is a very poor one, as only the high spots are brushed. The motion should be a *vertical* one, placing the brush high (or low, if for the lower teeth) upon the gums and then

rotating it so that the bristles pass over both the gums and teeth. A very short, horizontal motion will drive the bristles between the teeth, dislodge the food and prevent the formation of tartar. To cleanse the lingual, or inner surfaces, the brush should be used in a similar manner; for the upper, place the ends of the bristles in the centre of the roof of the mouth, and roll it down over the gums and teeth; for the lower, raise the tongue and place the brush low down upon the gums, then roll it up over the ends of the teeth; the bristles upon the end of the brush only may be used in some parts. These movements must be repeated several times, using plenty of water. The grinding surfaces are cleansed by the horizontal use of the brush, as is usually practised for all surfaces of the teeth.

This method will seem awkward at first, but with a little practice it will become just as natural and easy as the old way of brushing across the teeth, with the added advantage that by using the brush in this manner the bristles pass in between the teeth to a certain extent, and cleanse more or less the approximal surfaces. By the horizontal motion of the brush across the teeth the gum tissue overlying prominent teeth, such as the cuspids, will in time recede, exposing the necks of the teeth above the enamel. These exposed surfaces of the roots soon become discolored and sensitive.

It may be necessary occasionally to use a good tooth powder or a little camphorated chalk to remove stains, but any preparation used should be one which does not contain ingredients that are injurious to the teeth, and whatever is used should be carefully washed from around the teeth.

Rinsing the mouth thoroughly is an excellent means of dislodging any collection between the teeth. It is possible by the action of the tongue and cheeks to force a liquid back and forth between the teeth with considerable pressure. Try it. Many persons do not know how to properly rinse their mouth. A very palatable and refreshing wash for rinsing the mouth may be made by adding about ten drops of oil of peppermint to three ounces of water, using a few drops of this solution in sufficient water to rinse the mouth two or three times.

No preparation could be used in the mouth that will kill the germs; they must be brushed away.

Tooth soaps are very injurious and should not be used. Pastes, as a rule, are not as good as powders, because most of them contain sugar, simple syrup, etc., substances which are favorable to the development of bacteria. The advice of a dentist should be sought in reference to the selection of any preparation with which to cleanse the teeth, as many of the articles upon the market for this

purpose are very injurious. Some persons use powdered charcoal, pumice or cigar ashes. One might use something of this kind once in several weeks, if the teeth become stained, but if the brush is diligently used two or three times a day at least, with the addition of a good tooth powder once perhaps every three or four days, there will not be much occasion to use a gritty substance.

It is advisable to have the teeth thoroughly sealed and polished by a dentist two or three times a year, because the approximal surfaces cannot be thoroughly cleansed by the brush.

When food lodges between the teeth, it can best be removed by the use of a quill toothpick. Toothpicks of wood are usually too large and rough, and considerable damage may be done to the gum tissue by their use. Where food lodges there is something wrong, and a dentist should be consulted, as the continual crowding of food into these spaces presses back the soft tissues and exposes the necks of the teeth, and thus decay starts at a point where the germs cannot be brushed away conveniently.

With care, the approximal surfaces of the teeth may be cleansed and polished by means of ordinary rubber bands or floss silk, but the use of these is a dangerous proceeding, because if the silk or rubber band is permitted to snap down upon the gums after it passes the "tight point" between the teeth, it will set up an inflammation in the soft tissues that will cause them to recede. These are all right when used by a careful dentist, but not so in the hands of the average person.

