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Descriptive Circular, containing sample plates, sent free on application to the publishers.

ATLAS AND EPITOME

OF

DISEASES OF THE MOUTH PHARYNX, AND NOSE

BY

DR. L. GRÜNWALD
Of Munich

Second Edition, Revised and Enlarged

Authorized Translation from the German

EDITED, WITH ADDITIONS, BY

JAMES E. NEWCOMB, M.D.
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With 102 Illustrations on 42 Lithographic Plates, and 41 Figures in the Text

PHILADELPHIA AND LONDON
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EDITOR'S PREFACE.

THE work of the editor has consisted, first, in a careful comparison of the translation with the original text, and, second, in the addition of such notes as have seemed advisable to represent certain distinctively American views on the several topics discussed. The most extensive of these notes relates to the use of the active principle of the suprarenal bodies, which has won for itself a permanent place in the materia medica of rhinology and laryngology.

With the stimulus of a deep appreciation of the valuable services to this special department of medical science of the distinguished German author and clinician, it has been a pleasurable task to assist in bringing them to the knowledge of a wider circle of readers on this side of the Atlantic.

J. E. N.

PREFACE TO THE SECOND EDITION.

THE present second edition of this atlas represents a complete remodeling of the first edition. In accordance with the general plan of the undertaking, which has now attained such gigantic proportions, a short epitome has been added to the explanatory text of the illustrations. As in the case of the *Atlas of Diseases of the Larynx*, the epitome is designed to assist both students and practising physicians to obtain a clear understanding of the more difficult departments of the subject. The material is therefore subdivided according to general pathologic principles, instead of strict localization by special regions, which would be both tedious and perplexing. Such headings as "Diseases of the Nasal Septum," "Diseases of the Soft Palate," and the like will not be found in this volume, and this, the author flatters himself, will not be regarded as a disadvantage by the unprejudiced reader. His aim has been to arouse a general understanding of pathologic conditions. The technic and the clinical details in this department of medicine can be learned only on the living subject, under the guidance of a competent teacher; hence in the matter of treatment the author has confined himself to a few hints which practical experience has shown to be necessary, and which will perhaps be not unwelcome even to out-students in clinical courses and polyclinics. A few very common and important surgical operations have been described, because the omission of an apparently immaterial detail may in certain cases render the operation absolutely worthless. In spite of all these limitations, an attempt has been made to give as exhaustive an exposition of the subject as possible.

Material changes will also be found in the atlas itself. The text, in addition to the descriptions of the plates, contains, as in the *Atlas on the Larynx*, complete case histories designed to supplement the text of the epitome by some important details. The plates themselves are more numerous than in the last edition, and the earlier ones have been worked over and adapted to harmonize with the general plan of the work—a plan which the author believes is an improvement as well as an innovation.

A number of histologic plates have been added as explanatory aids. Only such operations and instruments as are still quite unknown will be found illustrated in the text, because any others can be readily found in instrument-makers' catalogues and similar publications. The newer instruments here illustrated are from the firm of Stiefenhofer, of Munich, to whom the author is also indebted for the use of a number of other cuts.

The pictures were prepared partly from personal sketches and partly from life—most of them by the artists, Messrs. Fink and Hammerschmidt. Thanks are due to these gentlemen for their intelligent manipulation of the difficult subject-matter, as well as to the publisher for his liberal aid in furthering the success of the work; and, finally, to the lithographer, Mr. Reichhold, for his conscientious and artistic work in preparing the plates.

Special thanks are also due to Professor v. Bauer for his kindness in allowing the use of several cases from his clinic, and to Professor May for his obliging help in selecting those cases.

THE AUTHOR.

PREFACE TO THE FIRST EDITION.

When the publisher of this work requested me to contribute the present volume to his collection of hand-atlases, I was well aware of the difficulty of competing with the already existing excellent works on this subject. I was encouraged, however, by the consideration that the publisher's idea of bringing the atlases within the reach of a wide circle of readers, especially students, would unquestionably bear good fruit. Accordingly, I have kept the needs of students in view by selecting, so far as possible, typical cases of the various diseases, and omitting rare conditions and curiosities, the description of which more properly falls within the scope of larger illustrated works.

My chief object was to encourage objective instruction in our curriculum, and to show to the students what must be observed and what methods are to be employed in observation. The subject-matter of the text has been arranged with this end in view. Just as an expert observer may make the diagnosis by mere inspection of the illustrations, so the accompanying description should at once bring up a mental picture of the pathologic condition described. Accordingly, the illustrations are described in the text in exactly the same way as a practised examiner would demonstrate the objective findings to his class, allowing the student to draw his own conclusions. This, however, could be carried out only so far as the visible properties of the condition portrayed supply all the necessary data for a diagnosis. When that was impossible, the other findings required for diagnosis were included in the description. It is impossible, as it is unnecessary, to mention all the pathologic varieties, and I have confined

myself to those which either are of practical importance or in which the signs determinable by inspection form the most prominent features. For this reason I have included a few rare clinical conditions that occur under very especial circumstances in the nose, so as to demonstrate as clearly as possible the question of perspective, which is so very important in this branch of our subject.

As regards the preparation of the illustrations, the majority of them were painted by myself; two were photographed from nature; one was taken from the well-known atlas by Luschka; and one was prepared with the kind permission of Dr. Mikulicz. Most of the pictures were drawn directly from nature; a few had to be copied from older drawings and sketches.

THE AUTHOR.

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Tab. 1.

Fig. 1.

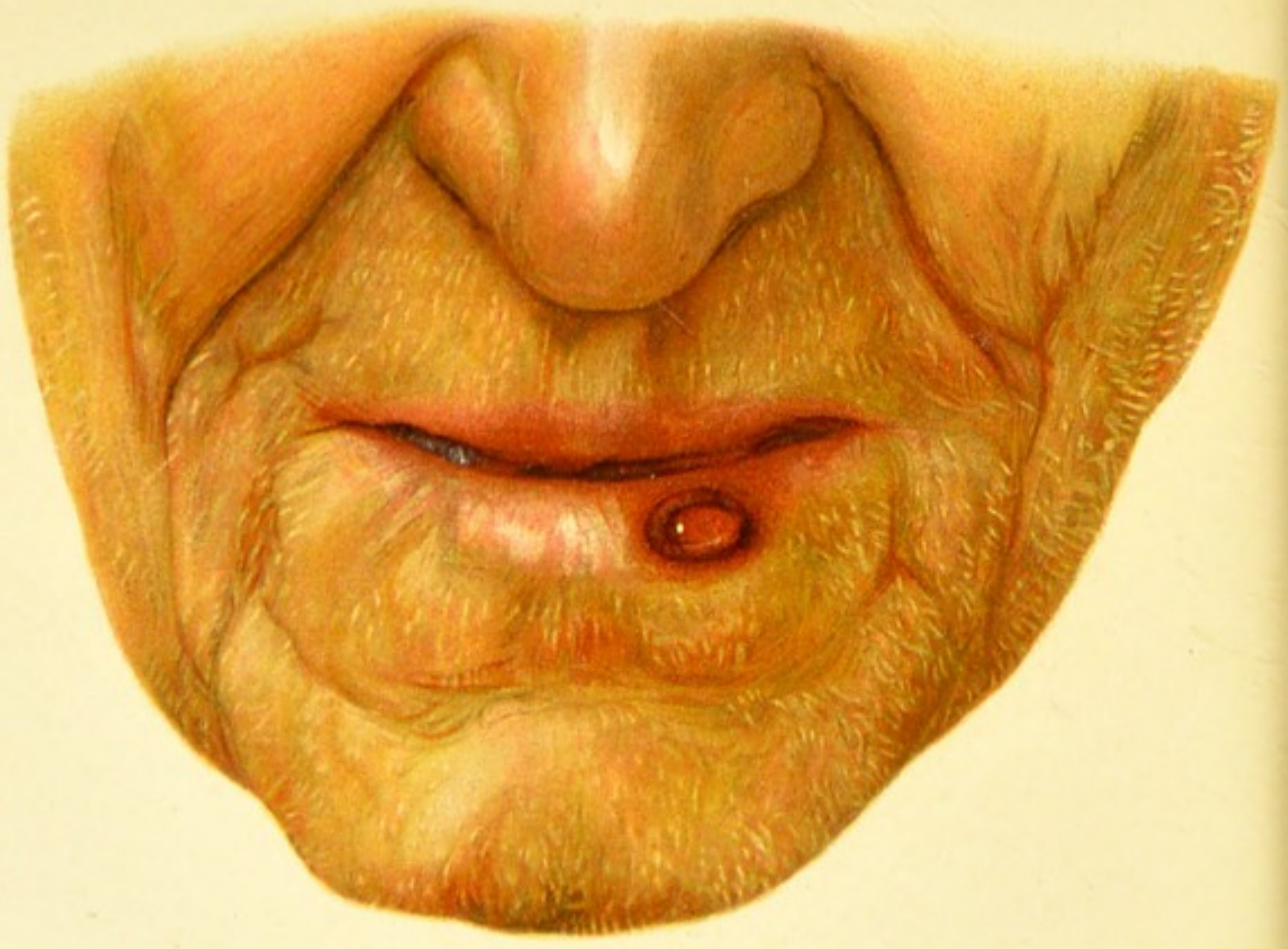

Fig. 2.

PLATE 1.

FIG. 1.—A man, thirty-four years of age, was admitted to the hospital in a wretched state of health. He had endured several weeks of hardship, during which he had been without shelter. On the day following his admission hemorrhages were noticed from the mouth, and blood was found in the urine and feces.

The oral mucous membrane is exceedingly dry and somewhat livid. The gums at the margin of the teeth are swollen and present a whitish discoloration. On the inner surface of the lower lip are several ecchymoses of varying extent, and a hemorrhagic vesicle the size of a lentil. The skin has a yellowish tint.

The hemorrhages extend to the gums in the upper jaw and to the hard palate (see Plate 17, Fig. 1), where they are quite recent, as evidenced by their lighter color and striated appearance. The margins of the lips are covered with desiccated, hemorrhagic scabs. The surface of the tongue is dark gray in color from the presence of dried blood. These acute spontaneous hemorrhages point to dyscrasic changes in the blood. The hemorrhages in the mucous membrane are especially characteristic of

Scurvy.

FIG. 2.—A man, sixty-three years of age, has noticed a wart on the lower lip for the past six months. Recently he noticed that the wart occasionally discharged and crusts were beginning to form.

On the vermilion of the lower lip, a little to the left of the median line, there is an oval, dark-red elevation about half the size of a lentil, with raised edges and a central depression of a somewhat lighter color.

On palpation the tumor is found to be hard and not sharply defined from the surrounding tissues. No glands can be felt either under the chin or at the angle of the jaw. The patient's parents died rather suddenly of some unknown disease in extreme old age.

The patient's age, the appearance and seat of the neoplasm, which suggests rather an infiltration than a true tumor, and its tendency to degeneration, as evidenced by the central depression, leave no doubt as to the diagnosis, which is

Carcinoma (Epithelioma) of the Lip.

PLATE 2.

FIG. 1.—A strong, healthy man, thirty-six years of age, presents himself for examination on account of a small ulcer on the upper lip, which made its appearance about two weeks ago.

Near the inner border of the upper lip, a little to the left of the median line, is a flat ulcer the size of a lentil, covered with a yellowish exudate and surrounded by a narrow, red areola. The surrounding mucous membrane is somewhat tumefied and colored bluish-white. An area of similar discoloration is found on the right side and somewhat more internally.

The discoloration, combined with the subacute course, at once arouses suspicion of syphilis. The patient, it is true, "knows of no infection"; on the other hand, inspection of the skin yields positive information, for on the breast there are a few coppery macules the size of the head of a pin that do not quite disappear on pressure, and the diagnosis of

Condyloma Latum Labii (Mucous Patch)

is assured.

FIG. 2.—An obstinate inflammatory condition has developed in the course of the last two months at the right angle of the mouth of a man, twenty-five years of age, suffering from tubercular apical catarrh. At the labial junction is a somewhat reddened, slightly depressed area, surrounded by irregular, bluish-white, raised edges. There is no pain. No glandular enlargement can be found, either under the jaw or in the neck or above the elbow. The diagnosis is

Aphthous Tubercular Ulcer,

and although no tubercle bacilli can be found, it is confirmed by the slowly progressing, non-inflammatory enlargement, notwithstanding the administration of potassium iodid.

Fig. 1.

Fig. 2.

Tab.3.

Fig.1.

