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ORTHODONTIA AS A PROPHYLACTIC MEASURE.

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(Read before the New York Odontological Society at its regular monthly meeting,  
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I WISH to thank your committee for the honor conferred upon me by their invitation to present a paper to this society. In accepting their invitation I hoped that I might be able to present a few facts setting forth the importance of occlusion and use of the teeth as a factor in the development of the entire internal face, as well as in maintaining a normal healthy condition of the tissues of the mouth and the upper respiratory tract.

Normal dental arches can no longer be considered from the esthetic standpoint alone, nor can orthodontia be regarded as purely cosmetic. The day is fast approaching when a close relationship between orthodontia and general prophylaxis must be recognized.

Anything that *guards* or defends against disease is a "prophylactic." Any

measure that tends to increase physiological resistance to the invasion of and propagation of pathogenic germs, and thus lessens the liability of the individual to disease, is a "prophylactic measure." If it can be demonstrated that orthodontia as practiced today tends to the physical improvement of the patient by increasing his power of resistance to disease, then orthodontia must have a place as a prophylactic measure.

Throughout this paper I shall make free use of the opinions of men in both the medical and dental professions who have given much study to pathological conditions of the oral and nasal cavities.

From almost every part of the field of medicine we hear of the baneful effects of *mouth-breathing*.

Dr. Coakley, in his "Diseases of the

Nose and Throat," says, "Of the functions of the nose, that which is vitally the most important to the individual is the respiratory."

Dr. Holt, in his "Diseases of Infancy and Childhood," says, "In consequence of difficult breathing children sleep in all sorts of positions, lying upon the face, sometimes upon the hands and knees, and often toss restlessly about in the vain endeavor to find some position in which respiration is easy."

It has been commonly observed in those cases where "nasal breathing has been obstructed from infancy, that there are often found those deep lateral depressions of the lower part of the chest with prominence of the sternum known as 'pigeon-breast,' due to interference with pulmonary expansion." (Holt.) In a large proportion of these cases long-continued mouth-breathing results in impaired hearing due to implication of the Eustachian tube; persistent coughs; hoarseness; bronchial asthma; headaches; impaired general health from lack of oxygen and loss of sleep. The growth may be stunted, the facial expression dull and stupid. These children are languid, listless, and often depressed, and in school are frequently regarded as mentally deficient. These symptoms are not all present in each individual case, but vary in number and severity with each patient.

Mouth-breathers are always in more danger from infectious diseases than normal nasal breathers, because of the lessened physiological resistance of the post-nasal, pharyngeal, and laryngeal tissues, coupled with the fact that the atmosphere is carried directly to these weakened parts without having been filtered and moistened as in nasal breathing.

Some bacteriologists claim that the secretions of the nasal mucous membrane possess bactericidal properties, retarding the growth of some bacteria and preventing the development of others. It is a well-known fact that there are very few bacteria found well within the nasal cavities, which condition would make the claim appear highly probable.

Where the nasal respiratory function has been interfered with for an extended

time, the bony framework of the nose becomes contracted through atmospheric pressure and disuse. If this condition be allowed to continue till the bones of the face have firmly united, "the capacity for nasal breathing is permanently fixed," so far as surgical aid from the rhinologist is concerned.

Dr. Kyle, in his "Diseases of the Nose and Throat," referring to adenoids says, "Even should the gland structure causing the obstruction be removed, while its ablation may relieve the naso-pharyngeal symptoms, it cannot possibly increase nasal respiration, other than by lessening the engorgement of the submucosa. This fixity of the bones of the face may leave the individual a confirmed mouth-breather."

Whether it be due to inflammatory organization in consequence of interference with function, or to other cause, it is a fact that adenoids are very liable to recur in young children, no matter how thoroughly the operation for their removal may have been performed. I have in mind at the present time two children, both of whom I met within the month, a little girl aged eleven years and her brother aged nine. These children were operated upon almost two years ago for the removal of post-nasal obstruction, when they were aged respectively nine and seven years, yet they continue to breathe through the mouth.

Dr. Kyle states that in these developmental deformities due to nasal obstruction, little can be done by the rhinologist toward increasing the nasal space for breathing after the age of seven years.

