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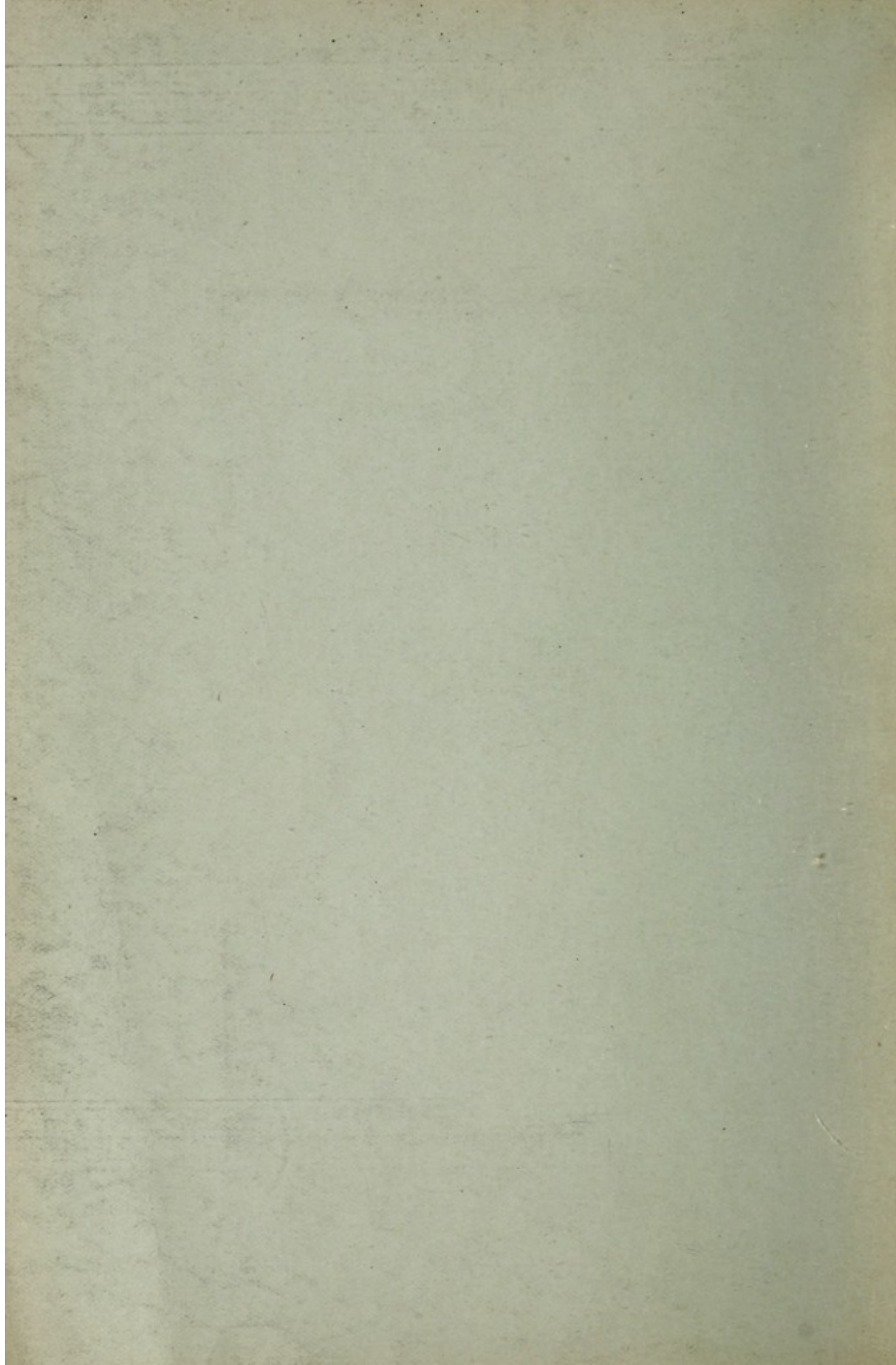
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INCIDENT TO


THE FIRST DENTITION.

BY

JAMES W. WHITE, M.D., D.D.S.

PHILADELPHIA:

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DISEASES INCIDENT TO THE FIRST DENTITION.

By JAMES W. WHITE, M. D., D. D. S.

THE term "dentition," as here employed, does not include the development of the teeth-germs, but refers simply to the natural processes (usually beginning between the fifth and eighth months and terminating between the twenty-fourth and thirtieth months) by which the teeth are liberated from their osseous and fibrous coverings and made subservient to speech and mastication. "Incident" in the title of this article is to be understood as indicating various local and systemic disturbances which, occurring simultaneously with the eruptive processes of dentition, are in some instances at least certainly dependent upon them.

The first dentition is a physiological and anatomical crisis of infancy—a process which, under conditions in every respect favorable, may proceed with little or no disturbance to the child, without attracting the attention of even a watchful mother, though it is rare for a child to pass through the period of dentition without more or less manifestation of suffering, and frequently there are serious and alarming disturbances of its health.

Authorities are at variance with regard to the liability to, and the frequency and importance of, departures from physiological dental evolution. There are extremists who over-estimate the average influence of teething as a disturbing element, and on the other hand there are those who underrate the difficulties which may attend it. It is not disputed, however, that it is during the teething period that the greatest number of deaths occur. The mortality of infancy is alarmingly great, and though it must be admitted that many infantile diseases are in no way related to dental evolution, yet it is reasonable to assume that it has a large share in the production or aggravation of the derangements of health so common and so serious at this time of life, and that vast numbers of children die because of lesions which, if not dependent on, are concomitant with, the process of dentition. The nervous perturbation occasioned by the eruption of the teeth increases the susceptibility and lessens the resistive power of the child. Thus, because of a disturbance of its equilibrium, it is not only more sensitive to the ordinary causes of derangement—to the impression of cold or to the irritation from unsuitable food—but it is also less capable of combating disease; and a catarrhal attack, an indigestion, or an eruptive fever, coming at

this time, acts upon a system less able than usual to resist injurious influences.

The period during which the teeth and surrounding tissues are undergoing those changes which precede and accompany the eruption of the former being one of augmented *nervo-vascular* action, there is then a more than usual liability to disturbance of harmony, and consequently a predisposition to functional derangement. It is analogous in this respect to other so-called critical periods, such as *utero-gestation* or the establishment and cessation of the menstrual function, which, though purely physiological processes, are subject to deflections which not infrequently place them within the domain of pathology. At each of these periods, but especially during the eruption of the teeth, the brain and nervous system, the stomach and intestinal tract, the circulatory and respiratory systems, show an increased though varying liability to irritation.

Coincident with the development of the masticatory apparatus other important changes are taking place in the organization of the child, notably in the stomach and intestinal tract, preparing these for the reception and digestion of solid food. These concurrent changes, while exercising their full share in the production of constitutional disturbances at this period, increase also the nervous impressibility of the child, and thus lessen its ability to resist other perturbative influences. The natural vigor of the child, the state of its general health, and the conditions by which it is surrounded exert an influence in preventing or promoting aberrations in dental evolution. Improper clothing, atmospheric variations, intense or prolonged heat, cold or dampness, miasmata, the exanthemata, indigestion, excitement of the nervous system by fright or anger—anything which, causing a modification in the normal standard of healthy life, reduces the resisting power of the organism, may find pronounced expression in a disturbance of the otherwise physiological process of dentition.

A consideration of pathological dentition recognizes interference with function in contiguous or remote organs from causes originating in the mouth, and, as well, the expression in the oral cavity of constitutional disturbance. Pathological dentition may thus be credited with causing or aggravating various systemic disorders, as such disorders may in turn be reasonably suspected of interference with this developmental process. Therefore, while dentition is not to be held accountable for all the ills to which infancy is heir, it is unsafe to ignore the possible pathological complications in any case. It does not militate against the theory that dentition is frequently a disturbing element because multitudes of children escape, in part or altogether, the evils with which others, having feebler powers of resistance, are afflicted. There are varying degrees of susceptibility, differences of environment, of hygienic care, of quality of food, of clothing, and of habits taught or allowed, that enter into the problem of the maintenance of infantile health, the influence of which can be only approximately estimated. Viewing dentition, therefore, either as the principal factor in the production of constitutional disturbance or as a single link in a chain of deranged activities, it is surely desirable that a careful investigation should be

made as to the condition of the eruptive process in all cases of infantile disease.

An intelligent understanding of the subject under consideration requires an appreciation of the physiological relations of the mouth and of the peculiar sensitiveness of infancy. Anatomically considered, no other portion of the human organism offers such a complex association of tissues as those which compose the mouth; no other has such diversified physiological functions, and, from a pathological standpoint, no such significant systemic relations. Its various offices necessitate a no less varied organization and an equally varied relation with other structures. The wide circle of its anatomical and physiological sympathies suggests an equal circle of pathological complications, and indicates the diversity, as well as the gravity, of the disturbances dependent upon systemic relations to which its lesions may give rise. By means of its lining mucous membrane the mouth is related by continuity with the pharynx, œsophagus, stomach, and intestinal tract, the larynx, trachea, and bronchi, and by contiguity, as well as by continuity, with the eyes, ears, nares, and antra. But it is to direct or sympathetic nervous relations that the most formidable disturbances resulting from an interference with the eruptive process are to be attributed. The terminal distribution in and about the mouth of the sensory and motor branches of the sensitive trigeminus, its extensive topographical connections and their relations to the heterogeneous tissues and manifold functions concerned, and its association with the great sympathetic, thus connecting the teeth with the entire organism, explain the liability to aberrations of sensation, nutrition, and motion when its termini are the seat of disordered sensibility. It should be remembered that the fifth nerve is the largest of the cranial nerves; that it is the great sensitive nerve of the head and face, the nerve of the special sense of taste, the nutrient nerve of the teeth, and the motor nerve of the muscles of mastication; that it not only gives off branches—the ophthalmic, the superior and the inferior maxillary—but that these, by subdivisions, supply branches to the eye and eyelids, the nose, the ears, the forehead and scalp, the upper and lower lips, the chin, the gums, the tongue, and the teeth of the upper and lower jaws; that filaments of the maxillary branches again join the ophthalmic branch and the seventh nerve, which controls the muscles of the face; that its numerous ganglia, its varied functions, and its frequent communication with the sympathetic nervous system give it unequalled importance among the cranial nerves. It is evident from this standpoint that the pathological bearings of deranged action connected with the teeth may not be easily defined or limited.