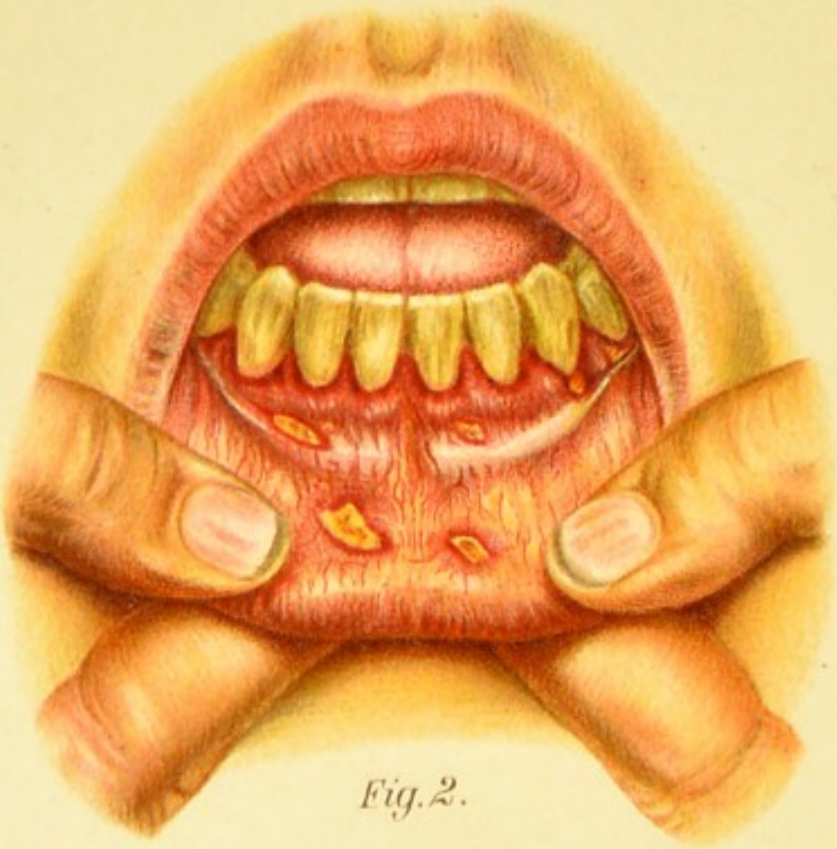

Fig.2.

PLATE 3.

FIG. 1.—The gums of the lower jaw are somewhat swollen, livid in color, with a superficial whitish sheen. The border next to the teeth is distinctly reddened, and in places presents a somewhat whitish discoloration. We have before us the appearances of

Catarrhal Stomatitis,

which is apt to follow neglect of the mouth, excessive smoking, etc., and occurs with especial preference in febrile diseases and as the initial stage of mercurial salivation.

The edge of the tongue, which is thrust forward into the left angle of the mouth, is somewhat swollen, and at about the middle there is a superficial, somewhat irregular ulcer, covered with a grayish exudate, the surrounding mucous membrane showing a whitish discoloration. It is a

Decubital Ulcer,

produced by the edge of the tongue rubbing against a sharp or carious tooth. The whitish discoloration here, as well as in the gums, is to be attributed to cloudy swelling of the epithelium.

FIG. 2.—The gums of the lower jaw are swollen, livid, and separated from the teeth by a vivid red border. They do not extend as high as under normal conditions, so that the teeth appear lengthened. Two ulcers are seen at the junction with the mucous membrane of the lower lip; and two others on the lower lip, which has been turned down. The ulcers are flat, with rather sharply outlined edges, and surrounded by a narrow inflammatory zone; the floors of the ulcers are covered with a yellowish exudate. The entire picture is that of acute catarrh, and in the light of the history is recognized as

Mercurial Stomatitis.

The ulcers are to be interpreted as decubital ulcers; those at the edge of the gums are produced by the caustic irritation of the secretion accumulated between the folds of the swollen mucous membrane, while those on the lower lip itself are to be attributed chiefly to the pressure of the teeth. Ulcers of this kind are seen in greatly neglected cases or in very severe mercurial intoxication.

PLATE 4.

FIG. 1.—The patient, a man of forty-one, has been under observation for the past three and one-half years. At first he had ulcers at the right angle of the mouth and on the tongue, which healed after repeated caustic applications. Later he developed a fistula in ano and chronic infiltration of the posterior wall of the larynx. Recently he had several slight hemorrhages from the lungs.

Lungs: Over the anterior upper portion of the right lung there is slight impairment of resonance, with accentuated vesicular breathing. Larynx: Marked infiltration and tumor formation in the posterior wall, in the right ventricular band, and in the left true vocal cord.

At the junction of the lower lip with the gums there is a deep, grayish-green ulcer, with lumpy, thickened, undermined edges, the immediate surroundings of which are covered by isolated yellowish nodules the size of the head of a pin. The middle of the right half of the tongue presents a smooth, triangular scar with greatly retracted center.

A single tubercle bacillus was found in the discharge obtained from the ulcer; but even without the finding of this bacillus, decisive as it is, the picture itself, and especially its association with the other affections, would assure the diagnosis of

Tubercular Ulcer of the Mouth.

FIG. 2.—The patient, a young lady of thirty-two years, is reduced in health owing to repeated attacks of pleurisy with effusion; she complains about her teeth, which, she says, are becoming loose.

After a somewhat purulent exudate has been removed from the gums of the upper jaw. it appears that the gums are enlarged, especially on the left side, the swelling becoming more distinct toward the molar teeth, with the formation of small, rounded, bluish-red nodules encroaching on the surfaces of the teeth and the interdental spaces. The gums over the roots of the teeth, on the other hand, are retracted upward, so that in the canine teeth, for instance, half of the root is exposed. The teeth themselves, especially the canine tooth, show greenish-gray discoloration from the deposition of tartar. This condition, referable to neglect of oral hygiene and to bodily weakness, is that of

Pyorrhœa Alveolaris.

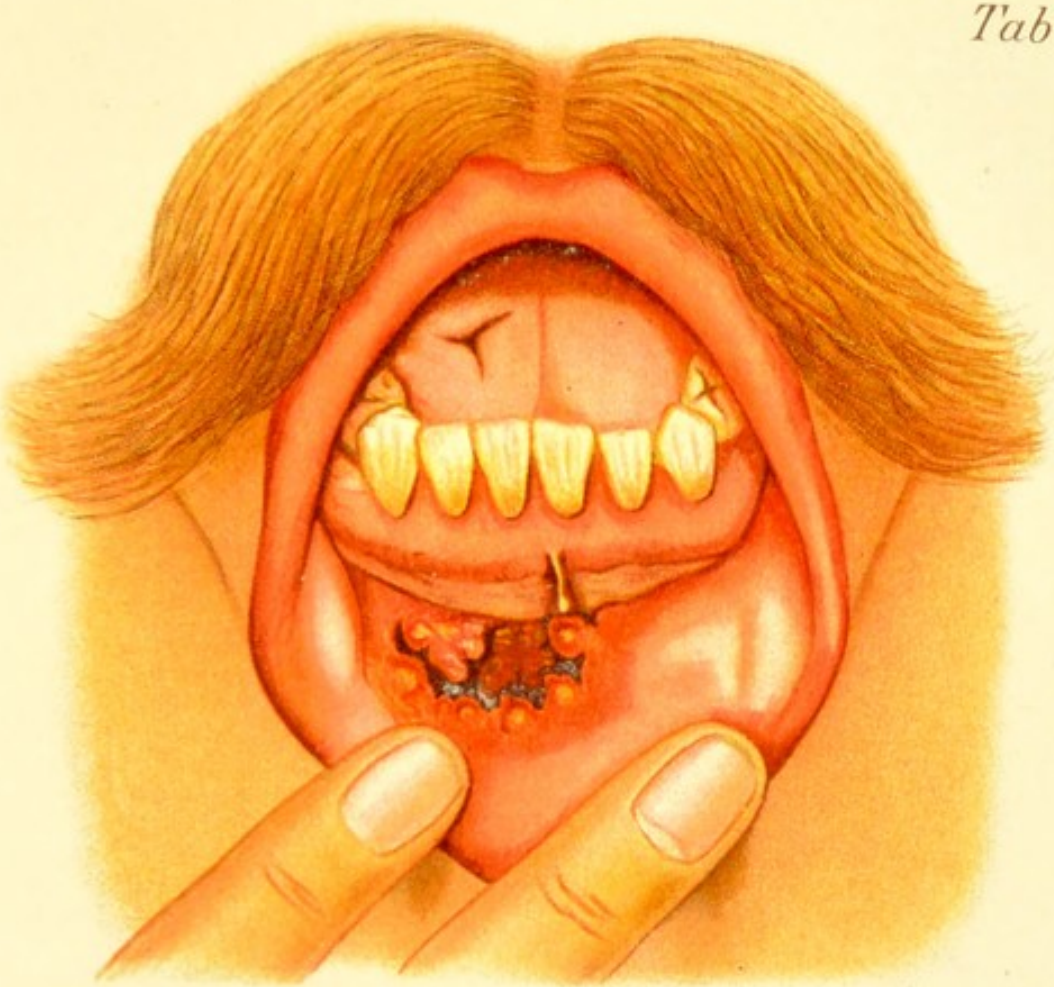

Fig. 1.

Fig. 2.

Tab. 5.

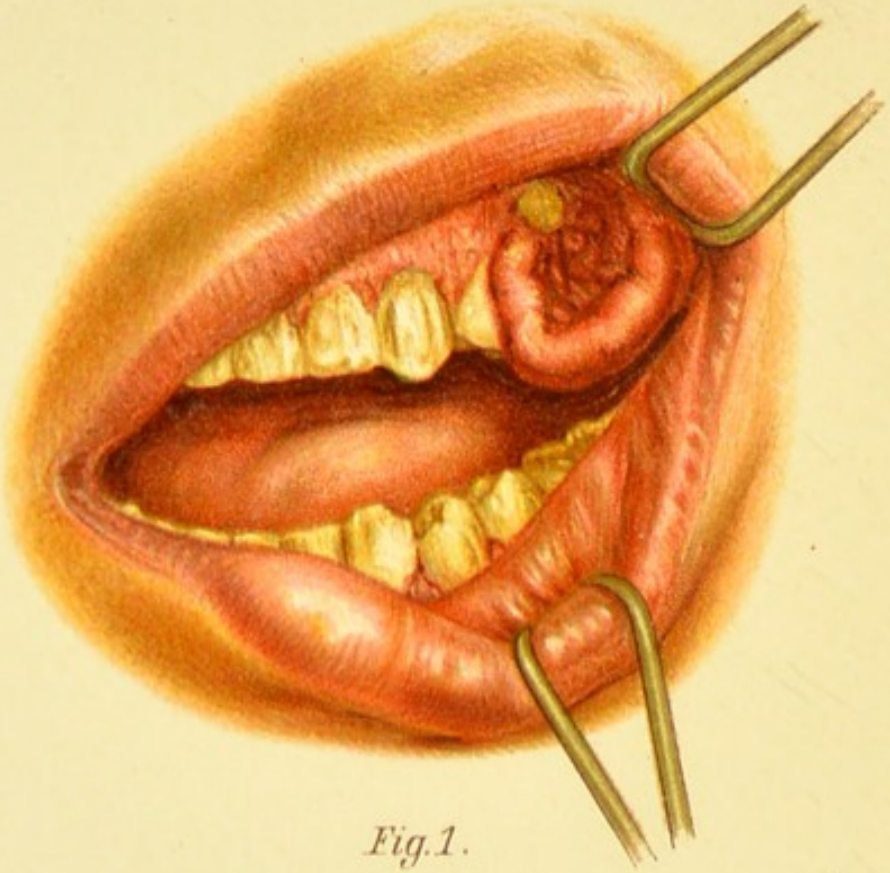

Fig. 1.

Fig. 2.

Fig. 3.

PLATE 5.

FIG. 1.—In the course of the past year the second of the upper molars of a woman, thirty-eight years of age, has gradually come away in fragments, and its site is now occupied by a movable tumor. At the angle of the mouth, which is exposed by means of retractors as far as the outer side of the first bicuspid, a bright-red oval tumor about the size of a hazel-nut is seen projecting beyond the line of the teeth, and apparently growing from the gums. The border is smooth and rounded, the inner surface is depressed, and the inner edge of the border, as well as the floor of the depression, are somewhat uneven. Above the tumor, and corresponding with the line of the second molar, which is concealed, is a small fragment of bone. On palpation the latter is found to be movable. The tumor is known as an

Epulis.

The name does not explain its nature. To arrive at a true diagnosis the clinical conditions, the subsequent course after removal of the tumor, microscopic examination, and the general condition of the patient must be taken into consideration. In the present case it turned out that the tumor was merely a periodontal proliferation occurring over a tooth with a diseased root.

FIG. 2.—The child's mouth presents on the tongue, especially at the margin, on the hard and soft palates, and on the buccal mucous membrane of the left side, a number of dirty yellow, flat exudates, ranging in size from the head of a pin to a small lentil, and surrounded each by a narrow, red areola. The appearance, the peculiar reaction indicated by the inflammatory areola, and the irregular distribution characterize the condition as

Aphthous Stomatitis,

an infection that is not infrequent during childhood when the mouth is neglected, and is probably of a mycotic nature.

FIG. 3.—On casual inspection of the tongue of a patient in middle life its peculiar coloration was noted.