If these cases—where the bones have become so fixed that even after the removal of the causative obstruction nature cannot restore normal conditions—were placed in the hands of the orthodontist, and he worked in conjunction with the rhinologist, instead of leaving the individual a confirmed mouth-breather the post-nasal space would in many cases be increased, and normal nasal breathing restored without a conscious effort on the part of the patient. (Fig. 1, A, B.) Of course this refers to patients under fourteen or

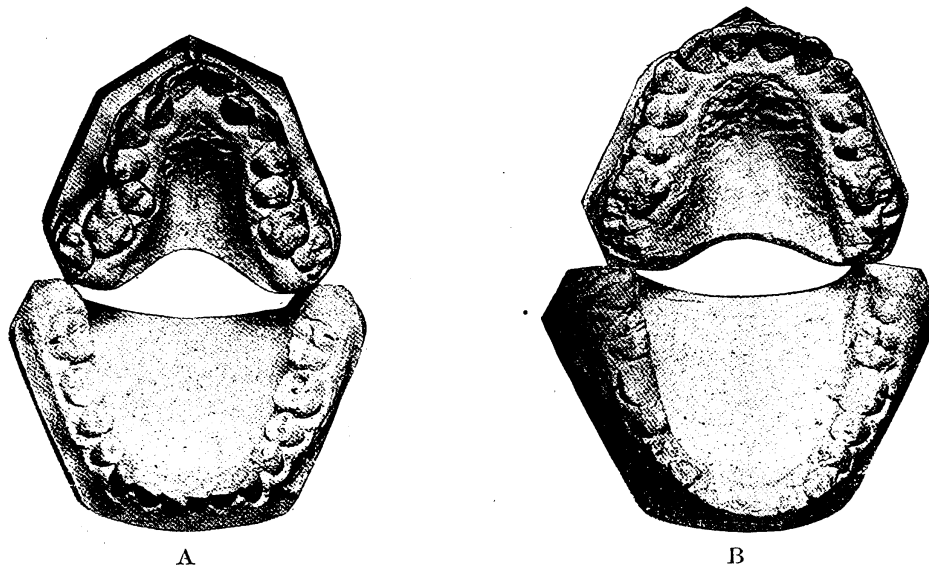
fifteen years of age, the development of the internal nose being almost complete at that time.

In thus playing an important part in the restoration of normal nasal function and normal lip function—thereby lessening the liability of the individual to all those infectious diseases to which the

as I am able to see, is the keynote of all that Dr. Smith has taught on the subject.

The part which the patient takes in this prophylactic treatment becomes an important factor in making a prognosis. Any condition of the mouth which tends to make the thorough cleansing of the teeth by the patient himself a difficult

FIG. 1.



Age thirteen years. A: Diameter of vault in molar region, 1.60 in.; at second bicuspid, 1.33 in.; at first bicuspid, 1.38 in.; at canine, 1.25 in. B: Diameter in molar region, 2.05 in. (expansion 0.45 in.); at second bicuspid, 1.87 in. (expansion 0.54 in.); at first bicuspid, 1.68 in. (expansion 0.30 in.); at canine, 1.54 in. (expansion 0.29 in.).

mouth-breather is peculiarly exposed—orthodontia certainly establishes a claim as a prophylactic.

As dentists, however, we have principally to consider malocclusion and its relation to "oral prophylaxis"—a term which I understand to imply perfect cleanliness of the oral cavity, a condition that can be maintained only through the constant and united efforts of both patient and operator.

Dr. Miller, who perhaps has given more scientific study to the etiology of dental caries than has any other member of the profession, in speaking of its prevention says, "Under all conditions the chief thing is the thorough mechanical cleansing of the teeth." And this, so far

operation, lessens, inversely with the difficulty, the probability of a favorable result. When the dental arch is constricted and the teeth are crowded and overlapping (Fig. 2, A), forming triangular spaces into which food débris is forced by stress of mastication, it is impossible for the patient to keep those teeth clean. Bacteria which possess high fermentative and acid-forming activity lodge in those spaces undisturbed, and the rapidity with which they carry on their destructive work, either in producing caries or pyorrhea, depends entirely upon the degree of resistance offered by the surrounding tissues.