In reflex action is found an explanation of the mutual relations of apparently unconnected disturbances. The influence of a pathological condition, acting as an irritant upon an afferent nerve, is conveyed to a related nerve-centre which may from some cause be in a state of exalted sensibility, and is thence reflected along an efferent nerve, producing reflex phenomena. Reflex disturbances are variable in character, and their mechanism is not always explainable. But as efferent nerves are distributed to glands and to muscles, voluntary and involuntary, reflex phenomena generally occur in one of two principal directions—viz. in

modified secretion or muscular spasm. There may be either an increase or a diminution in the amount of secretion in the affected gland. Irritation of an abdominal nerve may lead to a suppression of the renal secretion. A mental impression, as fear or anxiety, generally produces increased renal and intestinal secretions, but arrests the salivary secretion. In the adult, reflex spasms are common, from various causes, in the stomach, at the neck of the bladder, in the urethra, in the sphincters of the vagina and rectum, in the œsophagus, larynx, bronchi, intestinal canal, ureters, and gall-duct, and notably in the uterus. Reflex muscular spasms may also originate through the agency of vaso-motor nerves acting upon the contractile walls of blood-vessels, causing either contraction or dilatation. Examples of such effects are the pallor produced by fright and the suffusion of the face and neck in blushing.

Owing to the predominance of the spinal system in infancy this sympathy of distant organs with one another is notably greater than in adult life, creating a special tendency to the production of reflex phenomena. The exceeding mobility of the nervous system at this period is also such that a mere peripheral irritation is liable to result in sympathetic general disturbance—often, indeed, to the overshadowing of the original lesion by accessory phenomena. The profound disturbance which may be excited in an infant by even a slight functional disorder is a matter of common observation. A little irritation of the larynx will produce spasmodic croup, a little indigestible food may cause convulsions, and almost any excitant may provoke vomiting. Thus a mere interference with function may result in consequences out of all seeming proportion to the gravity of the cause. Post-mortem examinations of infants are therefore very frequently unsatisfactory, because they fail to afford any explanation in structural change of the cause of death. There is, however, in infancy, not only a predisposition to disease, owing to the weakness of the organization, but a tendency of functional derangements to excite organic changes, and thus to add new complications.

The body of an infant is not a miniature of an adult organism, but is characterized by peculiarities of structure and function. All of its organs are incompletely developed, but not uniformly so. The brain is, proportionately to size and weight, larger than in the adult, imperfect in structure, and so soft as to be almost a semi-fluid. The brain and its meninges are extremely vascular. The tissues generally are softer, more vascular, and more distended with fluids. The skeleton is for the most part cartilaginous, the muscles are gelatinous, the cellular tissues are filled with serum, and the skin is vascular and sensitive. The abdomen is disproportionately large; the mucous membrane of the alimentary tract is soft, vascular, and hypersensitive. The mesenteric and salivary glands, the pancreas and lacteal vessels, the kidneys, suprarenal capsules, and liver, are relatively larger than in the adult. The structure of the spinal cord and nerves is more perfect than that of the brain, and therefore the functions of sensation and voluntary motion are correspondingly in advance of the functions directly dependent on the cranial nerves. The glandular, lymphatic, and capillary systems, and the nutritive system generally, are the most fully developed, and functional activity is confined chiefly to the nutritive processes. These

structural and functional peculiarities explain the tendency of disease in infants to assume an inflammatory type, and also explain the facility with which morbid action is transferred by extension, metastasis, or reflection to organs not originally implicated. The liability of an irritation or inflammation of the mucous membrane of the alimentary tract to set up an analogous condition in the brain or its meninges is a familiar example of this, as is also the tendency of a morbid action in a mucous membrane to extend throughout the entire length of the affected tissue. Thus, an inflammation of the tonsils may invade the pharynx and œsophagus, the larynx and trachea—may even follow the gastrointestinal mucous membrane and involve the mesenteric glands. The activity of the vascular system, the free supply of blood to the tissues, the liability to effusion of serum or lymph, and the susceptibility of the nervous system, contribute to the creation of a special tendency to intense and dangerous reactions from local irritations. The balance between health and disease in an infant is delicately adjusted, and slight disturbing causes will incline it to one or the other side.

The evolution or development of the teeth commences about the seventh week of foetal life, and is continued within the jaws until (generally between the fifth and seventh months after birth) the eruption or cutting of the teeth begins—a double process, consisting of the gradual elongation and rising of the teeth and the coincident absorption of the hard and soft tissues overlying them. The alveolar borders are the first to show signs of the absorptive process by a dissolution or melting of their approximated edges. The teeth, rising in their sockets, the roots meanwhile lengthening, press upon the overlying gums, which, becoming thinner and thinner, finally allow them to escape. It is therefore the removal of impeding tissue by absorption which permits the passage of the teeth through the gums.

Normal dentition depends upon an absolute accord between the processes of growth and absorption, as well of the crypt as of the mucous membrane covering the tooth. When, therefore, from any cause, there is a want of such accordance the propulsive and resistive forces are in antagonism, and irritation is the result. If the eruption proceeds physiologically, the absorption of the overlying tissues is effected without the production of irritation, but an abnormal pressure arrests the absorptive process and produces congestion, tumefaction, induration, and ulceration. Thus, if the advance of the tooth is more rapid than the removal by absorption of the superimposed tissues, these act as a mechanical obstacle, and the tooth becomes in turn a mechanical irritant.

It has been urged that dentition cannot produce special discomfort, because of the comparative insensibility of the gum-tissue, and because the progressive growth of a tooth is inadequate to make sufficient pressure to cause serious distress. But this argument finds answer in tumid, tense, and shining gums; in ulceration, in sloughs, and in the black, thickened blood which sometimes follows a touch of the lancet. It is true that normal gum-tissue is comparatively insensitive, but when inflamed it becomes exquisitely tender. The usual results of continued irritation of any tissue follow—determination of blood, congestion, effu-

sion, and even suppuration. (It is in such cases that "scoring"—superficial incisions—of the gums may afford an incomplete relief by lessening the capillary distension.) Under such circumstances the gums are so sensitive that the lightest touch will cause pain, so that the child on attempting to take the breast will jerk back its head—a manœuvre which is frequently mistaken as an evidence of colic; but a little attention enables the nurse to distinguish the difference between the indications of the two troubles.

Many who admit that dentition may exercise an influence on the etiology of the diseases of infancy assume that the explanation of deranged action is to be found only in the direct pressure of the advancing tooth upon the fibrous tissue, which fact is always to be determined by local signs. It is doubtless true that there is generally some such external evidence, but it does not follow, because there is no local manifestation, that therefore dental evolution can have no relation to a pathological condition. Hyperæmia of the gums is perhaps generally caused by the eruption of the teeth proceeding more rapidly than the absorption of their integumental covering, and the undue pressure thus exerted may occasion trouble by the irritation of the nerves of the gum-tissue, manifested locally by soreness, tumefaction, redness, or ulceration; systemically, by irritability, sleeplessness, fever, etc.

But the direct pressure of the advancing tooth upon the fibrous integuments is not the only nor the principal factor in disturbance of equilibrium in pathological dentition. The most serious complications are, it is reasonable to suppose, caused by the resistance of the gums, and consequent pressure upon the nervous and vascular supply of the pulp, giving rise to severe and unremitting pain—a true toothache, comparable only to that exquisite torture which is experienced in after-life from an exposed and irritated pulp. The condition when a tooth is thus situated is not unlike that which is found in whitlow—vascular and sensitive tissues bound down by unyielding coverings. If such a perversion of this physiological process is possible, there can be no question as to the extent of the mischief which may result—an irritability of the general system which finds expression in loss of appetite, sleeplessness, nausea, thirst, fever, diarrhoea or constipation, convulsions, paralysis, and other serious lesions; many of which, as strabismus or epilepsy, remain throughout life.

It is not surprising that those who hold the theory generally assumed and taught, that the direct pressure of the advancing tooth upon the fibrous tissue is the explanation of all symptoms attributable to pathological dentition, should underrate the distress and danger which may occur. But the severity of the disturbance frequently witnessed suggests a more serious complication, and a consideration of the conditions justifies a graver diagnosis. It must be remembered that at the period of eruption the roots of the teeth are yet incomplete. Instead of the conical termination and minute foramen which characterize a perfected tooth, the aperture is nearly as large as the root itself, and thus when the sensitive pulp, made up of connective tissue, blood-vessels, and nerves, is in a condition of irritation because of the morbid activity of the process of dentition—augmented vascular and nervous action—there may be

produced a hyperæmia sufficient, possibly, to cause the protrusion of a part of the mass from the incomplete aperture of the root, giving abundant cause for extreme constitutional disturbance. If in the adult the irritation of a dental nerve may give rise to otalgia, otorrhœa, deafness, amaurosis, hemicrania, neuralgia, hysteria, chorea, epilepsy, tetanus, etc., it is surely not only possible, but highly probable, that a like irritation may be the occasion of grave and even fatal disorders in the infant.