The entire base of the tongue is a deep grayish-brown. On the surface and toward the edges are a number of patches ranging in color from light brown to black, and resembling bunches of hair, which on palpation are found to consist of a mass of short, thick threads. This peculiar picture, which is designated

Lingua Nigra (Nigrities Linguæ),

is produced by hypertrophic cornification, with pigmentary degeneration of the filiform papillæ.

PLATE 6.

FIG. 1.—From time to time the patient, a gentleman forty-two years of age, has attacks of difficult mastication. The attacks last several weeks, and consist in slight burning of the tongue, a marked feeling of dryness, and a pasty taste. The upper surface of the tongue and the left margin are occupied by a number of bluish-white macules, some of which, especially near the edge, allow the vermilion of the tongue to shine through. Further back are two small, yellowish-brown, flat deposits within similar whitish circles.

The patient states that the patches, which frequently vary in extent, have existed for a number of years. The patient had syphilis in his youth and smokes a good deal; he also suffers greatly from nasopharyngeal catarrh. The white patches are produced by horny changes and desquamation of the epithelium; the brownish patches are due to advanced horny change with accumulation of pigment. The disease is known as

Leucoplakia Linguæ,

or psoriasis buccalis.

FIG. 2.—A boy, fifteen years of age, has observed the appearance of patches on his tongue since earliest youth. They have never produced any subjective symptoms. The patches vary, both as to seat and shape, and sometimes disappear for a time. The tongue is traversed by numerous longitudinal and transverse furrows and by yellowish-white bands which intersect in such a way as to form a great variety of figures. The true mucous membrane is of a bluish-red color.

We have to deal here with so-called

Lingua Geographica.

The furrows are congenital (lingua dissecata).

Fig.1.

Fig.2.

Tab. 7.

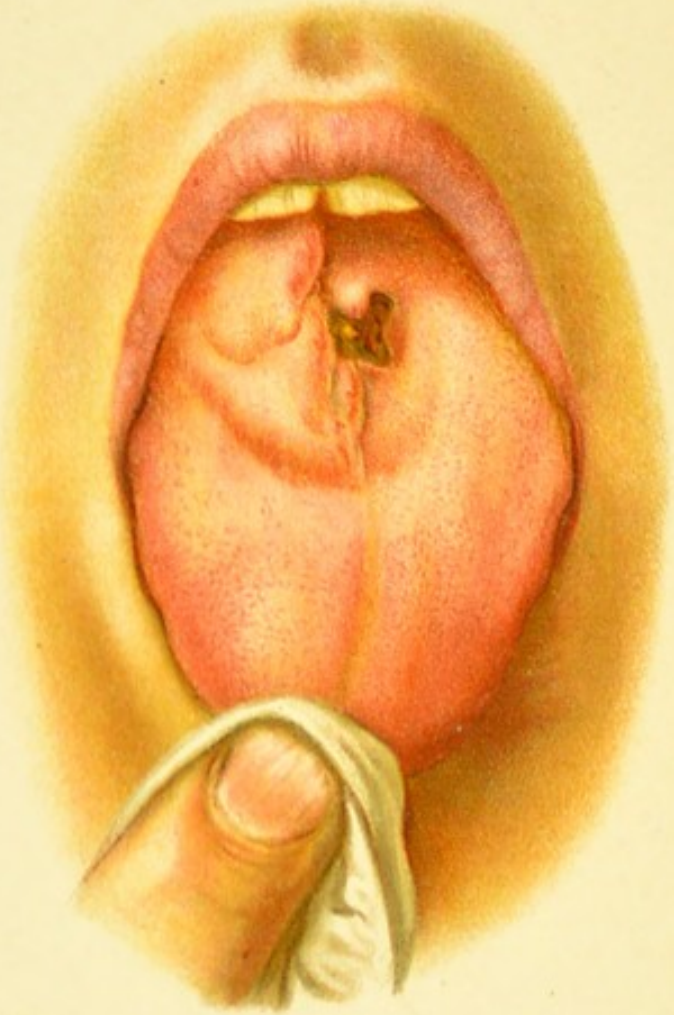

Fig. 1.

Fig. 2.

Fig. 3.

PLATE 7.

FIG. 1.—A woman, forty years of age, complains of increasing difficulty in speaking and chewing, caused by a swelling of the tongue, which has developed during the past eight weeks. Recently pain was added to the other symptoms.

The right half of the tongue is swollen in front; the posterior half especially so, and thickened, forming several ridges, superimposed like terraces. At the base of the tongue, on the left side, there is a slight swelling surrounding a deep, punched-out ulcer about the size of a lentil, with nodular, overhanging, somewhat wavy edges.

The sinuous outline of the sore strongly suggests a tuberculous ulcer, but this is not borne out by the subacute course of the extraordinary tumor-like swelling, bounded by the median line of the tongue. The course is also too rapid for malignant neoplasm; there is nothing left but syphilis. As a matter of fact, the ulcer soon cleared up on the exhibition of potassium iodid, and the swelling partially subsided, so that the provisional diagnosis of

Ulcerative Gumma of the Tongue

was amply confirmed.

FIG. 2.—A man, sixty-two years of age, has noticed a small wart on his tongue for some time. During the past three months it increased rapidly in size, and at the present time it tends to bleed easily, and occasionally gives him some pain. On the edge of the right half of the tongue there is a tumor the size of a walnut, moderately elevated, of a whitish-red color, and with a rough, nodular surface, not sharply defined from the surrounding normal tissues. The picture at once arouses a suspicion of malignancy—in fact, it is easily recognized as

Carcinoma (Epithelioma) of the Tongue.

The history bears out this diagnosis, and, lastly, a few hard glands about the size of peas are found in the angle of the right jaw.

FIG. 3.—Attacks of irritative cough and the feeling of a foreign body in the throat are the distressing symptoms complained of for several years by a man thirty-five years of age. They have driven him from one health resort to another, until finally he is beginning to fear that he has a cancer. Nothing unusual is found in the nose, nasopharynx, and throat, except a slight thickening of the fauces. Perhaps the larynx will furnish an explanation. The illustration shows an (inverted) image of the posterior parts of the tongue and larynx; of the lower structures, the commissure of the vocal cords and the epiglottis are visible. The latter is covered by a massive tumor about the size of a hazel-nut, marked by numerous notches and surrounded by wavy edges growing from the base of the tongue behind the circumvallate papillæ. The position and structure of the tumor are characteristic of

Hypertrophy of the Lingual Tonsil.

That this small tumor is enough to produce the symptoms is clearly shown when the various portions of the throat are successively examined with a probe without any particular objections on the part of the patient, whereas the slightest application of the instrument to the tumor is immediately followed by a violent fit of coughing.

PLATE 8.

FIG. 1.—Headache, depression, fever up to 39° C. (102.2° F.) were the secondary symptoms in an attack of acute pain in the throat with great difficulty in swallowing and speaking. The pain radiated to the ears.

In the pharynx the velum is slightly reddened; the uvula still more so and slightly edematous; both tonsils are greatly swollen and congested, and covered with radiating masses of yellowish-white exudate, forming a continuous pattern; the fauces and the posterior wall of the pharynx are not involved. It is the typical picture of an ordinary

Acute Lacunar Angina (Lacunar Tonsillitis).

[In this connection reference may be made to an ulceromembranous form of tonsillitis due to the bacillus of Vincent. It may be confined to the tonsils or appear on the cheeks, tongue, and gums. It generally assumes a chancroidal aspect, having a worm-eaten floor, but with its edge on a level with or slightly above the tonsillar surface. Except for the necrotic floor, the ulcer has a "punched-out" appearance. At first the area involved seems to be covered with a false membrane, but after thirty-six hours a swab applied against it apparently penetrates it and enters a cavity. The color of the area may be yellowish, greenish-gray, or a dirty light-brown. As a rule, the submaxillary glands are enlarged—more rarely the cervical. The enlargement is painless, and remains for some time after the ulcer has healed.

As a rule, there are no constitutional symptoms, though there may be a mild fever. The tonsillar ulceration alone rarely causes any fetor of the breath, but if the lesion spreads to the other sites named, fetor appears. The disease is not dangerous, but calls for differentiation from lacunar tonsillitis, diphtheria, and tonsillar chancre.

From confluent lacunar tonsillitis it is distinguished by the absence or mild degree of constitutional symptoms, and by the superficial character of the lesion in the tonsillitis. The two conditions may coexist; from diphtheria it is distinguished by the culture-test alone. In diphtheria a smear-test is unreliable, but in ulceromembranous tonsillitis it is more reliable than the culture, because up to the present time no medium has been found for the growth of the bacillus of Vincent in pure, uncontaminated form; from syphilis the smear-test will suffice to make a differentiation. This test is here most important, for we do not wish to submit a patient with a simple tonsillitis to all the annoyances and possible dangers, under the circumstances, of a mercurial treatment. If syphilis and the ulceromembranous lesion coexist, we should treat the latter first.

In a recent paper,[1] Vincent makes two forms of the affection: (1) a diphtheroid, containing a characteristic fusiform bacillus alone; (2) an ulceromembranous, containing both bacilli and spirilla. Herman and Sobel[2] describe the former as about twice as long as the Klebs-Löffler bacillus, needle-like, and somewhat pointed at the ends. They may be arranged at an acute angle or be irregularly scattered over the field. The spirilla are long and cork-screw-like, with wide curves. Herman and Sobel advance the following arguments in favor of the specific character of the organism: (1) Its uniform presence in the disease in very large numbers or nearly pure culture. (2) Its gradual disappearance during the process of healing of the ulceration and rapid disappearance when the process is ended. (3) The presence of so few other micro-organisms. (4) The occurrence of instances in which the disease has been transmitted from one patient to another. For treatment they advise daily applications of silver nitrate (3 to 5 per cent.) or of Lugol's solution. The latter is preferable to, but more painful than, the former. The application of a saturated aqueous solution of methylen blue is also advised.—ED.]

FIG. 2.—This patient, a man twenty-two years of age, complained of the same symptoms as the last patient, except that the pain was present only on the right side.

[1] *Bull. de la Soc. Med. des Hôp. de Paris*, Feb. 1, and Mar. 23, 1901.

[2] *New York Medical Jour.*, Dec. 7, 1901.

Accordingly we find the right side of the pharynx greatly reddened, and the tonsil covered by large and small masses of yellowish exudate.

The exudate can be removed with the forceps without producing a hemorrhage or revealing any marked destruction of tissue. This agrees with the strictly circumscribed character of the inflammation, which involves only the tonsil and shows that the condition is not a necrotic, diphtheritic process, but merely a coagulation necrosis confined to the epithelial layer. The diagnosis is

Benign Fibrinous Angina.

It is worth noting that just before the inflammation subsided similar phenomena appeared on the left side.

FIG. 3.—This case is that of a girl twenty years of age. She also presented similar general and local symptoms. The temperature was 39.5° C. (103.1° F.).

The greatly swollen and club-shaped uvula is the most conspicuous feature in the pharynx, which is of a deep dark red. The uvula, the tonsils, the arches, and the posterior wall are covered by discrete and confluent yellowish-white exudates of varying thickness.

An attempt to remove these exudates would be followed by hemorrhage, but this sign is not needed. The wide distribution of the exudate, extending far beyond the region of the tonsils, enables us to recognize that we are dealing with

Faucial Diphtheria.

[While the experience of each clinician may enable him to feel positive that a given faucial exudation is or is not true diphtheria, it must be borne in mind that the culture-test alone can decide. Some cases resembling in their appearance and clinical course an ordinary lacunar tonsillitis have been shown to be due to the Klebs-Löffler bacillus, the process being confined entirely to the crypts. The obvious lesson is the familiar one—to isolate every case of sore throat until its exact nature shall be accurately determined.—ED.]

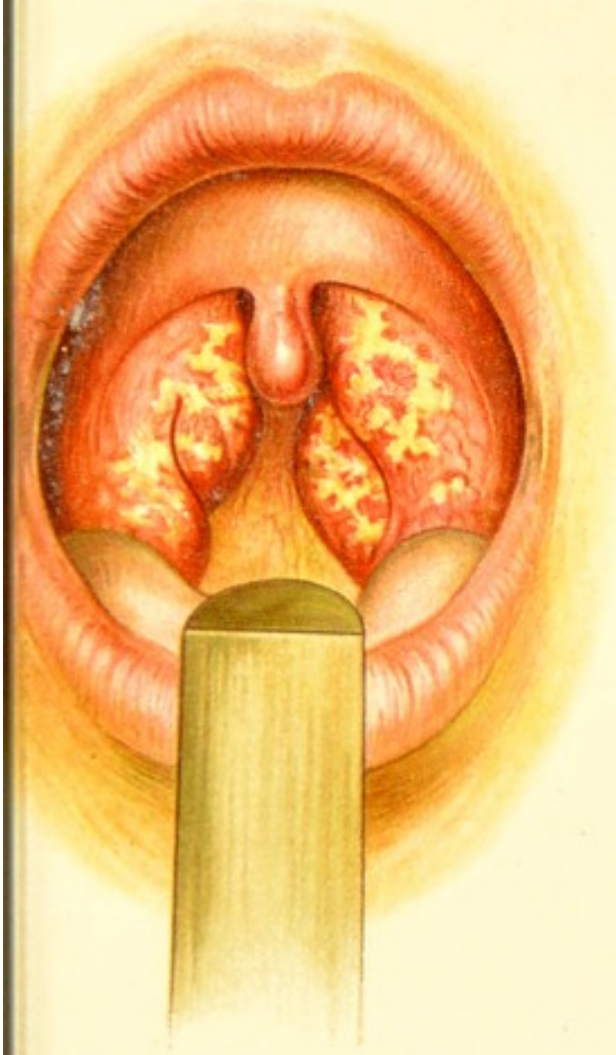

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 1.