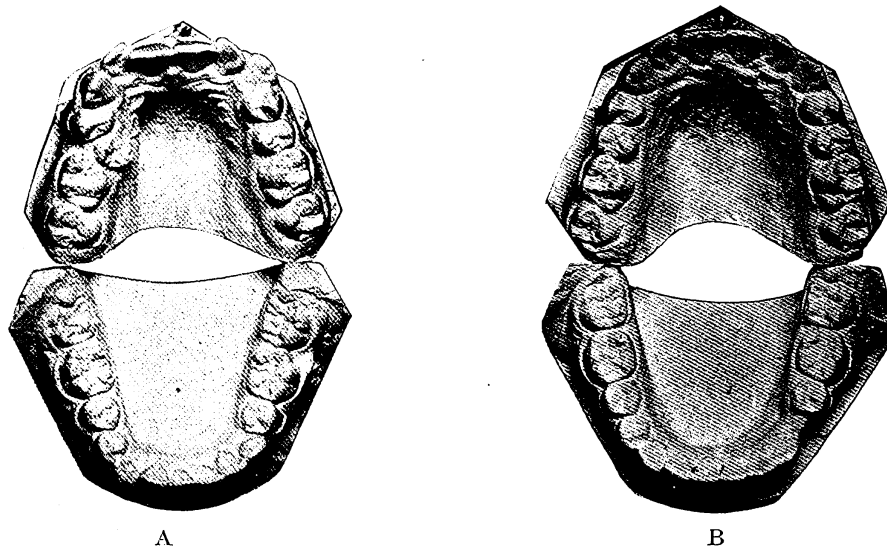
Since first the study of the etiology of dental caries was taken up by the dental

profession, "irregularities of the teeth" has been given and universally accepted as one of the potent predisposing causes of dental decay.

If perfect cleanliness of the teeth will prevent dental caries—and of this there seems to be small doubt—then that condition of regular alignment of the dental arches, normal occlusion, and normal articulation (Fig. 2, B) which best facili-

tifical. In some the crowns of the teeth are so well formed and arranged and knuckle up together so perfectly that as long as the interdental papillæ are in a healthy condition there is little possibility for food to lodge. In others we find the food sticking between the teeth everywhere. There can be no doubt that this circumstance is of very considerable consequence in regard to the origin and

FIG. 2.



Age fourteen years.

tates perfect cleanliness is a condition which must necessarily contribute much to prophylactic treatment of the oral cavity. In the normal dental arch, "Nature has given us an apparatus that is in a large measure self-cleansing," while in those mouths where malocclusion exists, every protected surface of a tooth invites an accumulation the presence of which favors dental decay and gingival irritation.

In a paper entitled "A Study of Certain Questions Relating to the Pathology of the Teeth" (Cosmos 1904, vol. xlvi, p. 991), Dr. Miller refers to the facility with which different dentures are cleansed, in the following words: "Different dentures show very marked differences in regard to the efficiency of cleansing processes, whether spontaneous or ar-

progress of caries." "All the cases of immunity to caries which I have examined during the last few months have related to dentures where there was little tendency to retention of food particles." "The comparative immunity of the lower front teeth to caries is due in a great measure to the fact that the food particles do not readily lodge about them." If for any reason food particles are retained, "then these teeth decay as readily as any others."

In almost every case of malocclusion where the lower front teeth are crowded and overlapping, you will find some of them attacked by caries—some so far decayed, because of their broad surfaces of contact, as to be almost beyond the hope of permanent retention. (Fig. 3, A, B.) This is true even in those mouths where

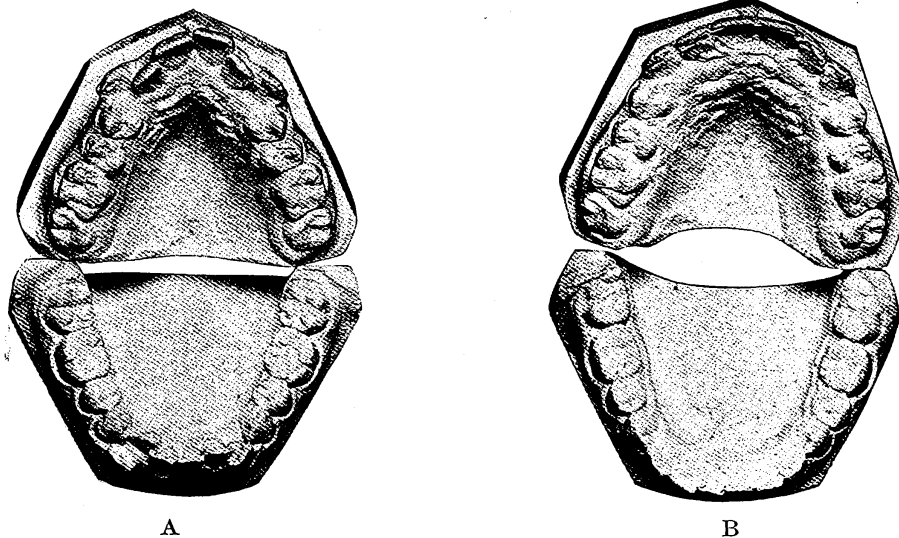
the other teeth are comparatively free from decay.