That this resistance of the gum-tissue is the occasion of the constitutional disturbance so often seen in teething children appears probable in view of those cases in which, though there be no local indication of trouble, every untoward symptom disappears promptly after lancing of the gums over the tooth or teeth next in order of eruption. It is almost demonstrated, negatively, by the inefficiency of hygienic measures and of systemic medication, by failure to procure relief by scoring the gums (a practice which has brought the lancet into undeserved disrepute), and positively by the immediate, apparent, almost magical, improvement which follows the removal of the cause—viz. the pressure of the fibrous tissue upon the advancing tooth and its nervous supply. This theory makes it easy to understand how the thorough lancing of the gums over the tooth or teeth thus situated may give a relief so immediate and complete that there shall be no room for doubt as to the correctness of the diagnosis.

If these views be correct, it is evident that there may be cases in which a train of morbid symptoms presents, ending possibly in convulsions and death, without the existence of a single local indication. It is not, therefore, a sufficient reason for not lancing the gums that they exhibit neither tumefaction, redness, induration, nor the whiteness of the presenting tooth, though generally there is some external local manifestation. If, however, there be no obvious explanation for the occurrence of untoward symptoms during the period of dentition, it seems the part of wisdom to give the child the benefit of the doubt by free incisions over the tooth whose eruption is, in accordance with general laws, to be anticipated, even though there be no hyperæmia of the gums; especially as the operation causes only a trifling amount of pain, inflicts no injury, and is practically free from danger. Local indications demand the lancet; constitutional symptoms of distress not otherwise accounted for suggest and justify it.

The manifestation of functional inharmony from pathological dentition will depend, as in trouble arising from any other disturbing cause, upon the temperament and health of the child, its dietetic management, and its hygienic surroundings. In some cases there is a gradual development of biliary, gastric, enteric, and cerebral complications; a slow but steady loss of vital power, with no effort at recuperation, and feeble resistance to the undermining influences which gradually but surely wear out the young life. In other cases the indications of disturbance of function are manifested primarily in the nervous system; the symptoms are all characteristic of acute derangement, and are dangerous from their violence and uncontrollability. High fever, vomiting, choleraic diarrhœa, meningitis, convulsions, stupor, and death are

the rapidly-succeeding phenomena. Between these two phases, chronic and acute, there is every conceivable grade of symptoms, every imaginable complication. Many disorders occurring during dentition are not incident to, but coincident with, this process, and it frequently requires a nice discrimination to determine the rôle of the teething process in the causation of morbid manifestations at this period.

Usually, the first indication of the advance of the teeth is an increased flow of saliva—a healthy manifestation, as it serves to keep the mouth moist and cool. This increased flow of saliva, called “drooling,” is doubtless due to the irritation of the trifacial nerve, which is sensory to the teeth and nutrient to the salivary glands. As the itching or discomfort increases, the child is observed to be disposed to carry its fingers or anything which it may have in its hands to the mouth, as though a sense of slight irritation were relieved by rubbing or pressure, and an evident satisfaction is experienced by the child if the gums are rubbed gently by the nurse. If the discomfort becomes more pronounced, the mouth is likely to be hot and dry, and more or less febrile excitement is manifested. Frequently a diarrhœa ensues, which, if not too severe or protracted, is beneficial rather than hurtful—requiring care, however, that it does not itself become a source of danger. An unusual redness of one or both cheeks, sometimes changing from one to the other, is a frequent symptom of nervous disturbance. Eruptions are apt to appear—usually on the cheeks, but sometimes on the head or even over the whole body—or ulcerations on the tongue, lips, gums, and inside of the cheeks. Itching of the nose, twitching of the muscles, dilatation of the pupils, fretfulness, restless sleep or wakefulness, thirst, and loss of appetite, are evidences of increasing irritation. A swelling of the cheek, with more or less redness, may result from a congestion of the gum over an erupting tooth, implicating also the cellular tissue. If the eruption of the tooth is still delayed, the child becomes more uneasy, troublesome, peevish, cross, and even vindictive; cries when awake or stops crying only to scream; moans when asleep; thrusts its thumb or finger between its jaws; refuses to be amused, and treats the effort as an indignity; throws down its toys when handed to it as though in a passion, and is outraged by any attempt at diversion; compresses its lips; corrugates its brow; shows an intolerance of light; pulls at its hair or ears; attempts to slap or scratch its nurse; refuses its food, or vomits it if swallowed. Associated with these indications, some or all, or quickly succeeding them, are persistent nausea and diarrhœa, fever, thirst, convulsions, or other systemic complications.

If the theory be correct that in such cases the trouble is mechanical and local, it would appear to be a folly to seek relief for the child by general medication, by relaxants, derivatives, calmatives, febrifuges, local emollients, fomentations, anodynes, etc. before the local and mechanical requirements had received the proper attention; though of course the judicious treatment of pathological dentition should in all cases include special hygienic care and medication if required, with the view of securing a perfect equilibrium of all the functions.

A familiarity with dental evolution is necessary to a proper appreciation of the probabilities in a given case; for although there is not

absolute uniformity in the order of eruption, the normal sequence will afford a basis for approximately correct interference. The period and order of eruption of the deciduous teeth are among the elementary facts with which every practitioner—indeed, every parent—should be familiar. The rule is that the lower teeth precede the upper of the same class by two or three months, but not infrequently the upper precede the lower by the same difference in time. Again, the rule is that the teeth are erupted in pairs, with an interval between the different pairs, but occasionally two or three pairs erupt concurrently. Still again, the rule is that the amount of irritation holds a relation to the number of teeth advancing simultaneously, but owing to varying susceptibility a single tooth may cause more disturbance in one case than a half dozen will in another. The usual order of eruption is as follows, the lower preceding the upper: Central incisors, fifth to eighth month; lateral incisors, seventh to tenth month; first molars, twelfth to sixteenth month; cuspids, fourteenth to twentieth month; second molars, twentieth to thirtieth month. There is occasionally great deviation from regular order as well as from usual time in the eruptive process. Anomalous cases are those in which one or more teeth are found erupted at birth, and those in which no teeth appear until long after the usual period—as sometimes happens, not until the second or even the third year. Premature dentition is more apt than a tardy eruption to be attended by constitutional disturbances—precocity being an evidence of weakness rather than of strength, not alone in the child, but in the character of the denture. It is also worthy of note that when the eruption of all of the teeth is delayed, the process, when once begun, is likely to be rapidly completed, and generally with but little disturbance to health. Exceptions to this rule are cases in which late dentition is associated with tardy and imperfect development of the body generally, because of feeble vitality or constitutional disease.

If the positions assumed as to the etiology of the morbid phenomena connected with dentition be correct, it follows that the lancing of the gums over the erupting tooth is the procedure which should be promptly resorted to as that most essential and most likely to afford quick relief, unless, indeed, it can be shown that there are valid objections to the operation.

The objection most frequently urged is that unless the tooth is erupted before there is time for the wound to heal, a cicatricial tissue is formed which offers increased resistance. This argument is in contravention of recognized facts as to the reparative process. Cicatricial tissue is always of a lower degree of organization than the original structure, and consequently easier of absorption. The uniting medium in the repair of a solution of continuity possesses less vitality, is less perfectly nourished, and is easier of disintegration than the original tissue. The tendency of scar-tissue to break down is a matter of common observation even among the laity, and except in the case of gum-lancing is not disputed by any medical authority. Gum-tissue offers no exception to the general rule.

The possibility of serious hemorrhage following the operation is sometimes urged as an objection, but the argument applies with equal force

not only to every surgical operation, but to all medication. If every possible fatality resulting from idiosyncrasy or unexpected complications is to be considered as contraindicating medical or surgical interference, the sphere of the surgeon and physician will be notably narrowed. Granting that it is among the possibilities that a child may die from hemorrhage following the lancing of the gums, it must also be admitted that occasionally an adult dies from hemorrhage following tooth-extraction; but, except in cases of known hemorrhagic diathesis, this liability is never taken into account. A suggestion of such diathesis or of hereditary probabilities it would of course be well to heed. In such cases the administration of the tincture of iron and of erigeron or ergot for a few days previous to lancing would lessen the liability to hemorrhage. The cases in which any serious trouble has resulted from hemorrhage following the lancing of the gums must be very rare, and it seems improbable that even a threatening hemorrhage could not be controlled by judicious treatment.

A further argument against lancing is based on the occasional necessity for a frequent repetition of the operation; but the reasoning applies with equal force to any medication which fails to secure permanent relief in a given derangement likely in the nature of things or under special circumstances to demand a repetition.

The possibility of injury to the developing tooth is an objection not infrequently made to the use of the gum-lancet, but only an ignorance of the anatomy of the mouth inexcusable in any dentist or physician could lead to the infliction of permanent injury. The probability of complication in erysipelalous or diphtheritic conditions is of course admitted, and such manifestations should be regarded as contraindicating the operation.