Fig. 2.

PLATE 9.

FIG. 1.—A man, twenty-two years of age, has had severe pain in the throat for the past three days, is totally unable to swallow, and has a free flow of saliva which he expectorates with great difficulty. He feels very much depressed and complains of being hot. Temperature is 39.2° C. (102.6° F.) at 3 o'clock in the afternoon. The left side of the neck is somewhat enlarged. The patient is barely able to open the mouth (in the illustration the mouth is opened somewhat more widely so as to afford a better view).

The left half of the soft palate, down to the base, is intensely swollen, and the tonsil is completely obscured. The uvula, which is completely deformed by the swelling, has been forced over toward the right. The mucous membrane is tense and bulging, and of a dark-red color. The bulging is greatest in the region of the upper extremity of the tonsil (not visible), where the

Supratonsillar Abscess

is about to rupture.

FIG. 2.—A woman, twenty-six years of age, was taken sick three days ago, with severe general symptoms, headache, and pain in the throat. The temperature has been as high as 39.5° C. (103.1° F.), but on two occasions it fell immediately to 37.8° C. (100.7° F.) and 37.6° C. (100.4° F.).

The mouth cannot be entirely opened, although there is no distinct interference with the movement of the jaws.

In the region of the left tonsil the entire soft palate bulges outward, forming a distinct tumor. The color is dark red, and the surface dry and glistening. The swelling is fairly well circumscribed on the right, and encroaches on the uvula, which is not swollen and only slightly reddened.

The absence of interference with the movement of the jaws indicates that the infiltration does not extend deeply. The circumscribed character of the tumor, the dry, glistening appearance of the surface, indicating superficial tension, and, finally, the intermittent fever, at once suggest the suspicion of

Pharyngeal Erysipelas.

No pus could be obtained from the supratonsillar fossa, even with the probe, and on the following day the temperature became normal. All the other symptoms rapidly subsided without discharge of any kind taking place.

PLATE 10.

FIG. 1.—A young man, seventeen years of age, has been working as an apprentice in a cigar factory for the last two months, and had to swallow a good deal of dust in the course of his work. He had always suffered more or less from pain in the throat and copious expectoration, but under the influence of this recent injury the dysphagia greatly increased and he began to suffer from a scratchy feeling in the throat. As a child he was sickly; his father died of pulmonary disease with asthma. Infection denied.

The patient is weak and anemic. Lungs and heart present nothing abnormal; no fever. Both tonsils are somewhat enlarged and covered with a grayish-white exudate; there are no signs of inflammation. The tongue is thickly coated. The posterior extremities of both lower turbinates and the pharyngeal tonsils are enlarged and covered with copious mucopurulent exudate. The cervical glands on both sides are swollen, but not sensitive to the touch. It may be added that the condition shown in the illustration was not affected by two weeks' treatment, so that both acute infection and syphilis could be excluded with certainty.

The picture, therefore, which is very unusual, is due solely to

Maceration of the Tonsillar Epithelium.

which is continuously bathed in the nasopharyngeal pus; the action of the latter is enhanced by the patient's poor constitution and by the recent injuries to the pharyngeal organs.

FIG. 2.—A man, twenty-two years of age, complains of gradually increasing pain in the throat and a burning sensation on the tongue for the past three weeks. In other respects, he says, he is healthy.

Both tonsils, especially the left one, are slightly swollen and reddened, while the central portion of each tonsil is covered by a delicate, milky, translucent exudate, dotted in places by a greenish-yellow discoloration. A similar exudate covers the posterior fauces on the right side and the tip of the tongue.

The softness of the exudate and the discolored areas, suggesting a tendency to ulcers, the multiple character of the lesions, and freedom of the posterior wall help to make the picture of

Mucous Patches

or syphilitic papules. From diphtheria the condition is distinguished by the more gradual onset, the absence of fever, etc., and the chronic course. Thrush is characterized by the presence of mycelium and more discrete character of the patches of exudate (see Plate).

FIG. 3.—A married (!) lady, twenty-eight years of age, complains of pain in the left side of the throat, especially during the act of swallowing. The pain came on two weeks ago and has been steadily getting worse. The left ear is also painful, and pain is felt at the angle of the jaw during mastication.

The region of the angle of the left jaw is slightly swollen and very painful; enlarged glands can be felt on deep palpation. The left tonsil is very prominent and intensely red; the inner border is some-

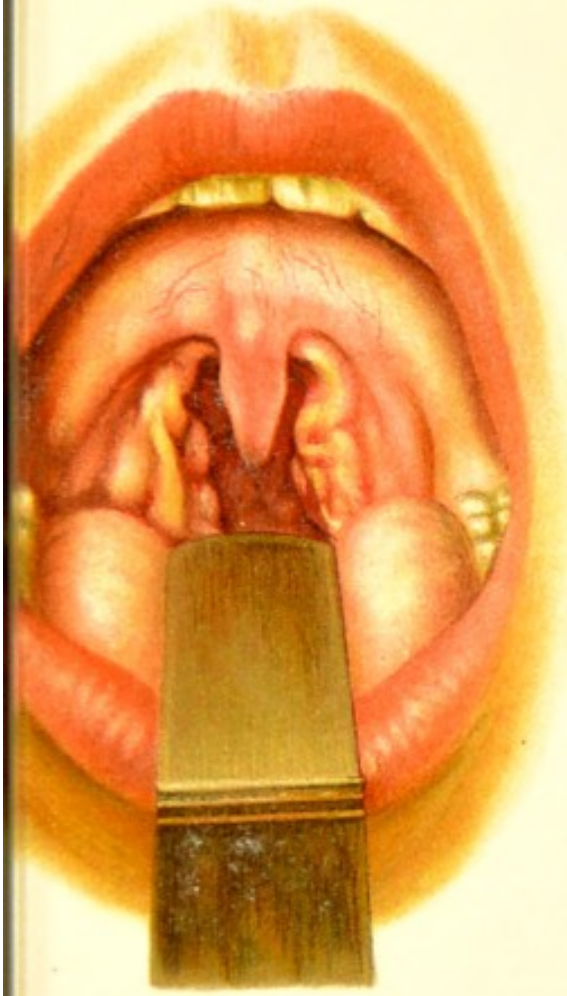

Fig. 1.

Fig. 2.

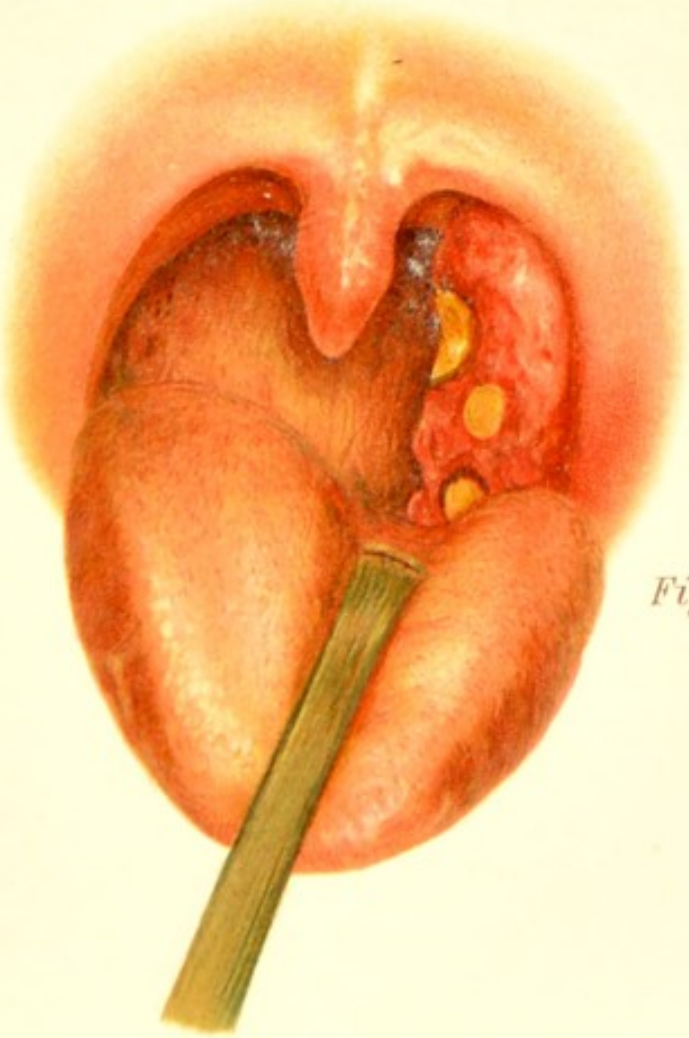

Fig. 3.

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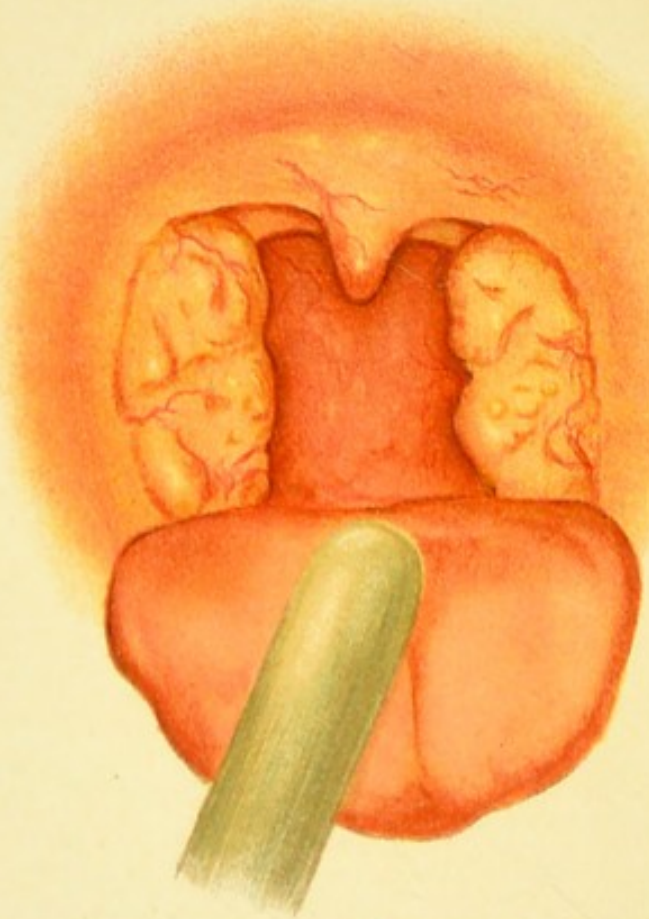

Fig. 1.

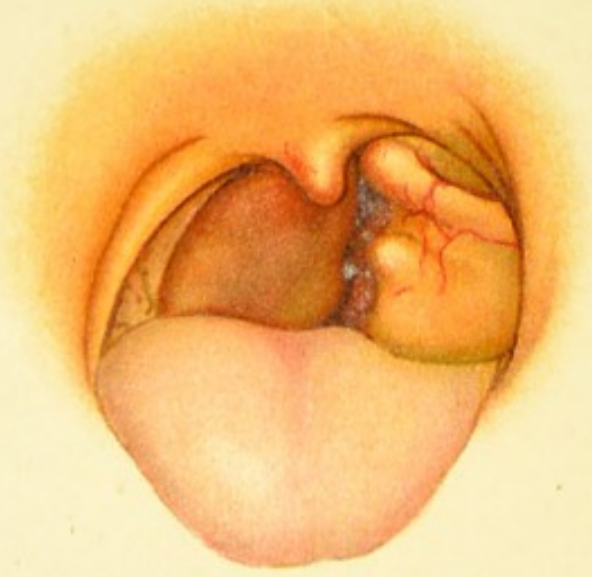

Fig. 2.

what nodular, and the upper portion of the inner border is interrupted by an ulcer half the size of a bean, with sharp edges and floor covered with yellow exudate. The ulcer encroaches on the surface of the tonsil. A similar ulcer is found on the anterior surface further down, partially hidden by the base of the tongue, and a third still smaller ulcer, the center of which has not as yet become depressed, occupies the middle of the tonsil.

The unilateral distribution, rapid course, presence of pain, and characteristic appearance establish the diagnosis of

Tertiary Syphilitic Ulcer of the Tonsil.

PLATE 11.