Concerning the etiology of pyorrhea, there have been theories countless almost as the sparkling orbs of heaven. It has been the subject for heated debate since first the attention of the profession was directed to it by Dr. Riggs, and it may continue to furnish food for controversy till science shall have eliminated

there must still be some predisposition on the part of the membrane which makes it specially liable to such deposition. This predisposition is to be found in impaired nutrition and lowered vitality in consequence of mechanical strain from overcrowding of the dental arch."

Professor Armand Deprès attributes "considerable importance to the overcrowded condition of the dental arch as a

FIG. 3.



Age thirteen years. Lower lateral incisors badly decayed.

it from the catalog of human afflictions. There are those in the profession who maintain that this disease is entirely constitutional; others who claim it to be of purely local origin, and yet others who believe it results from both constitutional and local causes. Investigations have been carried on along these various lines, positive conclusions have been deduced, and these conclusions just as positively controverted. Fortunately we have not to weigh these numerous evidences, but have only to see, if possible, what relation malocclusion may bear to pyorrhea.

Dr. Pierce, in referring to the exciting causes of the disease says, "But even admitting the deposition in the pericemental membrane of waste products of nitrogenous metabolism in combination with calcium salts derived from the blood,

predisposing cause in the development of pyorrhea." Dr. Bödecker believes pyorrhea to be of both constitutional and local origin, and in specifying a list of local causes mentions first of all the "faulty articulation of the teeth." Drs. Black, Marshall, Burchard, Kirk, and many others, recognize malocclusion as one of the contributory causes of pyorrhea. (Fig. 4, A, B.)

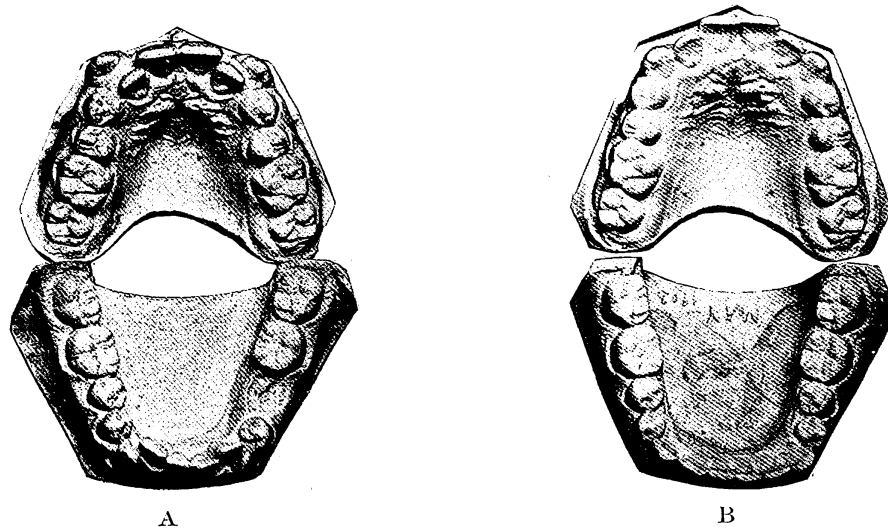
A short time ago I had the pleasure of seeing a number of slides shown by Dr. Schamberg. These slides were skiagraphs showing molars which had come into malocclusion or tipped out of the normal through the loss of an adjoining tooth. On the under or protected surface of every one of these teeth was a pyorrhea pocket or area of necrosis.

Chance has long since ceased to have

a place among men of science. Any present condition is but the result of the natural sequence of cause and effect. The co-existence of a crowded dental arch and dental caries, or the co-existence of malocclusion and pyorrhea, is not merely a coincidence, but in many cases a consequence—the one owing its existence to the other.