In addition to the objections noted the suggestion of lancing the gums meets frequently strong opposition on the part of mothers, because of their dread of the infliction of suffering upon tender babes. But that the amount of pain caused is of the most trifling character may be inferred from the readiness with which a child old enough to appreciate conditions submits to the operation after it has once realized its benefits. Even though a momentary suffering were considerable, the resultant relief is so immediate, complete; and permanent in most cases that it would be cruelty in the extreme to withhold the lancet.

Lastly, the argument which even professional men use, that thousands of children erupt their teeth without recourse being had to the lancet, is hardly entitled to serious notice. Thousands of women become mothers without the aid of a physician, and there are many practitioners who never use obstetric forceps, but obstetricians and obstetric forceps are nevertheless often necessary. All the arguments noted are offset by the consideration that many infants' lives are probably sacrificed yearly because of popular and professional prejudice against lancing; while, on the other hand, it will not be claimed that death, or even serious trouble, results in one case in thousands from the performance of this simple operation. The suffering, even if unnecessary, is very trifling, the risk hardly computable.

An examination of the mouth should always be made in any case of

illness not plainly accounted for occurring during the teething period. Even in this simple procedure regard should be had to the number of teeth, if any, already erupted, so that the finger may be introduced with reference to avoiding unnecessary contact with sore or inflamed gums. If no teeth have been erupted, the gums over the incisors should not be pressed upon, but the finger should be introduced at the corner of the mouth. On the other hand, if one or more of the incisors are in place, the finger should be introduced at the front.

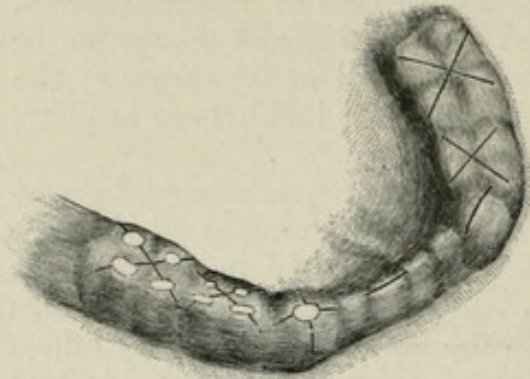
The operation of lancing the gums should, when necessary, be performed in the spirit of the adage, "What is worth doing at all is worth doing well." The operator should be seated directly in front of the assistant, the knees of the two parties corresponding in height. Some direct the child to be held crosswise on the lap of the assistant; others prefer to be behind the head of the child to operate on the left side, and in front to operate on the right side of either jaw. Others take the head on their knees when operating on the upper jaw, and place the head on the knees of the assistant for operation on the lower jaw. In any case the child should be held with such relation to the window or to the artificial light that the parts to be operated upon may be illuminated to the best advantage. The instrument employed should be a curved double-edged bistoury, so protected by wrapping the blade as to avoid injury to the tongue, lips, or cheek. The left hand of the operator should separate the jaws and protect the tongue and lips of the child in such manner that any unexpected movement may result in injury to his own fingers rather than to the child. In the case of a child disposed to bite the insertion of a small cork between the jaws will be of service. This should be guarded from falling into the throat by a piece of string or tape, and should be held in the desired position by the assistant.

The manner in which this trifling operation is performed has much to do with its success or failure. As has been already stated, the object is not merely nor chiefly to induce a flow of blood, but to remove tension. The cuts should therefore be made with special reference to the form of the erupting tooth, and should be sufficiently deep to reach the presenting surface and extend fully up to and a little beyond its boundaries, so as to ensure its entire liberation. Only an *undue* force will be likely to injure the incompletely solidified enamel of the tooth or endanger the germs of the developing permanent tooth. It is well always to direct the point of the lance toward the lips, instead of toward the lingual or palatal surface of the oral teeth, as there is thus less liability to injure the crypts of the permanent teeth if from any cause the cut should be made deeper than intended. The incisors and cuspids need only a division of the gum in the line of the arch. The molars require a crucial incision, the centre of the crown, as near as can be determined, indicating the point of decussation. (See Fig. 101.)

Partial eruption of a tooth is generally accepted as a solution of the problem, the slightest presentation being considered as definitely deciding against the necessity for lancing. This is generally true in the case of the incisors—far from true of the cuspids and molars. The cone shape of the cuspids ensures a persistence of the trouble, from pressure of the enclosing ring of gum, until fully erupted. A complete sever-

ance of this fibrous ring on the anterior and posterior as well as lateral surfaces is indicated, and is even more necessary than before the

FIG. 80.



Showing Lines of Incision in Lancing: A A. over the molars; B B. over the cuspids and incisors before eruption; C C C. over the molars and cuspids after partial eruption.

partial eruption of the tooth. A cuspid is indeed rarely the cause of irritation until after the eruption of its point. All the cusps of a molar may have erupted, and yet strong bands of fibrous integument maintain a resistance as decided as before their appearance. In this case either the boundaries of the tooth should be traced by the lancet, and all such bands severed around its outlines, or a crucial incision should be made so as to ensure perfect release from pressure. In extreme or urgent cases it is sometimes advisable to seize the

gum over a presenting molar with a tenaculum and cut out a square block of gum, so as fully to expose the whole articulating surface of the tooth. If the wound should heal readily and the symptoms point to a renewal of the irritation, an early repetition of the operation will be advisable, and may be resorted to with advantage at short intervals until the tooth has completely erupted.

Persistent bleeding after lancing, though infrequent, has occurred, and is probably due generally to the sucking of the gums provoked by the taste of the blood. In such cases the substitution of the nipple of the nurse will give the child better employment. The extent of the hemorrhage can be ascertained by touching the wound occasionally with the napkin-covered finger. If the child should refuse to nurse, it can be prevented sucking its gums by the introduction of any soft substance, such as a roll of linen or muslin placed like a bit in the mouth and kept in position by attachments of tape tied around the head. If the bleeding continues longer than seems desirable, a little very finely-powdered alum may be rubbed into the cuts, and will generally be all that is required to control the bleeding. Tannic acid may be employed in the same manner; or fibres of cotton which have been moistened and dusted with one of the vegetable or mineral astringents may be packed into the cuts; or styptic colloid—a saturated solution of tannin and gun-cotton in ether—may be applied with a minute camel's-hair brush over the wounds; or some one of the numerous remedies which act mechanically may be used: lycoperdon, puff-ball, matico, resin in powder, burnt cork, and spider's web are familiar examples. Pressure with the finger over the cuts would be an efficient procedure. As a last resort the actual cautery would promise relief. Nitrate of silver or the perchloride or persulphate of iron should never be used, because of their liability to cause a slough and consequent secondary hemorrhage more difficult to control than the primary bleeding. In an extreme case, to divert the circulation to other parts of the body, hot foot-baths or mustard cataplasms to the extremities may be resorted to, and the feet and limbs kept warm by the application of a

heated brick or flat-iron or by a bottle of hot water. In a case of hemorrhagic diathesis, where a slight oozing of blood persists in spite of local treatment, it would be necessary to administer remedies intended to correct an abnormal condition of the blood and to promote contractility of the blood-vessels. Of the former, the tincture of the muriate of iron is probably the most efficient; of the latter, acetate of lead, aromatic sulphuric acid, gallic acid, ergot, erigeron, and turpentine are of the class from which benefit might be expected. Both indications would be met in the following formula:

R. Tinct. ferri chloridi, fʒss;
 Acid. acetic. dil. fʒj;
 Liq. ammonii acet. fʒj;
 Ext. ergot. fld. fʒij;
 Syr. simp. fʒss;
 Aquæ, q. s. ad fʒiij. M.

Dose, a teaspoonful every three hours for a child six months old.

To promote as far as possible the normal eruption of the teeth the requirements which are advisable for the general welfare of the child are indicated with added emphasis—proper clothing, suitable food, abundance of sleep, fresh air and sunshine, judicious ventilation of the nursery, cleanliness, the avoidance of draughts, of nostrums, and sleeping drops, and especially of everything calculated to excite mental and emotional activity. An infant should always have a bed, crib, or cradle, and should never sleep in the bed with the mother or nurse. In this connection it may be noted that a cradle without rockers is to be preferred, and the same objections which apply to cradle-rocking apply with equal force to the senseless jolting upon the knee of the nurse so commonly practised. Infants should be allowed to lie in their cribs a considerable portion of the time, instead of being held in the arms and against the person of the nurse. Cleanliness of the nurse in person and clothing is next in importance to the cleanliness of the child in its influence upon the health of the latter. A teething child should have more than usual hygienic care, more than usual freedom from all avoidable disturbing influences; for whatever tends, by modifying the general health unfavorably, to lower the resisting power of the organism, may readily convert the natural and otherwise easy course of dentition into one of pain and danger. There is unquestionably during the period of dentition an increased susceptibility to nervous and digestive troubles, requiring more than ordinary watchfulness on the part of the mother. Causes which at other times might have no appreciable effect may then be productive of danger. Anything which introduces inharmony into the functions of animal life may result in a disturbance of the processes of dentition.

The brain and nervous system of a child need no stimulation. The danger is that they will develop too rapidly, diverting nutrition from the organic functions and creating a tendency to reflex disturbances which may be excited by trivial causes and lead to disastrous results. The prevailing type of infancy is, it has been said, "big heads, little bodies, and feeble digestive power." Certainly, the tendency of to-day is to a premature activity of the brain at the expense of the organic func-

tions—"to more nervous energy and mental activity, but less physical vitality and less power of endurance. The balance of structure and harmony of function in organization is thus radically changed, and carried to an intense development of nervous tissue which in its very nature is unfavorable to the preservation of offspring."