FIG. 1.—The color of the pharynx is normal, and the two tonsils present a symmetric enlargement. The surface is pale, traversed by one or two blood-vessels, and distinctly shows the lacunæ, with here and there a few yellowish-white nodules. It is a simple

Tonsillar Hypertrophy.

The appearance alone indicates the origin of the condition, which results from various kinds of inflammations tending to increase the size of the lacunæ and to bring on fatty degeneration or calcification of individual follicles represented by the yellowish-white nodules.

FIG. 2.—The throat of a man, fifty years of age, is greatly thickened in front and on the left side. It is surrounded by a firm, lobulated tumor, adherent at the region of the angle of the jaw, and merging in front and below into a dense, infiltrated tissue adherent to the skin. The tumor is surrounded by one or two hard glands, from the size of a pea to that of a bean, which are not painful and retain some degree of mobility. The tumor attained its present size in the course of three months. This indicates that in spite of the rapid growth the surface has not degenerated. The unilateral character, rapid growth, and consistency of the tumor point toward malignancy, and this is confirmed by the glandular enlargement in the neck. It is a

Primary Sarcoma of the Tonsil,

although the anatomic diagnosis cannot be assured without excising a fragment for examination.

PLATE 12.

FIG. 1.—A man, forty-eight years of age, has had several pharyngeal polyps removed at short intervals during the past six months. He presents himself on account of pain radiating to the ear and difficulty in opening the mouth, conditions that have developed recently. The complexion is bronzed and somewhat anemic; the same applies to those mucous membranes that are visible. The mouth can only partially be opened.

The site of the right tonsil is occupied by a dark-red tumor about the size of a walnut, with irregular, mammillated, almost nodular surface, which gradually fades away into the tongue below and the velum above, without any distinct demarcation. The posterior faucial arch as far as it is visible is thickened and somewhat reddened. The surface of the tumor presents several greenish-yellow, shallow ulcers. The tumor is traversed and surrounded by a number of dilated veins.

The appearance, in combination with the unilateral character, suffices for the diagnosis of malignant growth. It is a

Carcinoma of the Tonsil.

On inspecting and palpating the outer side of the neck it is found that the neoplasm is extending toward the angle of the jaw, where there is a hard, diffuse swelling adherent to the skin; in its immediate neighborhood several small hard glands can be felt. Microscopic examination later brought anatomic confirmation of the diagnosis.

FIG. 2.—In examining the pharynx of a woman, twenty-five years of age, who had contracted an acute disease, the anterior surface of the posterior arch on the right side was found occupied by a flat, round eminence, bluish-white in color, and about half the size of a lentil.

Palpation with a probe shows that the tumor everywhere is slightly raised above the surrounding level, except the lower portion, which has slightly overhanging edges. The patient knows nothing about the condition. The provisional diagnosis will have to be a

Neoplasm—Probably Benign.

On microscopic examination of the excised tumor an indefinite type of connective tissue was found, so that the subsequent course will have to establish the diagnosis definitely.

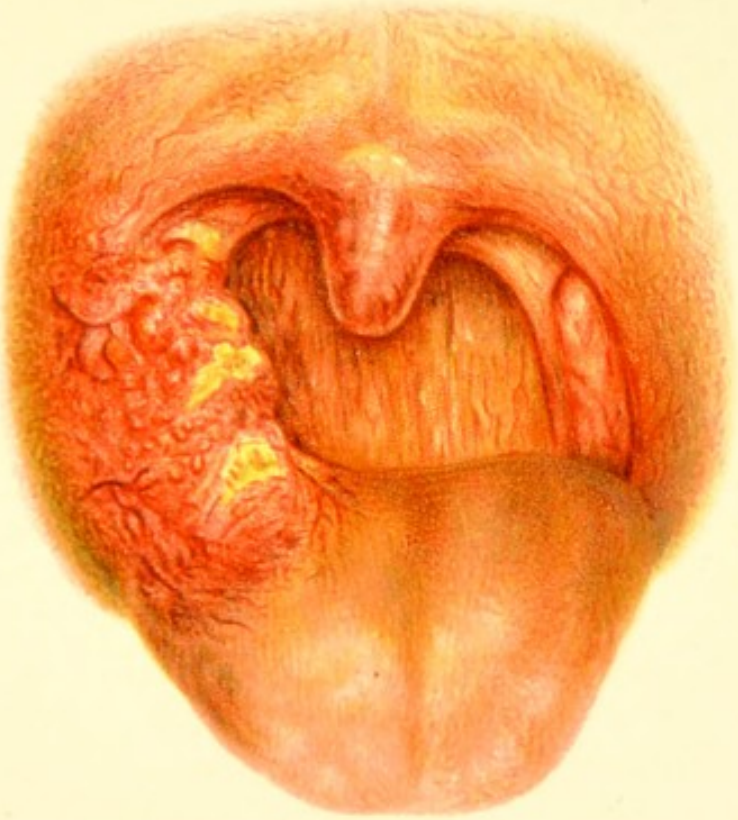

Fig. 1.

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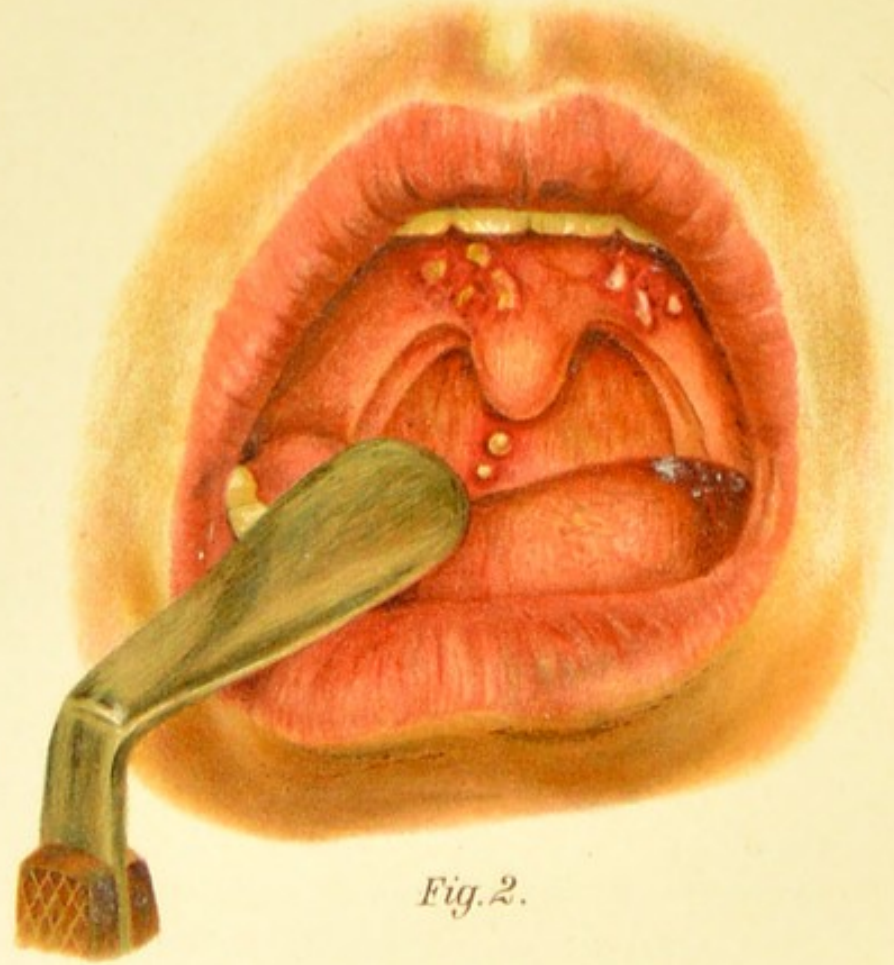


Fig. 2.

PLATE 13.

FIG. 1.—At the beginning of the third week of typhoid fever, patches appeared in the mouth of a man, twenty-three years of age.

The intermaxillary fold of the right side, the posterior faucial arch of the same side, and the soft palate are covered with small whitish exudates about the size of a lentil. The exudates are surrounded by a deeply injected areola and slightly raised above the surrounding level. The center is somewhat depressed and of a yellowish color. These are typical

Typhoid Ulcers.

FIG. 2.—A gentleman, forty-seven years of age, infected with lues in earlier life, and recently treated for syphilitic manifestations in the larynx, was attacked by severe pain in the throat two days ago, and yesterday had an attack of fever with chill. This morning the temperature was 38.3° C. (100.9° F.).

The pharynx is greatly reddened, especially in certain areas, and occupied by two or three groups of lesions. On the posterior wall are two small yellow vesicles. The velum on the right side presents several yellowish, discolored, shallow ulcers; on the left side there is also a delicate, whitish exudate of some extent.

Disregarding the history of syphilis, which is misleading, the appearance of the eruption, its grouped arrangement, combined with the paroxysmal character of the fever, clearly indicates that the disease is

Pharyngeal Herpes.

The picture presents the three stages of herpes formation,—vesicles, ulcers, and membranous exudate,—as it happens that there are three groups of lesions which have appeared at the intervals corresponding to these stages in their development.

PLATE 14.

FIG. 1.—A man, sixty-four years of age, who is a frequent sufferer from indigestion and gastric trouble, complains of severe pains in the throat for the past two days. The soft palate and uvula are intensely reddened and of a velvety appearance. The surface is covered by an abundant macular exudate, milky-white in color, partly translucent and partly opaque, without any regular arrangement. Aberrant patches are found as far down as the posterior faucial arch on the left side. There is no ulceration of the mucous membrane.

The exudate is firmly adherent; when one of the patches was removed with the forceps for purposes of examination, it was followed by bleeding.

Under the microscope the membrane is found to consist almost exclusively of the mycelium and gonidia of the oïdium albicans. The clinical picture, therefore, is that of

Pharyngeal Thrush.

FIG. 2.—This is the toothless mouth of an infant, which presents two diseased patches on the hard palate, on each side of the middle line between it and the posterior extremity of the alveolar process. The patch on the right side presents the appearance of a group of slightly elevated, milky-white, irregular spots, as large as pin-heads. That on the left side is a yellowish-white ulcer about the size of a lentil, with coated floor and slightly raised, dark-red edges. The seat of the disease and its appearance point to

Bednar's Aphthous Stomatitis,

which is here represented in two stages that ordinarily are observed only in succession. The group of patches represents the early appearance, while the lesion on the left side of the palate—a solitary aphtha—has been produced by confluence of the nodules and the addition of a fibrinous exudate.

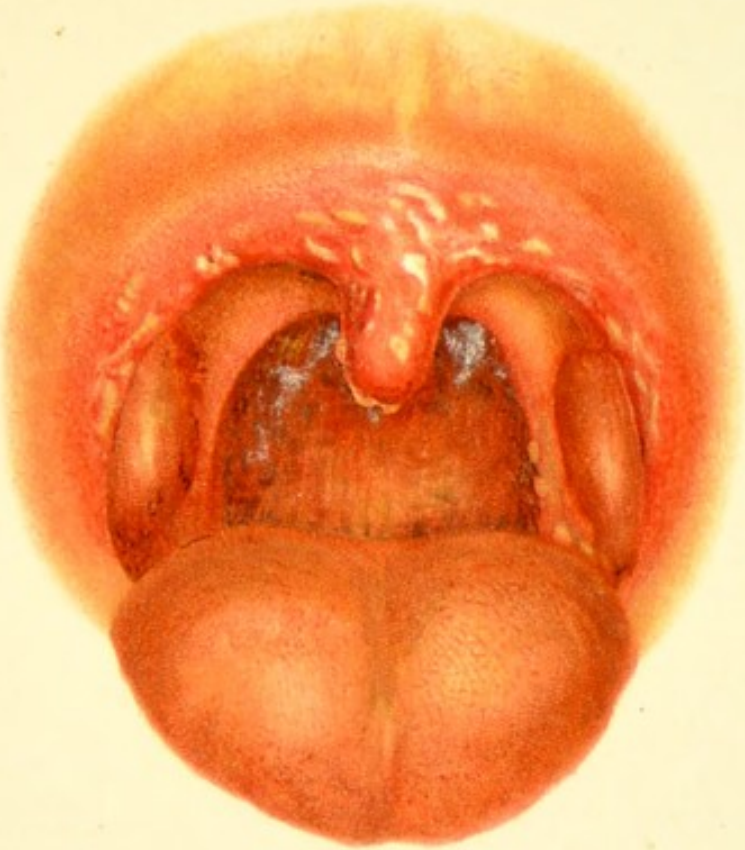
FIG. 3.—Condition accidentally found in examining the throat of a man thirty-eight years of age:

The pharynx is pale rather than inflamed, and the tonsils, the anterior faucial arches, and the lingual tonsil are covered with numerous small, yellowish-white, somewhat prominent deposits. With the probe they can be enucleated, showing that they consist of deposits of foreign matter. The nodules are spheric and of friable consistency. The diagnosis of

Pharyngomycosis Leptothricia

is readily made.