#### WHEN SHOULD THE TEETH BE BRUSHED?

To cleanse the mouth and teeth should be the very first duty in the morning, in order to clear away as thoroughly as possible the germs which may have fastened themselves upon the teeth during the hours of sleep, when the tongue and salivary glands are inactive. It is desirable to get rid of these germs, so that they will not be brushed off by the food in mastication and carried into the stomach along with the breakfast. The teeth should be brushed after each meal to remove all particles of food which may have lodged around them. The most important time of all, so far as the preservation of the teeth is concerned, is after the last meal of the day, taking care to remove thoroughly all particles of food at this cleansing. During the hours of sleep the saliva is not flowing freely, neither is the tongue brushing the surfaces of the teeth; if there is food lodged around them, the germs will have several hours during which to grow undisturbed, and having this grand opportunity, night after night, for years, is it any wonder that they destroy teeth? Persons in delicate health, or those whose teeth are

very susceptible to decay, would do well to cleanse the mouth and teeth before each meal; it will prevent the entrance into the stomach of many germs which more or less interfere with normal digestion.

#### HYGIENE OF THE MOUTH.

1. Good health is necessary to avoid disease.
2. Good health depends on good digestion.
3. Good digestion depends on good mastication and a clean mouth.
4. Good mastication depends upon good teeth.
5. To preserve the teeth from decay and keep the tissues of the mouth healthy it is necessary to keep the teeth and gums free from decaying food particles and to stimulate the circulation of the blood in the gums.
6. To assist in this masticate hard foods.
7. Soft foods cling to the teeth.
8. Teeth decay chiefly at night.
9. Brush the teeth before retiring and upon rising, and if possible after each meal. Rinse the mouth with an abundance of tepid water.
10. Use a tooth brush or brushes of such forms and sizes as will reach all the surfaces of all the teeth.
11. Brush the teeth from the gums towards the biting edges.
12. Use mouth preparations upon the advice of a dentist.
13. Consult a dentist as often as advised by him.
14. Good teeth and a clean mouth are more essential to the child than to the adult.

## Reviews

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*Diseases of Women.* By J. BLAND-SUTTON and ARTHUR E. GILES.  
New York: Rebman & Company.

The sixth edition of this admirable work is written in a manner which makes it most valuable to the student of gynecology. The style is easy and conversational; the subject matter is systematically arranged, and a large amount of information is contained within the covers of a comparatively small book.

The importance of the pathology of the different conditions described is impressed on the student, and separate chapters are devoted to the description of fibrosis uteri and adenomyomatous disease of the uterus in their relation to uterine hemorrhage.

A note of warning is also sounded in the chapter on injuries to the uterus, and the necessity for care in the performance of minor operations on the uterus is emphasized.

Operations and operative procedure are left to the end of the book, where all the gynecological operations are minutely described. One misses the illustrations so commonly found in most text books, but the clearness and conciseness of detail more than compensates for their absence.

Altogether the work is one which should commend itself to both student and practitioner.

W. B. H.

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*The Practice of Surgery.* By JAMES S. MUMFORD, M.D., Visiting Surgeon to Massachusetts General Hospital and Instructor of Surgery at Harvard Medical School. Philadelphia and London: W. B. Saunders Co. Canadian agents, J. F. Hartz Company, Toronto.

The author states in the preface that he has endeavored to make this a practical clinical surgery, and for economy of space omits the Principles of Surgery. He consequently deals with the more common things met with in hospital practice. Some things he touches lightly, because they are the realm of the specialist in some branch.

The order of arrangement is unusual. The book starts out with appendicitis, intestinal obstruction and surgery of the abdomen. His reason for such an arrangement being that he wishes to put things in order of importance and frequency.

Diseases of the female organs of generation is an important chapter and is well handled. It is unusual to have these diseases dealt with in a book of Practice on Surgery, and I quite compliment the author on his stand in including these diseases as a part of general surgery.

The book is profusely illustrated, and altogether is a work well worth having at hand. It is almost entirely clinical and operative, and tells in a clear and precise way how things are done at the Massachusetts General Hospital. One can without hesitation recommend it to the general practitioner.

W. W. J.

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*Text-Book of Nervous Diseases for Physicians and Students.* By PROFESSOR H. OPPENHEIM, of Berlin. Authorized Translation from the Fifth Edition by Dr. Alexander Bruce, Edinburgh. Two volumes. Pp. 1,424. Price, £2 2s. Published by Schultze, 20 South Frederick St., Edinburgh.