Dr. Campbell reports a case among the poor of London, of a man in his fiftieth year whose teeth were all perfectly sound, a very unusual condition among this class of people. In seeking an explanation Dr. Campbell elicited the fact that "this man was unable to swallow his food without chewing it very thoroughly, and upon giving him a piece of bread with the re-

FIG. 4.



A Age twelve years. Lower laterals, canines, and first bicuspid teeth predisposed to pyorrhea. B: Predisposition to pyorrhea overcome by correction of the occlusion.

It is very probable that the various organs of the body were prepared for their special physiological functions through a process of variation and natural selection due to environment, and to the necessity for using or not using certain parts of their anatomy. Naturalists are observing anatomical changes going on today. The ostrich, through his desire to walk, has lost his power to fly.

The effects of the disuse of the teeth for masticatory purposes are readily seen in those mouths where, from sensitiveness of a tooth or any cause, the patient uses only one side of the mouth. The accumulation of food débris in the disused portion, the calcic depositions about the necks of these teeth, and the concomitant inflammation of the gum tissue in this region, all tell the story of what mastication does for the teeth and mouth.

quest that he chew it in the ordinary way, found that he subjected it to one hundred and twenty bites before swallowing it. The temporals and masseters were enormous, and the nasal passages well developed, while the oral mucous membrane was unusually healthy."

The dental hygiene being taught today is only an attempt to restore by artificial means the health of those tissues of the oral cavity that are suffering from disuse. It is false doctrine to teach, as one gentleman endeavored to in his discussion of a paper at the meeting in Washington of the Southern Branch of the National Dental Association, that "Our teeth are not for mastication in our present civilization;" that "mastication and insalivation are not necessary processes at all."

Professor Irving Fisher of Yale University recently conducted some experi-

ments to discover whether attention to slow eating and enjoyment of the food would affect the working powers of the individual. The experiments were made with nine Yale students, and lasted four and one-half months. The rules of the experiment were, first, thorough mastication of the food, with the attention directed to its taste and enjoyment; and second, implicit obedience to the appetite. The men ate nothing which they did not choose of their own free will. Nothing was set before them except as ordered by them, and meats were available three times a day. They led sedentary lives, and took no more exercise than they had been accustomed to before the experiment began.

At the end of the first half of the time the men had improved fifty per cent. in endurance. At the end of the second half they were able to do double the amount of physical work—as shown by gymnasium tests—that they were capable of doing at the beginning of the experiment. It was also found at the close that

their consumption of flesh foods had decreased to one-sixth of the original amount.

The trituration and insalivation of the food are not the only important functions of mastication. In normal occlusion of the teeth the evenly distributed force of impact during the process of mastication affords a stimulus not only to the teeth, but to the membranes of the mouth, the peridental and alveolar tissues, and even to the maxillæ and mandible, which is beyond our power to measure.

Orthodontia is not a panacea, but normal occlusion of the teeth is a very important factor in producing the normal development of the internal face, as well as maintaining a normal hygienic condition of the mouth by the natural processes of mastication.

When an organ is no longer called upon to perform the function for which nature intended it, just so soon does it begin to lose its power of function and to atrophy, and is very likely to become the seat of disease.

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**ORTHODONTIA: OPENING THE BITE IN THE REGULATION OF THE TEETH: A METAL FLANGE FOR IMPROVING THE ANCHORAGE OF APPLIANCES, MOVING TEETH, AND FOR HARMONIZING THE OCCLUSION.**

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(Read before Section I of the National Dental Association, Atlanta, Ga., September 18, 1906.)

**I**N the practice of orthodontia, cases are presented with irregularities of the teeth in which the abnormal occlusion requires the opening of the bite for their correction; that is, some of the teeth that should have a labial occlusion have a lingual occlusion, or the reverse, being interlocked by the teeth of the opposite arch. In some instances the movement of these teeth, in their correction, is greatly facilitated by opening the bite so that they

will not be interfered with by the teeth of the opposite arch during their movement.

Of the large number of cases of irregularity of the teeth treated, but a small percentage require the appliance to be arranged to open the bite for their correction.

When the jaws are at rest the teeth are not in occlusion, the full occlusion of the teeth taking place only at the time of