The nodules consist chiefly of the mycelium and gonidia of the leptothrix buccalis and of inspissated and calcified masses of secretion.



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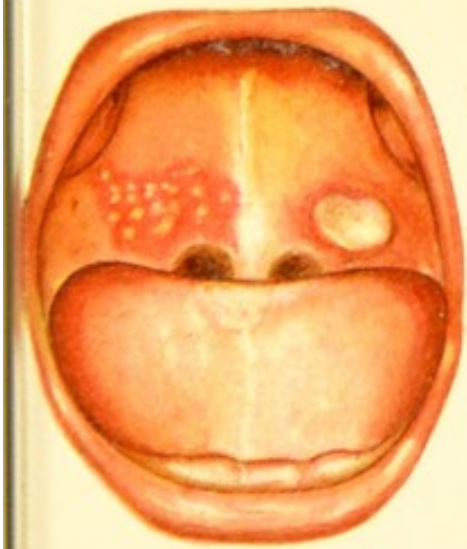

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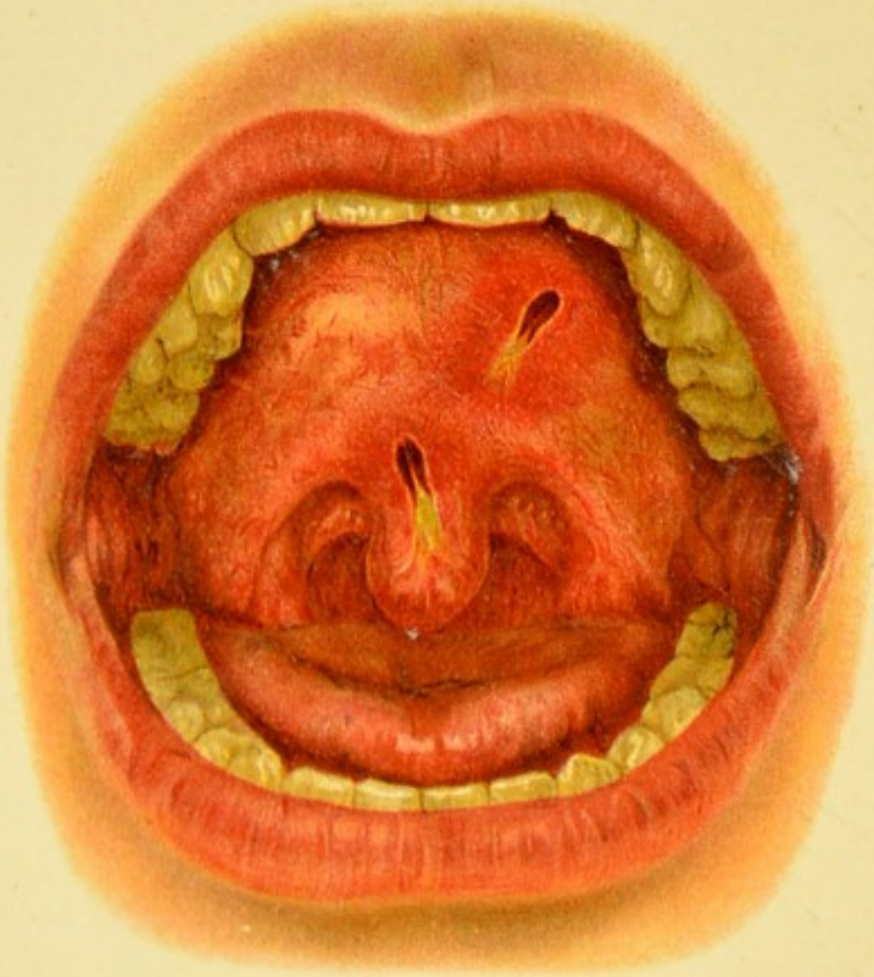

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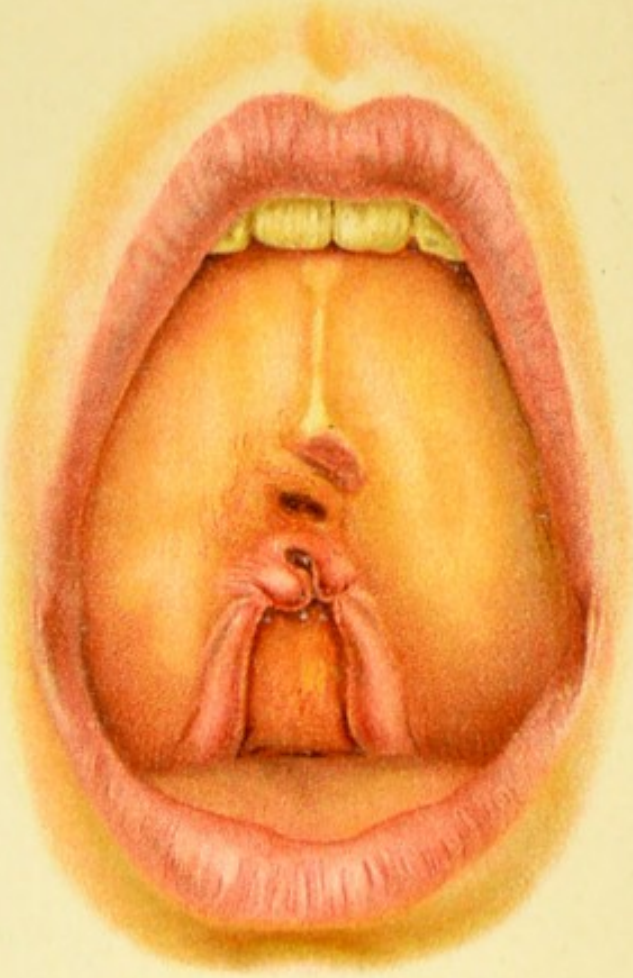


Fig. 2.

PLATE 15.

FIG. 1.—A man, about thirty-five years of age, presents himself for treatment. He says he has two holes in his throat. When interrogated, he informs us that he has very little pain and that the holes were noticed yesterday for the first time. This is all the history that can be obtained.

The central portion of the soft palate, up to its junction with the hard palate, is of a dark-red color; the uvula is swollen and shortened; at the base of the uvula there is a deep ulcer about the size of a grain of wheat, with punched-out edges, becoming more shallow toward the tip of the uvula, where it is also covered with a yellowish exudate. A similar deep ulcer, but without any shallow portion, is found above and farther to the left side.

The swelling, the intense redness, the sharply outlined edges of the ulcers, justify the immediate diagnosis of

Syphilitic Ulcer of the Soft Palate.

On probing, it is found that perforation has already taken place.

FIG. 2.—A girl, who is now fifteen years old, was treated by the author seven years ago (!) for severe laryngeal syphilis.

In spite of urgent representations to the parents, the girl did not return for treatment, and now reappears for the first time on account of a defect in her speech. The latter is very nasal, and it is very difficult to understand what the child says. Both anterior faucial arches are converted into thick folds of tissue. The uvula is replaced by a small, deformed nodule, displaced to the right by cicatricial contractions; the soft palate presents a button-hole perforation in the median line, at its junction with the hard palate. It appears, therefore, that destructive syphilitic processes have occurred in the pharynx since she was last treated, and have left the picture of

Postsyphilitic Defects and Scars.

PLATE 16.

FIG. 1.—A man, forty-two years of age, who has been treated on account of an obstinate purulent discharge from the nose, complains of severe pains in the throat for the past three weeks, although there is nothing to be seen except a diffuse redness.

Finally, one day, three yellow nodules the size of a grain of barley are discovered near the base of the uvula, which is greatly inflamed.

Nothing in the history or in the examination indicates either tuberculosis or syphilis. The diagnosis of

Miliary Gummata,

which was made later on, was based on the rapid breaking down of the nodules, the painful, subacute course, and, finally, on the positive result of the therapeutic test with potassium iodid.

FIG. 2.—It is impossible to tell exactly how long this woman, who is thirty-six years of age, has been suffering from sore throat; the trouble has lasted at least a year. There are not many subjective symptoms, except that lately the appetite has been failing; night-sweats are becoming frequent, and the patient is losing flesh rapidly. In her youth the patient was chlorotic. Both parents died of pulmonary disease.

In both lungs extensive consolidation with signs of ulceration are discovered. The sputum contains tubercle bacilli.

The uvula, especially the left half, is greatly thickened and deformed, the surface is covered by numerous irregular, dark-red nodules with soft edges. Similar nodules are seen on the anterior faucial arch of the left side, which, as a result of the morbid thickening, is in contact with the uvula. Numerous small, grayish-yellow nodules are found higher up on the soft palate. There is no doubt that we have to do with

Pharyngeal Tuberculosis Resembling Lupus,

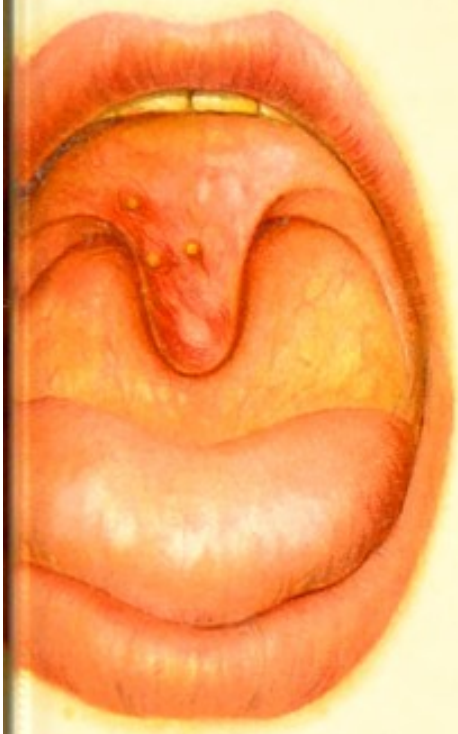
a diagnosis that is borne out not only by the history and the condition of the lungs, but also by the appearance of the tumor, which is infiltrated, of slow growth, and not ulcerated on the surface.

FIG. 3.[1]—The upper lip presents irregular, lobulated enlargement, and the edge is covered with shallow ulcers resembling rhagades, the floors of which are covered with a greenish-yellow exudate. The soft palate is of a dark-red color. On the posterior wall of the pharynx, immediately behind the posterior faucial arch on the left side, there is a small, yellow, oval tumor the size of a pea, the surface of which presents a dull luster. The uvula is covered by a whole group of similar growths, somewhat smaller in size, and surrounded by a bright-red areola. The phenomena are caused by

Lepra in its Early Stage—

so-called *lepra tuberosa*. The difference between this picture and the nodular tuberculous infiltration represented in the foregoing picture is striking. The chief points of distinction are the circumscribed character of the nodules, their greater size, and waxy yellowish appearance.

[1] From Mikulicz and Michelson's *Atlas*.



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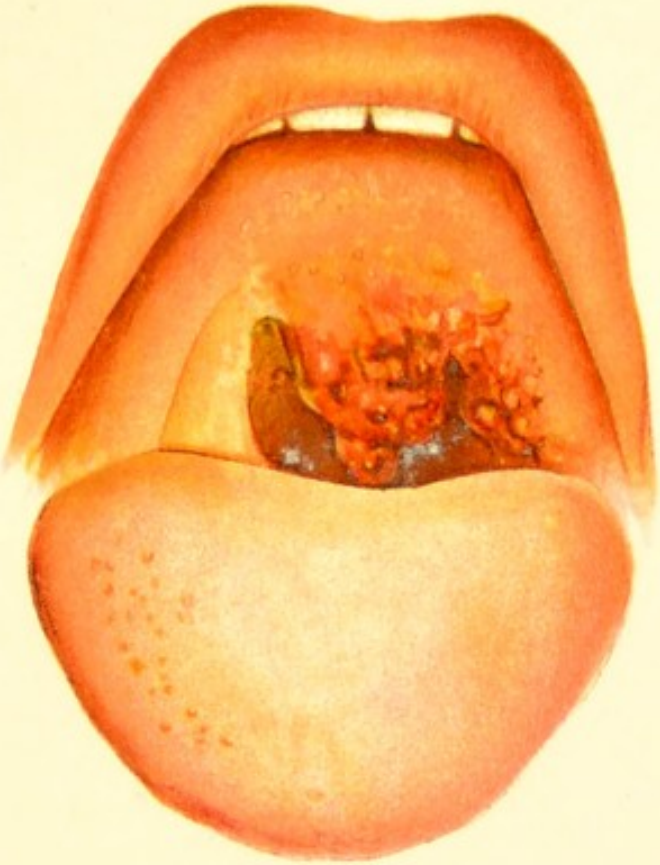