The clothing of an infant should be such as, while not interfering with respiration and muscular action, will protect the entire body, especially the legs and feet. A fine soft flannel next to the skin, worn in winter and summer, will protect the body from variations of temperature and do much toward preventing catarrhal and other troubles. An entire change of clothing at night is desirable, and in warmth should be at least equal to that worn during the day. As a rule, the heads of children are kept too warm, and the legs and feet are insufficiently protected in outdoor exposure. But, indoors or out, bare neck, arms, or legs should never be permitted. All changes in the clothing or food of a child should be made gradually, so as not unnecessarily to disturb its functions.

The food of an infant for the first few months after birth should consist exclusively of milk. Always, when possible, it should be nursed by the mother; when that is impracticable, by a wet-nurse. But the mother or the nurse must herself be in good health or her milk may be unwholesome. Undue fatigue, excitement, or improper diet may not only interfere with the secretion as to quantity, but destroy its nutritive properties and render it harmful to the infant. When human milk cannot be obtained, cow's milk should be substituted. Condensed milk may answer for a short time and under peculiar circumstances, when fresh and pure milk of the cow cannot be obtained, but should not be relied upon as a steady diet. When circumstances make it desirable to give condensed milk, care should be taken that it be not used in excess. A small teaspoonful is enough to make four ounces of rich milk. Barley-water makes a useful diluent for this preparation. Arrowroot, corn starch, and other farinaceous foods are positively injurious to a child under three months of age. The secretion of saliva before that period is scant, and is, moreover, deficient in the property which is essential to produce the change required in starchy foods to fit them for digestion; and this property is not fully developed in the saliva until the child is about a year old. A very small quantity of one of the farinaceous preparations may be advantageously added to milk, simply to prevent the tendency to the formation of large curds, but in any considerable quantity it is absolutely hurtful, and dependence upon farinaceous food as a staple will almost surely produce intestinal trouble. It will fail, moreover, to supply the essential elements for the building of the osseous and muscular structures. As a food it only makes fat and produces heat. After the child is nine months of age, if weaned, milk should still be made the staple, but the diet may be varied by the addition of oatmeal boiled to a jelly, wheaten grits, barley flour, rice, farina, sago, breadcrumbs, the yelk of egg with milk, and chicken or mutton broth. After two years of age bread and butter, baked potatoes, and ripe fruits may be gradually added. But milk should still be the staple until three years of age. While, on the one hand, confinement to any

one article of food, unless it be pure rich milk, should be avoided, and a varied diet allowed, care should be taken, on the other hand, to exclude those substances which contain but little nutriment or are difficult of digestion, such as pastry, confectionery (unless of the simplest forms), cabbage, turnips, the skins or rinds of fruits, etc. Most children are fed too often and too much. The resulting indigestion is the fruitful cause of disorders of the stomach and bowels, and if such disturbance be added to the prostrating effects of summer weather, and especially at the teething period, a formidable complication is presented. Too much stress can hardly be placed on the evil of overfeeding—a mistake so common that intelligent observers have estimated it as the chief cause of the mortality of infancy. No uniform rule can be laid down as to the quantity of food to be allowed. The amount will vary with the age and constitution of the child. As an approximate guide it may be assumed that a healthy infant will require from twelve to sixteen fluidounces daily during the first month, increasing during the second and third months to twenty-four ounces, and after that to two or even three pints. Of course, strength and quantity bear a relation which must be taken into the account. For infants brought up by hand the addition of lime-water to the milk neutralizes the acid secretions of the stomach and intestines and serves to prevent colic and diarrhœa. To boil milk makes it more difficult of digestion.

The amount of dilution which cow's milk should receive depends on the character of the milk and the age and condition of the child. If the milk be pure and rich, it should be diluted one half for the first six weeks of life, and one third from six weeks to four months. As long as milk forms the staple of the feeding the addition of lime-water to each meal's allowance will be beneficial.

Within the limits designated it is well to vary the food of a child artificially fed, and all its food should be moderately salted. The addition of some mucilaginous article, such as gum-acacia or gelatin, is highly recommended by some practitioners. Pure cool (not cold) water is generally very acceptable to an infant, and happily supplies the physiological demand for fluids and prevents it from overloading its stomach in nursing. It should be remembered that milk rapidly absorbs odors and septic germs, and quickly ferments and sours. It should be kept in scrupulously clean vessels and intelligently guarded from all contaminating influences. Unless assured of its perfect sweetness it would be well always to test it by litmus-paper. Scrupulous cleanliness of the nursing-bottle is required. The plain white glass feeding-bottle with a rubber nipple as sold in the shops is to be preferred to all complex feeding apparatus with glass or rubber tubing, and the child should be encouraged to use it until of an age when solid or semi-solid food may be allowed. The bottle should never be used a second time without previous washing with scalding water, after which it should be filled with a solution of bicarbonate of soda, and this should be allowed to remain in it until it is again wanted for use. It is well to keep both bottle and nipple in duplicate and use them alternately. The rubber nipple should be turned inside out after using, washed clean, and kept in a solution of bicarbonate of soda until again needed.

To discuss the various theories relating to the best substitute for woman's milk would far outrun the limits of this chapter. An excellent formula is that proposed by the late Dr. J. Forsyth Meigs—equal parts of milk, cream, lime-water, and oatmeal, barley- or arrowroot-water, a little sugar of milk being added. The barley may be employed preferably for children who manifest a tendency to diarrhœa, the oatmeal for those who have a tendency to constipation, changing from one to the other according to changes in the intestinal functions. The oatmeal or barley should be thoroughly boiled—a teaspoonful of either to a pint of water evaporated by boiling, preferably in a water-bath, to half the quantity, and strained through muslin. With some children cracked wheat, treated in the same manner, seems to answer better than either oatmeal or barley. If a tendency to constipation is not overcome by the use of oatmeal as suggested, the administration of sweet oil two or three times daily, in doses of from twenty drops to a teaspoonful according to age, will probably correct the difficulty. In adynamic or scrofulous conditions cod-liver oil might be substituted with advantage. Dr. Arthur V. Meigs recommends two parts of cream, one of milk, two of lime-water, and three parts of a solution of sugar of milk of the strength of $17\frac{3}{4}$ drachms to the pint of water.

Meigs and Pepper¹ recommend a preparation made by dissolving a small quantity of prepared gelatin or Russian isinglass in water, to which is added milk, cream, and a little arrowroot or any other farinaceous substance that may be preferred. They say: "We have given this food to a great many children during the last twenty-five years, as well to those brought up by hand as those partly suckled or weaned, and can truly state that they have thriven better upon it than upon anything else we have employed." The mode of preparation and the proportions are as follows: "A scruple of gelatin (or a piece two inches square of the flat cake in which it is sold) is soaked for a short time in cold water, and then boiled in half a pint of water until it dissolves—about ten or fifteen minutes. To this is added with constant stirring, and just at the termination of the boiling, the milk and arrowroot, the latter being previously mixed into a paste with a little cold water. After the addition of the milk and arrowroot, and just before the removal from the fire, the cream is poured in and a moderate quantity of loaf sugar added. The proportions of milk, cream, and arrowroot must depend on the age and digestive power of the child. For a healthy infant within the month we usually direct from three to four ounces of milk, half an ounce to an ounce of cream, and a teaspoonful of arrowroot to a half pint of water. For older children the quantity of milk and cream should be gradually increased to a half or two-thirds milk and from one to two ounces of cream. We seldom increase the quantity of gelatin or arrowroot."

Dr. Eustace Smith speaks highly of "barley jelly," made as follows: Put two tablespoonfuls of washed pearl barley into a pint and a half of water and boil down to a pint; next strain out the barley and let the liquid set to a jelly. Two teaspoonfuls of this dissolved in eight fluidounces of warmed and sweetened milk are enough for a single

¹ *Practical Treatise on the Diseases of Children.*

feeding, and such a meal may be allowed twice a day after the eighth month.

The following is the formula suggested by Prof. Leeds of Stevens Institute as the best substitute for woman's milk :

- 1 gill of cow's milk, fresh and unskimmed ;
- 1 " of water ;
- 2 tablespoonfuls of rich cream ;
- 200 grains of milk-sugar ;
- $1\frac{1}{4}$ " of extractum pancreatis ;
- 4 " of sodium bicarbonate.

Put these in a nursing-bottle ; place the bottle in water made so warm that the whole hand cannot be held in it without pain longer than one minute. Keep the milk at this temperature for twenty minutes. The milk should be prepared just before using.

Dr. J. M. Keating considers that pancreatized milk has solved the much-discussed problem of the artificial feeding of children, and does not think that there is any occasion to ask or look for a more suitable food. He gives the following directions for its preparation : In a gill of water dissolve five grains of extractum pancreatis ; add this to a pint of milk at a temperature of 110° F. The pancreatin is first put in water, because it contains a curdling ferment that is weakened by water ; or the baby's bottle can be filled with milk and brought to the proper temperature by setting it in warm water, and the solution of pancreatin added in proper proportion—namely, a gill to a pint.

An old-time formula, which has been recently indorsed by Dr. J. Lewis Smith, is as follows : Pack a pound of dry wheat flour, preferably unbolted, into a firm muslin bag ; tie the neck of the bag so as to confine the flour tightly, and place it in a suitable vessel, in which it is to be covered with water and boiled constantly for ten hours. After it is removed hang the bag up to dry. The outer part of the flour ball can then be peeled off, leaving a lump looking something like yellow chalk. This should be scraped into a powder, a tablespoonful of which should be mixed with twelve tablespoonfuls of water and heated. For a child six months of age half a teaspoonful of extract of malt and a little salt should be added. White of egg or a little raw beef-juice may be added if more nourishment is needed. This food may be resorted to when a change seems desirable, especially when the bowels are out of order, or may be alternated with peptonized milk.