It is generally recognized that Oppenheim's text-book is without question the best of the smaller neurological monographs—that is, written throughout by one author—in any language, and the medical profession must be especially grateful to Dr. Bruce for rendering it accessible to English readers. A small translation of the third German edition was published some years ago by Mayer, but since then the original book has been not only enlarged and brought up to date, but also enriched by a carefully selected bibliography.

This is not the place to give a detailed or technical criticism of the book; it is sufficient to say that it is indispensable to anyone wishing for a really first-rate neurological text-book, for there is no other that can be mentioned as being in the same class. The chief blemish is the unfortunate mistake of including sections on the irrelevant subject of the psycho-neuroses, a subject on which the author is, in the opinion of the reviewer, not at home. The translation is throughout of the highest quality, both in accuracy and in style; the volumes are excellently printed, though they are decidedly too heavy for convenient handling. On the whole, the reviewer knows of no book on neurology that has ever appeared in English which can so cordially be recommended to both the general practitioner and the expert.

E. J.



# Dominion Medical Monthly

And Ontario Medical Journal

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Published on the 15th of each month. Address all Communications and make all Cheques, Post Office Orders and Postal Notes payable to the Publisher, GEORGE ELLIOTT, 203 Beverley St., Toronto, Canada

VOL. XXXVI.

TORONTO, FEBRUARY, 1911.

No. 2

## COMMENT FROM MONTH TO MONTH.

**Dean Clarke**, of the Medical Department of the University of Toronto, proposes an exceedingly radical step as regards medical standards, examinations and licences in the Province of Ontario. He advocates in the Report of the Board of Governors of the Provincial University to the Government of the Province a revision of the Ontario Medical Act, which will take from the Ontario Medical Council the right to prescribe standards of medical education, to set examinations, appoint examiners and issue authority to licentiates to practice in the province. The chief reason given for this move on the part of the Medical Department of the University, is that the Medical Council is antagonistic and blocks the progress of medical work in that institution.

Whilst we would willingly advocate any movement in this direction which would lessen the examination burdens of the medical student, the subject is of far too great importance to immediately stamp with approval without giving thereto close study, much thought and material consideration. There are other university interests to take cognizance of and as well the interests of the profession throughout the province.

This journal has oftentimes before urged the necessity of a

revision of the Ontario Medical Act, more especially as to representation, believing that in the present day and generation it was not just to the profession at large. Since its enactment institutions have become defunct, conditions archaic, cults moribund.

But it must be well remembered in any attempt to correct or remedy—to make better the Ontario Medical Act, even if in the direction advocated by Dean Clarke, the public are strongly averse to anything of the nature of close corporations; and if fully one-half of the powers of the Medical Council be curtailed, which is the better half probably in the eyes of the public, and there is left to it only the disciplinary powers, the public will very naturally consider that the medical profession would be more of a close corporation than ever.

The public quite naturally seeks a cure of its ills by any means regular or irregular; and the profession of medicine has, upon many occasions, had evidence of this from even the more enlightened and intelligent of the community.

Take away from the profession all its powers over medical education and medical examinations and licences and the public will soon put an end to the rest. For it is more upon its disciplinary functions that the Medical Council is attacked than upon its standards of medical education.

A compromise might be easily arranged and prove mutually satisfactory to the advocates of higher and better qualifications on the one hand and the guardians of the rights of the profession on the other. This might well meet with the approval of the educators, the profession and the student body. That is to say, if the standards and subjects of the primary and more scientific examinations were placed in the hands of the university and the final standards and examinations left as they now are, there would be reason for rejoicing on the part of the student body; the educators would have gained one-half their point and the Council would still be in possession of the practical part, which, after all is said and done, is that which most concerns the profession as well as the public.

There is no doubt about it that the standards and examinations in the primary subjects could best be prescribed and conducted by the university professors or their assistants; whilst the final subjects could be as well looked after by those within as by those beyond the pale of university life.