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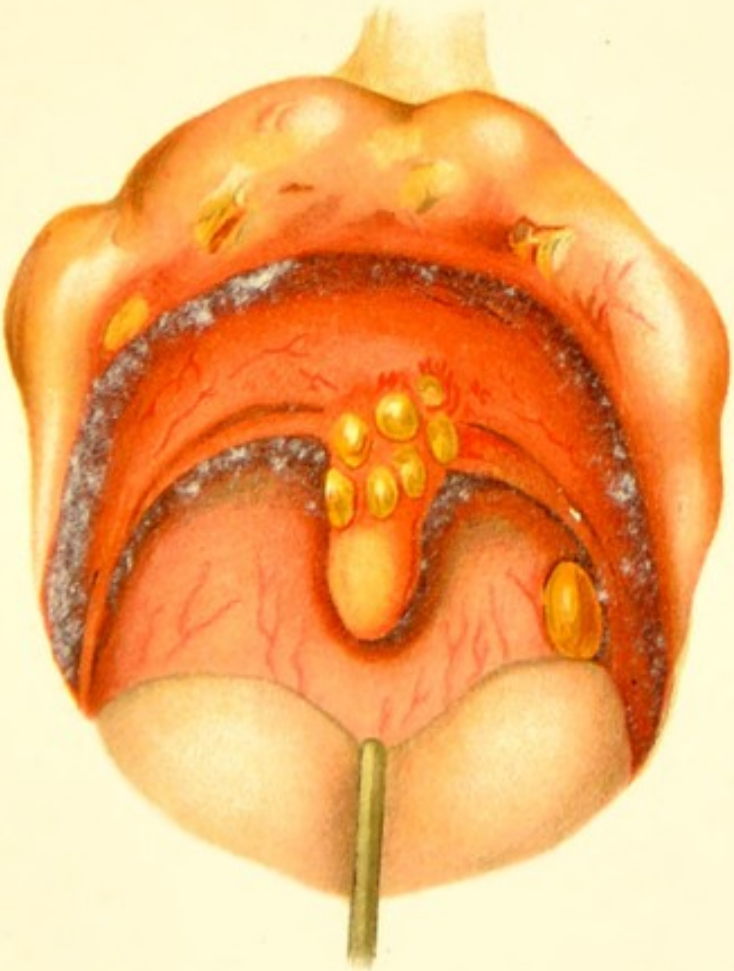

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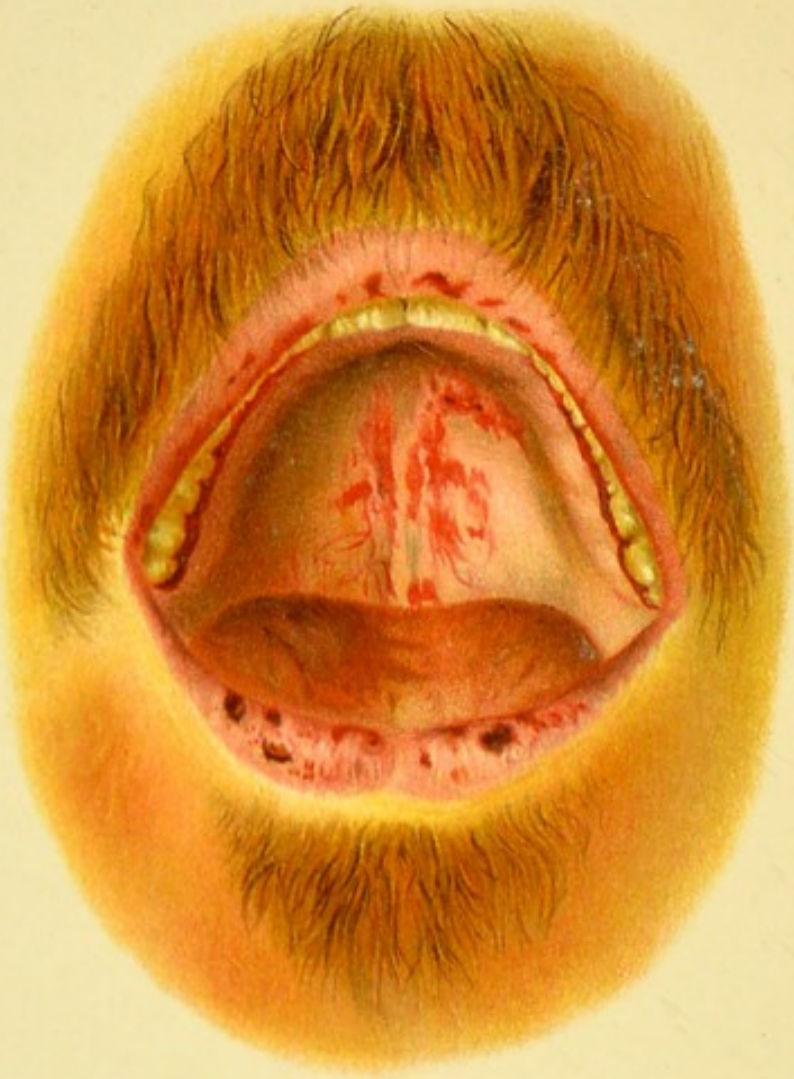

Fig. 1.

Fig. 2.

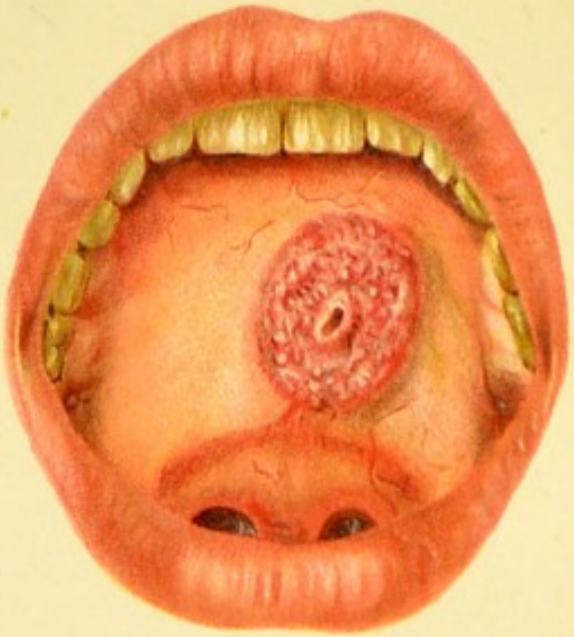

Fig. 3.

PLATE 17.

FIG. 1.—The case-history and description of this figure will be found opposite Plate 1, Fig. 1.

FIG. 2.—A young woman, twenty-eight years of age, has had a sensation as of a foreign body on the palate for the past two weeks.

At the junction between the pharynx and the soft palate, in the median line, is a dark-red elevation about 1 cm. in diameter, with a central flat depression of a bluish-white color. Somewhat dilated vessels pass from the periphery toward the center of the growth. The appearance corresponds to that of a

Broad Syphilitic Papule.

The diagnosis is confirmed by finding a macular eruption on the entire body and glandular enlargements in various regions.

FIG. 3.—This patient is a woman, thirty-nine years of age, who is otherwise quite healthy. For the past three years she has been troubled with a gradually progressing dryness and obstruction of the nose, followed later by redness and swelling of the tip of the nose. For the past six months she has also noticed a progressive swelling of the palate.

The woman is strongly built and well nourished. The internal organs are normal. The external nose is very red, and at the junction with the upper lip there is a small, red nodule. The septum is thickened, light-red in color, and granular, as are also the inner surfaces of both alæ nasi, which are more rigid than normal.

About the middle of the hard palate, in the region of the incisive canal, there is a spheric area of infiltration about the size of a dime, somewhat raised above the surface, whitish-red in color, and slightly granular. The center is marked by a flat depression.

The probe passes down to the naked bone without detecting any roughness or entering a perforation. From the history and appearance the nasal affection is unquestionably tuberculous, and the condition in the palate may equally be pronounced

Tuberculosis of the Hard Palate.

The integrity of the bone is a proof that the palatal condition is not directly continuous with that in the nose. The infection probably traveled from the floor of the nose by way of the lymphatic clefts of the incisive foramina.

PLATE 18.

FIG. 1.—A middle-aged gentleman suffers a good deal of annoyance from a feeling as of a foreign body in the throat and from attacks of convulsive cough. It is evident from his questions that he fears cancer or tuberculosis.

The throat is normal in color; the posterior wall is dotted over with spheric, oval, or linear, slightly reddened prominences. Behind the palatopharyngeal arches on both sides a columnar arrangement of similar tissue is also found.

The abnormal structures present the same color and glaze as the surrounding mucous membrane. These submucous growths are due to

Pharyngitis Granulosa et Lateralis Hypertrophica,

as the affection is somewhat inaccurately called, since there is no inflammatory element. The lateral growths are due to hypertrophy of the salpingopharyngeal folds.

FIG. 2.—This woman, who is sixty-four years of age, has noticed for the past six months that there was something wrong in her throat; but she paid no further attention to it, until lately, when severe pains, coming on especially during the act of swallowing and radiating toward the left ear, made their appearance.

The woman is very anemic and has evidently lost flesh.

Behind the soft palate, which is drawn down with a tenaculum, on the posterior pharyngeal wall, there is a flat swelling occupying the entire width of the wall and adherent on the left side to the posterior faucial arch. The lower border of the swelling is sharply defined. The surface of the swelling is rough or mammilated, and dotted over with red and yellow; there are also two distinct superficial ulcers of a grayish-yellow color.

Underneath the angle of the jaw on both sides, and along the muscles of the neck on the left side, are several hard glands about the size of a pea, not sensitive to the touch. The findings all point to a malignant neoplasm—a

Carcinoma of the Pharynx,

which has evidently originated in the nasopharynx.

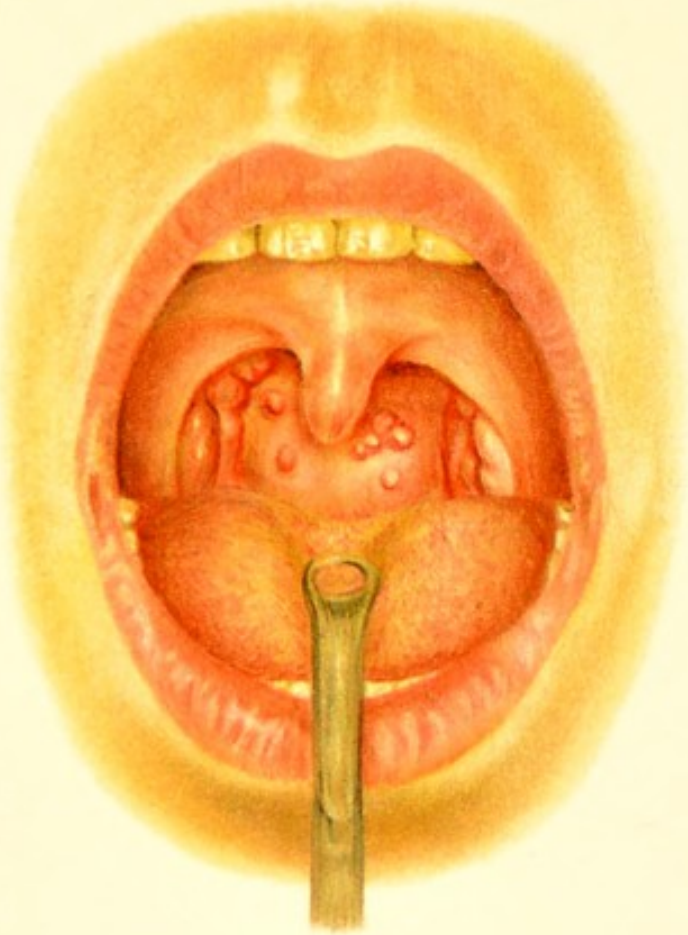

Fig. 1.

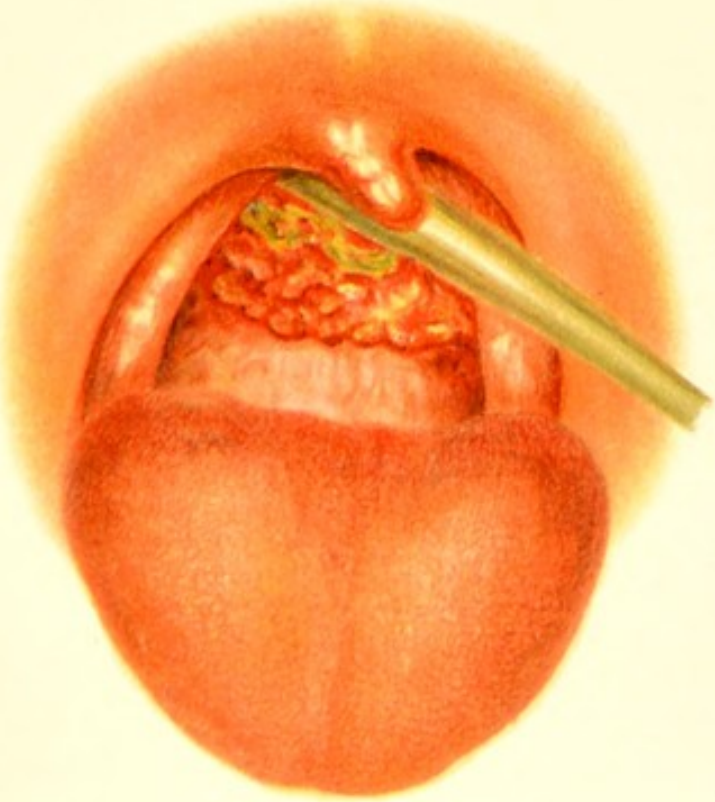

Fig. 2.