Dr. Louis Starr gives the following directions for the preparation of "flour-ball" food : Rub a teaspoonful of the powder with a tablespoonful of milk into a smooth paste, then add a second tablespoonful of milk, constantly rubbing until a cream-like mixture is obtained : this is poured into eight ounces of hot milk, stirring well, and is then ready for use.

Dr. Eustace Smith recommends the following preparation, which he considers especially useful to supplement the mother's milk when that is insufficient : One tablespoonful of cream, one of whey, and two of hot water. Whey is made by adding a large teaspoonful of wine of pepsin to a pint of fresh milk, allowing it to stand by the fire a couple of hours, then straining through muslin.

Dr. Louis Starr recommends the following as the best substitute for the mother's milk in gradual weaning of a child, say at ten months; it may also be employed to supplement the breast when the mother's milk is insufficient:

Cream,	f̄ss;
Milk,	f̄iiss;
Sugar of milk,	ss;
Water,	f̄j.

Should this quantity fail to satisfy the child, all the ingredients except the cream may be increased until the mixture measures six, eight, or twelve ounces.

Mellin's Infant Food is an English preparation which agrees admirably with many children. Horlick's Food, made in this country, is very similar. Either may be added in small quantity tentatively to the milk of a hand-fed infant after the fourth or fifth month.

At times milk in any and every form seems to disagree with a child. In such cases it should be withheld, and a temporary substitute given until its use can be safely resumed. Such substitutes are to be found in Mellin's and Horlick's Foods, barley jelly, broths, and beef-tea (peptonized if necessary), the white of raw eggs stirred in water, etc.

The accurate adaptation of diet is by no means an easy task in many cases, and only general rules can be given, which must be modified in individual instances where they do not seem to be successful. The object is to keep up the nutrition of the body with the least irritation to the digestive organs, and the food which will best serve these purposes is the best.

The annexed diet list¹ will be found of service as indicating a conservative regimen:

DIET OF CHILDREN IN HEALTH.

Diet 1.—From birth to six months; if child be nursed, nurse's milk, and *no other food.*

Nurse every two hours for first six weeks; six weeks to four months, every three hours.

From four months till two, four, or six teeth are cut, every four hours, when additional food may be given. (See *Diet 3.*)

During the whole time of nursing never nurse later than 11 P. M. or before 5 A. M.

After the teeth appear, no nursing at night, but continuing through the day till weaning, gradually lengthening the intervals.

Diet 2.—For infants brought up by *hand*, three or four ounces of fresh unskimmed milk and lime-water, with one teaspoonful of sugar of milk, the mixture to be tepid.

For first six weeks, half lime-water, and every two hours.

From six weeks to four months, one-third lime-water, and every three hours.

From four months till two, four, or six teeth are cut, every four hours.

N. B.—If the infant can be only *partially* nursed, nurse twice a day, and for other meals follow Diet 2.

¹Dr. E. S. Dunster.

Diet 3.—From seventh or eighth month (when two, four, or six teeth are through) to one year, *five meals*.

6 OR 7 A. M.—A cup of *pure* milk (if digested), with two teaspoonfuls of farina, oatmeal, wheaten grits, rice or rizensa, barley flour. It is well to alternate rice with oatmeal or farina.

11 A. M.—Milk with breadcrumbs, milk crackers, or rusk. Twice a week the yolk of one egg, beaten with teacup of milk, may be given with the bread and milk, etc., juice of raw beef, heated a little, or beef-tea, chicken or mutton broth, in small quantity. At about ten months, a piece of rare beef or chicken bone to suck.

2 P. M.—One cup of milk, with lime-water, if necessary.

5 P. M.—Same as at 7 A. M.

11 P. M.—*If needed*, same as at 2 P. M.

A healthy child, between ten and twelve months old, requires a pint and a half to one quart of milk in twenty-four hours.

Diet 4.—From one year to eighteen months.

7 A. M.—Same as Diet 3, at 7 A. M., or with a rusk, slice of bread, well soaked in milk.

11 A. M.—A drink of milk, slice of bread and butter, rusk, or crackers.

1 P. M.—A cup of beef-tea or piece of rare beef, chicken or mutton broth, with bread, rusk, or milk crackers; a mealy potato, moistened with beef gravy; one or two tablespoonfuls of light pudding, rice, rizensa, corn starch, or sago, made with milk.

6 P. M.—Same as 7 A. M.

11 P. M.—A drink of milk, *if required*.

A healthy child, between one year and eighteen months, will take two or three pints of milk in twenty-four hours.

Diet 5.—From eighteen months to two years.

7 A. M.—Cup of milk, rusk, bread and butter; occasionally yolk of one egg.

11 A. M.—A cup of milk or rice and milk, with ripe fruit occasionally.

1 P. M.—Rare beef, broths, soups not too rich, baked potatoes, with gravy, milk, or toast-water, or simply water as drink; small quantity of custard or other light pudding.

6 P. M.—Bread and butter, rice (or rizensa) and milk, occasionally stewed fruit.

Between two and three years, same diet may be continued, substituting 11 A. M. and 1 P. M. meals for one at 12 M. Meat can be given every day; vegetables, except cabbage, turnips, and parsneps; morning and evening, principally milk.

The following schedule of the diet of a hand-fed infant from birth upward¹ will serve as a suggestive and useful guide:

Diet during the First Week.

Cream,	fʒiij;
Sugar of milk,	gr. xv;
Whey,	fʒss, fʒij;
Water,	fʒss, fʒij.

This portion to be given every two hours from 5 A. M. to 11 P. M., and in some instances once or twice during the night.

¹ *Diseases of the Digestive Organs in Infancy and Childhood*, by Louis Starr, M. D.

Diet from the Second to the Fifth Week.

Milk,	f ̄ss ;
Cream,	f ̄ij ;
Sugar of milk,	gr. xv ;
Water,	f ̄j.

This portion to be given every two hours from 5 A. M. to 11 P. M.

Diet from the Fifth Week to the End of the Second Month.

Milk,	f ̄j, f ̄ij ;
Cream,	f ̄ss ;
Sugar of milk,	gr. xxx ;
Water,	f ̄j, f ̄ij.

This portion to be given every two hours.

Diet during the Third Month.

Milk,	f ̄iiss ;
Cream,	f ̄ss ;
Sugar of milk,	̄j ;
Water,	f ̄j.

This portion to be given every two and a half hours.

Diet during the Fourth and Fifth Months.

Milk,	f ̄iiiss ;
Cream,	f ̄ss ;
Sugar of milk,	̄j ;
Water,	f ̄j.

This portion to be given every three hours.

Diet during the Sixth Month.

Milk,	f ̄ivss ;
Cream,	f ̄ss ;
Sugar of milk,	̄j ;
Water,	f ̄j.

This portion to be given four times daily. Two other meals—morning and mid-day—may be as follows :

Milk,	f ̄ivss ;
Cream,	f ̄ss ;
Mellin's Food,	̄j ;
Hot water,	f ̄j.

Dissolve the Mellin's Food in the hot water, and add, with stirring, to the previously-mixed milk and cream.

In the *seventh month* the Mellin's Food may be increased to two teaspoonfuls and given three times daily.

Throughout the *eighth and ninth months* five meals a day will be sufficient—at 7 and 10.30 A. M., 2, 6, and 10 P. M.

Milk,	f ̄viss ;
Cream,	f ̄ss ;
Sugar of milk,	̄j ;
Water,	f ̄j.

This portion for the first and last meals. For the other three meals a tablespoonful of Mellin's Food may be added, or a teaspoonful of "flour ball" may be given twice daily instead of the Mellin's Food—say at the second and fourth meals.

Diet for the Tenth and Eleventh Months.

First meal, 7 A. M.:

Milk,	f̄ ₃ viiiiss;
Cream,	f̄ ₃ ss;
Mellin's Food,	̄ ₃ ss;
(Or "flour ball" or barley jelly,	̄ ₃ ij);
Water,	f̄ ₃ j.

To be used only when Mellin's Food is employed.

Second meal, 10.30 A. M.: Eight ounces of warm milk.

Third meal, 2 P. M.: The yelk of an egg lightly boiled, with stale bread-crumbs.

Fourth meal, 6 P. M.: Same as first.

Fifth meal, 10 P. M.: Same as second.

On alternate days the third meal may consist of a teacupful (f̄₃vj) of beef-tea, containing a few stale breadcrumbs.

Beef-tea for an infant is made in the following way: Half a pound of fresh rump steak, free from fat, is cut into small pieces, and put with one pint of cold water into a covered tin saucepan. This must stand by the side of the fire for four hours; then be allowed to simmer gently (never boil) for two hours, and finally be thoroughly skimmed to remove all grease.

A further variation can be made by occasionally using mutton, chicken, or veal broths instead of beef-tea.

Diet from the Twelfth to the Eighteenth Month (Five Meals per Day).

First meal, 7 A. M.: A slice of stale bread broken and soaked in a breakfast cup (f̄₃viiij) of new milk.

Second meal, 10 A. M.: A teacup of milk (f̄₃vj), with a soda biscuit or thin slice of buttered bread.