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**Dr. John N. Elliott Brown** is retiring from the Superintendency of the Toronto General Hospital, after a service of five and one-half years. He has proven himself a successful and com-

petent official in more ways than this, and is a medical man who has seen a great deal of executive work. Careful to detail, systematic, earnest in his work, always willing to do the best he could, the Hospital Trust will look far for a man who can qualify to fill the position as ably as Dr. Brown has.

Medical men who occupy official positions scarcely, if ever, command as good compensation for their ability and work as others who do not administer institutions or departments in civic or public service one whit better, but are looked upon as of more worth, because of the fact the public, although growing in intelligence, have not as yet come to a full and enlightened knowledge of the great possibilities of public health and institutional administration.

It is not necessary to cite instances; they are well known. Probably the time will soon come when competent medical officials will be as well paid for their work as those in other departments of public administration.

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**Is Dominion Registration** to be set back again because of the Province of Saskatchewan not yet having a medical school or university? The special committee of the House of Commons has been considering the amendment to the Canada Medical Act of 1902, the only objection, it is understood, coming from Dr. Neely, M.P., one of the members from Saskatchewan. The objection was along the line above mentioned.

Surely the medical men of Saskatchewan or its Medical Council are not going to block this legislation for such a picayune objection.

This Dominion Registration is for the whole of Canada, and now when it was understood every Province had acquiesced in the amendment, surely Saskatchewan, a Province which is the embodiment of progress in public health matters, with broad and liberal ideas, is not going to be the one Province to block or suspend legislation at this time.

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**Life Insurance Companies and Public Health.**—In a paper read before the Association of Life Insurance Presidents, by Dr. Eugene H. Porter, the Health Commissioner of the State of New York, the following ideas were suggested as a working basis of the immediate establishment in each Insurance Company of a Department of Health:

1. The instruction of medical examiners and life insurance agents in sanitation and preventive disease work.

2. The issuance of a carefully arranged series of letters or circulars on health topics to policyholders.
  3. The establishment of a health magazine or bulletin.
  4. The arranging for a series of public health lectures in various cities and towns with or without the co-operation of State or local health authorities. Some of these lectures to be published.
  5. To use all the time, systematically, the tremendous educational power of the press.
  6. Conjoint work with State and City Health Departments.
  7. Conjoint work with all organizations interested in public health work.
  8. The securing of more uniform and better health laws.
  9. The establishment of a National Department of Health.
  10. To aid in securing adequate appropriations for health work.
  11. The free re-examination of all policyholders. This opens a tremendous field of work.
  12. A special investigation of the causes of pneumonia, Bright's disease, diabetes, apoplexy and cancer.
  13. Making available that great storehouse of experiences now in possession of Life Insurance Companies—a gigantic collection of facts of incalculable value.
  14. Educate—Educate—and again Educate.
- Fraternal organizations could also well join in this grand army of health.

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**Dr. Chas. J. Hastings**, Medical Health Officer for Toronto, plans to make the Health Department of this city one of the best arranged and best administered on this continent. Dr. Hastings' first step was to secure a competent head for the laboratories, and reforms were immediately put in force, notably in connection with diphtheria swabs, which have commended themselves to the profession and citizens generally.

Having secured an appropriation of \$159,000, which is \$67,000 more than spent in the previous year, Dr. Hastings now proposes to organize bureaus in the department. There is to be a secretary of health, who will look after all correspondence, publicity and public health legislation; a bureau of vital statistics; a bureau of contagious diseases; a bureau of food inspection; a bureau of sanitation; a bureau of hospital and ambulance service, and a school for sanitary instruction.

This comprehensive reorganization will make Dr. Hastings' Department one of the most important at the City Hall, and its organization gives strong evidence that Dr. Hastings does not mean to rest content with being just Medical Health Officer. It evinces a progressive spirit, which will mark his administration as capable to the very best degree.