Third meal, 2 P. M.: A teacupful of beef-tea (f̄₃vj), with a slice of bread, one good tablespoonful of rice, and milk pudding.

Fourth meal, 6 P. M.: Same as first.

Fifth meal, 10 P. M.: One tablespoonful of Mellin's Food, with a breakfast-cupful of milk.

To alternate with this:

First meal, 7 A. M.: The yelk of an egg slightly boiled with bread-crumbs; a teacupful of new milk.

Second meal, 10 A. M.: A teacupful of milk, with a thin slice of buttered bread.

Third meal, 2 P. M.: A mashed boiled potato moistened with four tablespoonfuls of beef-tea; two good tablespoonfuls of junket.

Fourth meal, 6 P. M.: A breakfast-cupful of new milk, with a slice of bread broken up and soaked in it.

Fifth meal, 10 P. M.: Same as second.

The fifth meal is often unnecessary, and sleep should not be disturbed for it. At the same time, should the child awake an hour or more before the first meal-time, he should break his fast upon a cup of warm milk, and not be allowed to go hungry until the set breakfast hour.

Diet from Eighteen Months to the End of Two and a half Years (Four Meals a Day).

First meal, 7 A. M.: A breakfast-cupful of new milk; the yelk of an egg lightly boiled; two thin slices of bread and butter.

Second meal, 11 A.M.: A teacupful of milk, with a soda biscuit.

Third meal, 2 P.M.: A breakfast-cupful of beef-tea, mutton or chicken broth; a thin slice of stale bread; a saucer of rice and milk pudding.

Fourth meal, 6.30 P.M.: A breakfast-cupful of milk with bread and butter.

On alternate days:

First meal, 7 A.M.: Two tablespoonfuls of thoroughly cooked oatmeal or wheaten grits, with sugar and cream; a teacupful of new milk.

Second meal, 11 A.M.: A teacupful of milk, with a slice of bread and butter.

Third meal, 2 P.M.: One tablespoonful of underdone mutton pounded to a paste; bread and butter, or a mashed baked potato moistened with good plain dish gravy; a saucer of junket.

Fourth meal, 6.30 P.M.: A breakfast-cupful of milk, a slice of soft milk toast, or a slice or two of bread and butter.

The foregoing schedule must, of course, be regarded as an average. Many children can bear nothing but milk food up to the age of two or even three years, and provided enough be taken no fear for their nutrition need be entertained. The rule to adopt is, if a child be thriving on milk he is never to be forced to take additional food merely because a certain age has been reached. Let the healthy appetite be the guide.

Unless for reasons which outweigh the disadvantages, such as the pregnancy of the nurse, a child should not be weaned until it has erupted twelve teeth. In case of the pregnancy of the nurse it should be weaned at once. If possible to avoid it, a child should not be weaned just before or during hot weather. If there is a necessity for weaning it, compensation for the deprivation of the mother's milk would be secured to a large extent by its removal, if living in a large city, to the country or to the seaside. The extreme heat of midsummer is especially trying to infants, and choleraic symptoms, with a tendency to collapse, are frequently excited without other apparent cause. When practicable, children under twelve months of age should always have the benefit of country air during a long-continued heated term.

Derangements of health that are simply coincident with dentition are to be treated on general principles, but the liability of reflected dental irritation to exaggerate and complicate systemic disorders should always be borne in mind, and local relief afforded when indicated. The application of a saturated solution of bromide of potassium or of equal parts of phénol sodique and paregoric to the gums is soothing, and may be employed with the view of lessening whatever sense of discomfort may arise from the activity of the eruptive forces where no undue pressure upon or by the gums is suspected. In case of apparent distress arising presumably from a hyperæsthetic condition of the gum-tissues favorable results may be anticipated by brushing the surfaces at suspected points with a 4 per cent. solution of oleate of cocaine. In the presence of symptoms seemingly out of proportion to any recognized cause of disturbance it would still be proper to lance the gums over the teeth next in order of eruption, though local signs did not appear to demand it.

A febrile condition—the so-called irritative fever of infancy—is produced by various and frequently by slight causes. The process of teeth-

ing, indigestible food, worms, a misplaced pin, continued pressure as by a string or bandage, any considerable irritation of the cutaneous surface, will excite a more or less severe fever in proportion to the predisposing conditions present.

The nervous system in infancy is exceedingly excitable, and the sympathetic system of nerves is especially responsive. Peculiarities of the pyrexia of dentition are its severity, its irregularity, and the excitability attending it. Children are not infrequently delirious from the febrile disturbance consequent on dentition. This excitement, like all other disorders dependent upon tension from dentition, is best allayed by a removal of the tension. This is generally all that is required. If, however, the cutaneous surface becomes hot and dry, advantage will be found in bathing the child once or twice daily with warm water to which has been added alcohol, bay rum, or vinegar. Bathing the child's head frequently with cool water is an efficient aid in preventing a tendency to congestion. Inunction of the child's body with warm oil (an animal oil, or even sweet oil) has a very soothing effect, and will frequently, in hyperæsthetic conditions, ensure a quiet night.

If systemic treatment is required, the appropriate remedies will be refrigerants and sedatives, such as cool water, the neutral mixture, bromide of potassium, spirit of nitrous ether, compound spirit of ether, etc. An irritative fever of sufficient severity or duration to excite functional disturbance or organic changes must be treated on general principles, though the exciting cause should always be found and corrected if possible.

Spasms or convulsions may be coincident with or incident to dental evolution. Various causes, singly or in association, may produce such an irritation of the spinal centres that the co-ordinating function of the brain is overpowered, and irregular muscular actions, spasms, or convulsions may ensue. Of these causes none are more liable to act as excitants of convulsive attacks than irritations of the fifth and pneumogastric nerves. Oftener than from any other causes spasm is the indication either of irritation in the field of distribution of the fifth nerve or of gastric or intestinal disturbance. The condition of the mouth, therefore, and of the alimentary tract is to be considered in every case of convulsions not otherwise plainly accounted for. An overloaded stomach, or the presence of indigestible food, is perhaps the most frequent factor in the etiology of eclampsia. A convulsive attack is generally preceded by unusual and irregular movements of the eyelids, twitching of the corners of the mouth, and almost always by a contraction of the toes and turning of the thumbs into the palms of the hands; frequently by a strabismus of one or both eyes, and sometimes by spasmodic movements of the limbs.

The first indication for treatment is to remove the irritation—by the lancet, emesis, purgatives, etc., according to diagnosis. Further treatment may include the hot bath and general bloodletting, though the latter is seldom advisable. Here, again, after the removal or correction of the causative irritation, antispasmodics and nervous sedatives, such as have been enumerated, will be beneficial if judiciously employed; and to them may be added chloroform, ether, chloral, asafoetida, cam-

phor, valerian, belladonna, opium, etc., according to the condition of the little patient. As a rule, bromide of potassium is the most efficient agent, unless a more prompt remedy is required. A valuable combination is to be found in the following formula :

R̄. Potassii bromid.
Sodii bicarb. āā, gr. xvj ;
Chloral hydrat. gr. iv-viiij ;
Aquæ menth. pip. f̄j. M.

Dose, a teaspoonful every two hours at six months.

The indication is to lessen the nervous excitability by controlling the nerve-centres. The tendency in the individual case should be combated according as anæmia or plethora is manifested. In the one case tonics, and in the other salines and restricted diet, are indicated.

The manifestations of reflex excitability are numerous and varied. Occasionally the peripheral irritation is reflected to the genito-spinal centre, causing priapism and a picking or pulling at the penis by the child. Retention or incontinence of urine and painful and difficult micturition are sometimes apparently dependent upon reflected dental irritation. In such cases demulcent drinks—barley-water, flaxseed-tea, or solution of gum-acacia, sweet spirit of nitre, or citrate of potassa, and, if there is much pain, a half drop of tincture of opium occasionally—will usually correct the condition. Spasm of the glottis (*laryngismus stridulus*) appears sometimes to be excited by the irritation of teething. There is reason to believe that earache is often associated with and dependent upon the difficult eruption of one or more teeth, and that, apart from the aggravation of the fever and the increased liability to convulsions incident to this added anguish, there is also the possibility of the loss of hearing (entailing in young children the loss of speech) from the congestion and inflammation which result. But this is not the only—indeed, not the chief—danger. The inflammation is liable to extend to the membranes of the brain and end in death. The facility with which an irritation originating in the mouth may be continued to the ear, and thence to the brain, can readily be understood by a recognition of the intimate relations which exist between the parts concerned and of their elaborate nervous connections. The danger is a real one, and should not be lost sight of in the treatment of a child suffering from teething. The relief of the excitant cause is here also the important ameliorative or curative procedure. There seems little room to doubt that infantile paralysis is in some instances more or less directly connected with teething. Cases are recorded of paraplegia appearing at the cutting of each tooth and disappearing after its eruption. Infantile paralysis usually takes the form of incomplete paraplegia, sometimes affecting a single group of muscles or even an individual muscle. It generally occurs suddenly. Its duration varies greatly, from a few days or weeks to months, and in some cases it persists throughout life.

In all infants, especially in those artificially fed, there is a tendency to an acid fermentation of their food, due partly to the character of the food and partly to the peculiar activity of the mucous glands, either in response to a local irritant or to a reflex impression causing a modified secretion, or to an extension of a local irritation. Flatulence, pain,

vomiting, and diarrhoea are the natural results of this condition of the alimentary tract. Attention to the condition of the mouth, to the hygienic management of the infant, and especially to its diet as to quantity, quality, and frequency, should precede the employment of drugs. A flannel bandage around the abdomen will serve as a derivative, and if desired may be made more effective by rubbing powdered spices or dry mustard on the surface next the belly or by sprinkling it with turpentine mixed with sweet oil. A change or modification of diet is frequently advisable, and a change of air will often act like a charm. Under all circumstances it is well to limit the amount of food to the quantity just sufficient to sustain life, in order to afford the digestive organs physiological rest. The union of an alkali with an aromatic is indicated, and a grain of the bicarbonate of sodium or of potassium with anise, cinnamon, or caraway will prove of advantage if given with each meal until the condition is corrected. If undigested food or vitiated secretions in the alimentary tract are suspected, a dose of castor oil and aromatic syrup of rhubarb in equal portions—a teaspoonful of the mixture—will be of great service. If torpidity of the liver is diagnosed, a few doses, at intervals of two hours, of the twelfth or sixteenth of a grain of calomel, with one to two grains of sodium bicarbonate, will be likely to correct the condition. If the diarrhoea persists after the action of the purgative, the following prescription may be employed, first prohibiting the use of any farinaceous or milk food. Indeed, if all food be withheld for from two to six, eight, or even ten hours, and be then given in very small quantities, the effect on the digestive tract will be very beneficial:

R̄. Tinct. opii, gtt. viij;
 Bismuth. subnitrat. ʒj;
 Mucilag. acaciæ, fʒss;
 Aquæ menth. pip. fʒiiss. M.

Dose, a teaspoonful every three hours to a child six months old.

Opium is indicated, however, only after all offending matters have been expelled from the alimentary canal. Its chief value then is to lessen peristaltic action; but it is at best a choice of evils in the maldigestion of infancy, because of its interference with the normal secretion of the digestive fluids. Opium is sometimes beneficial when combined with small doses of a purgative—a half drop of laudanum to twenty or thirty drops of a mixture in equal proportions of castor oil and spiced syrup of rhubarb, given three or four times daily.

If the stools are serous and alkaline, the following mixture may be given:

R̄. Acid. sulph. aromat. gtt. viij;
 Spt. vini gallici, fʒij;
 Syr. acaciæ,
 Aquæ menth. pip. āā, fʒss. M.

Dose, a teaspoonful every two hours in a little water.

Or two drops of the wine of ipecac in an ounce of water may be given, in teaspoonful doses, every half hour, to control the vomiting. If the irritability and vomiting are excessive, the following formula may be resorted to:

R̄. Spt. chloroformi, fʒj ;
 Creasoti, ℥ij ;
 Vin. ipecac. ℥v ;
 Aquæ anisi, q. s. ad fʒij. M.

Dose, a teaspoonful in a little water for a child a year old.

A diarrhœa due apparently to relaxation from long-continued warm weather or succeeding to cholera infantum, and not attended by fever, is likely to be controlled by such a combination as the following :

R̄. Ext. hæmatoxyli, gr. xvj ;
 Tinct. opii camph. fʒj ;
 Mist. cretæ,
 Aquæ cinnamomi, āā, fʒij. M.

Dose, a teaspoonful in water every four hours for a child six months old.

If the diarrhœa seems to depend upon reflex nervous impression, sedative treatment is indicated, and bromide of potassium, liquor potassii citratis, liq. ammonii acetatis, compound spirit of ether, the camphorated tincture of opium, and even depressants, such as aconite or veratrum viride, may be required ; but the latter class of drugs should be given in very small doses and the effects carefully watched.

A diarrhœa dependent on reflex action from dental irritation and consequent irritability of the nerve-centres is usually characterized by profuse and watery dejections (which have a sour smell, indicative of fermentation, caused probably by an arrest of the functions of the intestinal glands), by irritable stomach, anorexia, hot head, cold hands and feet, fretfulness of temper, and restlessness. These conditions, if not corrected, are likely to eventuate in convulsions or congestion of the brain, but are frequently promptly relieved by remedies addressed especially to the nervous system. A combination of bromide and nitrate of potassium is an efficient remedy in such cases :

R̄. Potassii bromidi, gr. xvij-ʒss ;
 Potassii nitratis, gr. vj ;
 Sacchari lactis, ʒss.

M. ft. pulv. vj.

One of these powders may be given every three or four hours to a child one year of age.

Dr. Lees of London has called attention to a class of cases not very uncommon in children, in which the main symptom is the frequent passage of semi-solid stools, generally containing undigested food. Dr. Lees considered that these symptoms were due to a hyperperistalsis of the alimentary canal from irritation of the vagus nerve which supplies the excitor fibres to the intestine, the splanchnics conveying the inhibitory fibres. The proximity of the nucleus of the vagus to that of the trigeminus in the medulla indicated the possibility that this increased excitability of the intestine might be due to dental irritation. On the theory of the purely neurotic origin of the symptoms he treated these cases with bromide of potassium simply, without opium or astringents, and with immediate success.

Dr. Christopher Elliott recommends the infusion of chamomile-flowers as highly beneficial in infantile diarrhœa when proceeding from dentition and when the stools are greenish in color or are slimy and streaked

with blood. It will quickly calm a fretful child. The dose of the infusion is a half to one drachm for a child under one year; for a child over that age, double, three times a day or oftener according to the severity of the attack. The rationale of the treatment is the power which chamomile-flowers possess of subduing reflex excitability, this power belonging to the volatile oil they contain.

Constipation, whether incident to or coincident with teething, is, if obstinate, to be treated with laxative enemata, suppositories of cocoa-butter, tallow, or molasses candy, or by castor oil by the stomach or by abdominal inunction. A persistent tendency to constipation may be combated by the administration of cod-liver oil, beginning with ten-drop doses three times daily, and increasing, if necessary, to a small teaspoonful. Further treatment, if the troubles persist, should follow on general principles.

Inflammation of the mucous membrane of the mouth, with an increased acidity of the secretions, is a common pathological affection in infants, especially in those artificially fed, and still more especially in those accustomed to farinaceous foods. Varieties in expression of such disorders are designated, according to their character, as simple or erythematous stomatitis, follicular stomatitis or aphthæ, ulcerative stomatitis, gangrene of the mouth, and thrush. Either of these forms may be coincident with, if not incident to, dentition, and may therefore receive brief notice in this connection. Some of them are always, any of them are likely to be, associated with, if not caused by, gastric and intestinal derangement. The simple form requires only the use of demulcent and mildly astringent lotions applied gently to the parts by a camel's-hair brush or by a soft linen rag on the finger, so as to avoid injury to the mucous membrane. Aphthæ occur in two forms—the discrete and the confluent. The simple form is usually accompanied by symptoms of gastric derangement, requiring regulation of the diet and possibly laxatives. The local treatment indicated is demulcents and astringent washes. Glycerin and borax or alum, combined, are efficacious as local applications. The ulcers in the confluent form may require in addition a light application of a stick of nitrate of silver, and in morbid systemic conditions the administration of tonics and stimulants, such as iron, quinia, and brandy. Ulcerative membranous stomatitis (the *cancrem oris* of some writers) is supposed to be due to epidemic influences, and is sometimes fatal by reason of its extension to the pharynx and larynx. The treatment consists of regulation of the bowels, simple but nutritious food, tonics, and chlorate of potassium, conjoined with demulcent washes and astringent applications. Gangrene is a rare disease in private practice, but not infrequent in hospitals for children. It requires the most energetic nutritive, tonic, and stimulant systemic treatment and escharotics locally. Thrush is generally dependent upon a morbid condition of the digestive functions, and is almost never found in children who have been exclusively suckled. The disease is associated with the growth of a peculiar fungus, the *Oidium albicans*. It is comparatively rare, except in hospitals and among the children of those who are too poor to give them proper attention, and those fed on feculent food. The severe form is attended with fever, colic, diarrhœa, and

vomiting, and sometimes death results from abdominal complications. The abandonment of improper food and the substitution of proper alimentation are first necessary, following with remedies addressed to the correction of the disordered condition of the alimentary canal, and astringent applications locally. In any of these varieties of disease in the mucous membrane of the mouth the employment of solutions of the sulphite of sodium and of phénol sodique, of strength according to indications—say, as in the following formulæ—promises favorable results so far as local treatment is concerned :

℞. Sodii sulphitis, gr. xxx ; Glycerini, Aquæ, āā, f̄ss. M.	℞. Phénol sodique, f̄ss ; Glycerini, Aquæ, āā, f̄iiss. M.
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Either formula may be used on a swab every two hours.

Syphilitic stomatitis requires specific treatment.

Cool applications to the mouth are always agreeable and beneficial. The child may be allowed to suck small pieces of ice or the mouth may be frequently syringed with ice-water.

Cutaneous eruptions frequently occur during the period of dentition. These may be symptomatic or idiopathic, from local or constitutional causes. Heredity, predisposition, improper food or excess in feeding, derangement of the alimentary tract, uncleanliness or too frequent bathing, strongly alkaline or impure soap, or too much friction in washing or drying the child, excessive swaddling and consequent heating and sweating, clothing too tightly worn or of irritating material, or made so by dyes used in its manufacture, may produce a cutaneous disease. Derangement of the nervous system, of which dentition may be the exciting cause, is accountable for a variety of cutaneous disorders ; but while dental irritation may thus indirectly develop a skin disease, the treatment, except in so far as the removal or correction of the exciting cause is concerned, differs not from that which would be proper if a like disturbance of the nervous system from any other cause had resulted in a like pathological condition.