Tab. 19.

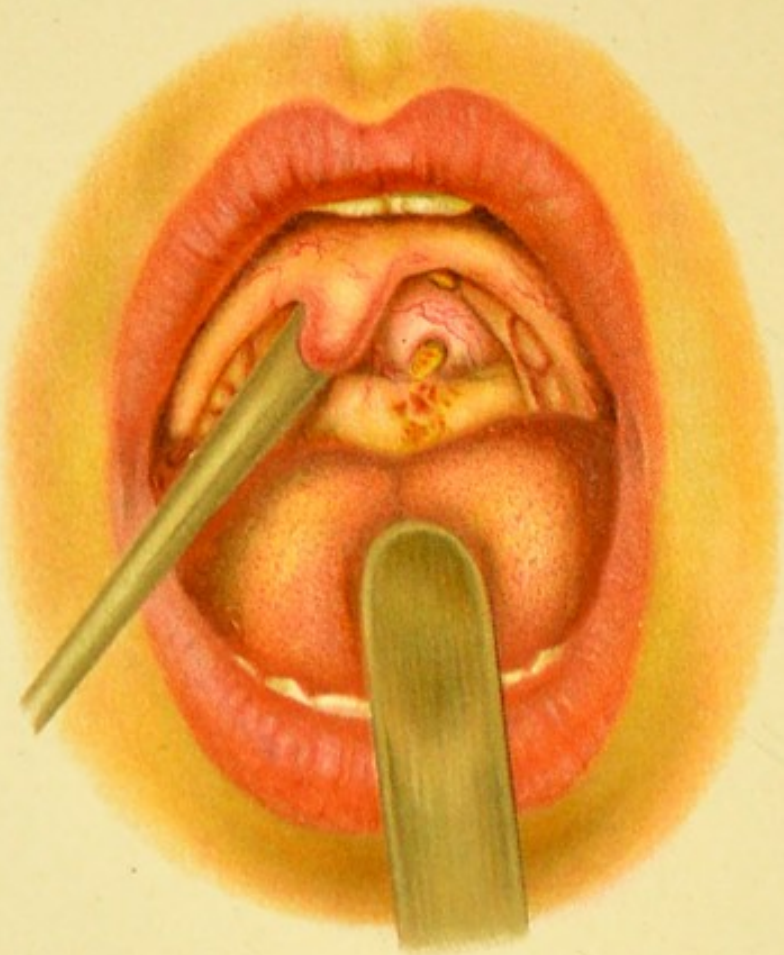

Fig. 1.

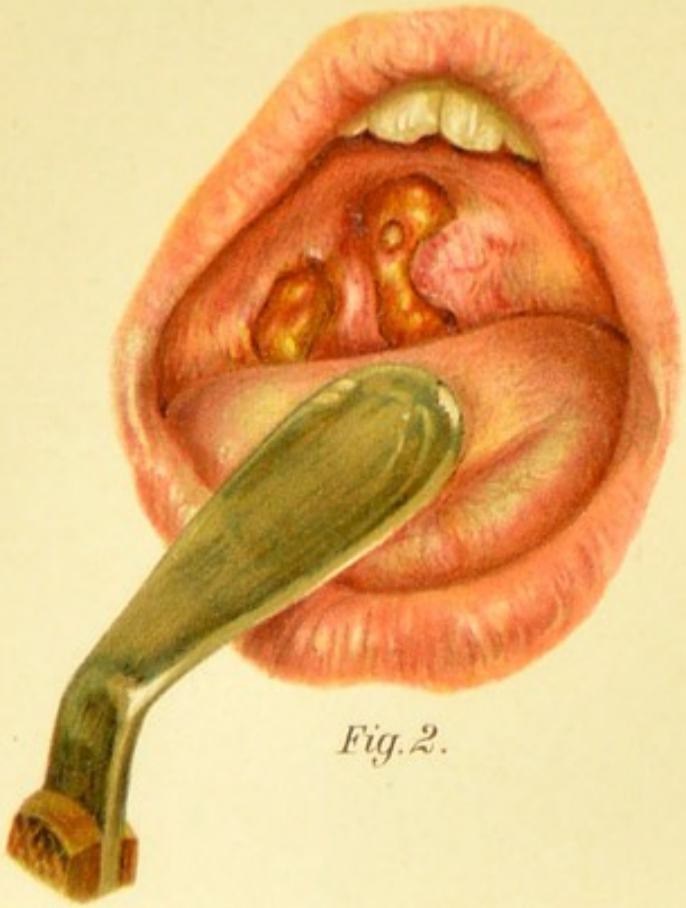

Fig. 2.

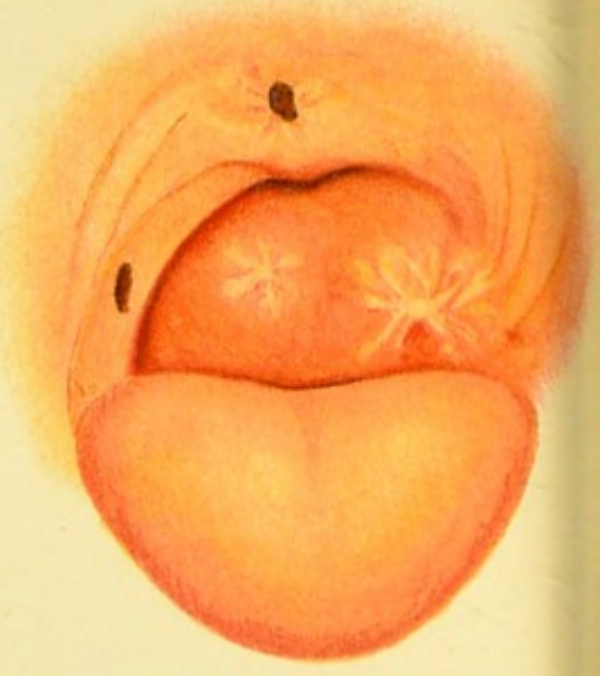

Fig. 3.

PLATE 19.

FIG. 1.—A woman, twenty-eight years of age, has suffered violent pain on swallowing and headache for several weeks past. Her general condition is wretched, and she has lost a good deal of hair.

Several purulent crusts are seen adhering to the posterior wall of the pharynx, and above the crusts there appears to be an ulcer.

After the soft palate has been drawn aside with a palate retractor the left side of the nasal portion of the posterior wall of the pharynx is seen to be occupied by a flat swelling, marked by two punched-out ulcers, and presenting in the left-hand portion a bluish-red color. The upper ulcer is half hidden from view. The floors of both ulcers are covered with a yellowish, discolored exudate, and from the lower there is also some discharge of yellowish-green, tenacious pus.

The history is very indefinite, but even without it the condition can be pronounced without hesitation an

Ulcerating Gumma.

FIG. 2.—On account of frightful pain in the throat lasting three weeks, a woman, thirty years of age, has finally consulted the physician, too late, however, as may be seen at the first glance.

The site of the right tonsil is occupied by an extensive ulcer, covered with a yellowish, lardaceous exudate and with slightly indented margins, the median portion extending deep into the tissues. The posterior faucial arch on the right side is greatly thickened and slightly granular. A similar ulcerated surface extends upward into the hard palate. The remainder of the soft palate has become adherent to the posterior wall of the pharynx, so that this ulcer extends from the hard palate to the pharynx and below as far as the level of the base of the tongue. The central portion is distinctly deeper than the rest of the ulcer, and has a sharply punched-out appearance. On the left side there is a prominent mass of tissue representing the uvula, which is drawn downward and to the left, greatly swollen, and of a granular, red appearance, so that it cannot be recognized by either its position or its outline.

It is obvious that an acute destructive process like the present obliterating of anatomic relations, and in which ulceration goes hand in hand with cicatrization, can be due only to

Tertiary Syphilis.

FIG. 3.—During a laryngeal examination of a woman between thirty and forty years of age the appearance of the pharynx attracted the surgeon's attention.

In the anterior faucial arch on the right side there is to be seen an oval defect with smooth edges, surrounded by pale but otherwise normal mucous membrane. A similar defect is seen higher up on the soft palate, above the uvula, but the mucous membrane surrounding it is drawn into pale, tense folds. Similar radiating folds are found in the central portion of the posterior wall and on the left faucial arch, binding the latter firmly to the posterior wall of the pharynx, and causing a retraction of the entire velum to the left. The uvula is

represented by a mere rudiment in the shape of a slight, wavy prominence. The pallor of the entire throat is noticeable.

The defects are perforations, the folds are hard cicatricial bands, such as are found as the

Cicatrized Syphilitic Ulcers.

The clean appearance of the defects, the hardness and intense whiteness of the scars, and the general pallor are characteristic features.

PLATE 20.

FIG. 1.—This presents a view of the left choana, seen from in front. The wide view was made possible in this case by marked destruction of the middle turbinate (*c*). The posterior wall of the pharynx (*d*) is visible and appears formed by the choana, which is bounded internally by the septum, below by the floor of the nose (*a*), to the outer side by the lower turbinate (*b*) and by the Eustachian fold (*e*). Above the lower turbinate a small portion of the tubal opening (*t*) is visible. It is the picture of the

Eustachian Tube in the Quiescent State,

while No. 2 represents the

Eustachian Tube During Deglutition.

In the latter position it projects some distance into the lumen of the choana, and has a club-shaped outline. The mouth of the tube is wide open (*t*); the interval between it and the lower turbinate is occupied by a triangular fold of mucous membrane (*g*). The posterior surface of the velum thus cuts off communication with the nasopharyngeal space from below. This illustration readily explains why fluid in the nose is liable to be forced into the tube during the act of swallowing.

FIG. 2.—This represents the nose of a girl thirteen years of age. The chambers are so wide that on the left side the entire choana, and on the right at least half of the posterior naris, can be seen. Framed by the choana and occupying the posterior wall of the pharynx are several pale-red structures with a slightly nodular surface somewhat resembling a mulberry. On the left side the growth gradually merges into a smooth, slightly elevated tumor on the outer and lower side. This unusual condition, permitting a view of the pharynx directly through the nose, enables us to see the

Hypertrophied Pharyngeal Tonsil,

which in addition occupies a very low position.

FIG. 3.—The vault of the nasopharynx in a woman twenty-six years of age is filled with a mass of pale-red nodular bodies hanging down almost to the upper edge of the choana. The surface of the nodules is, on the whole, smooth and shiny. The seat and appearance of the growths identify them as

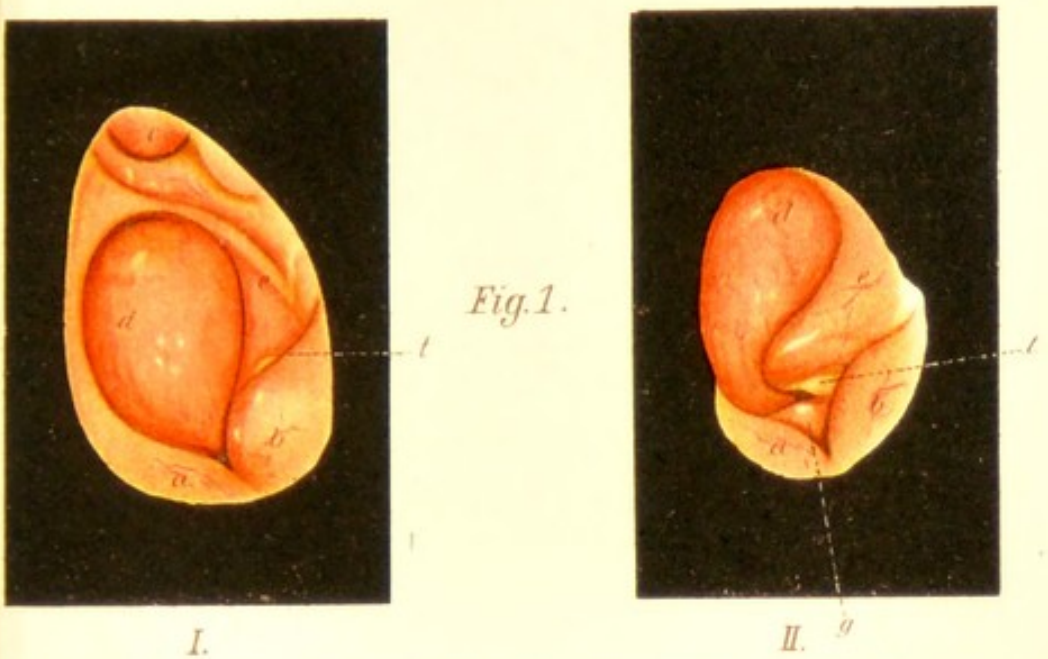

Fig. 1.

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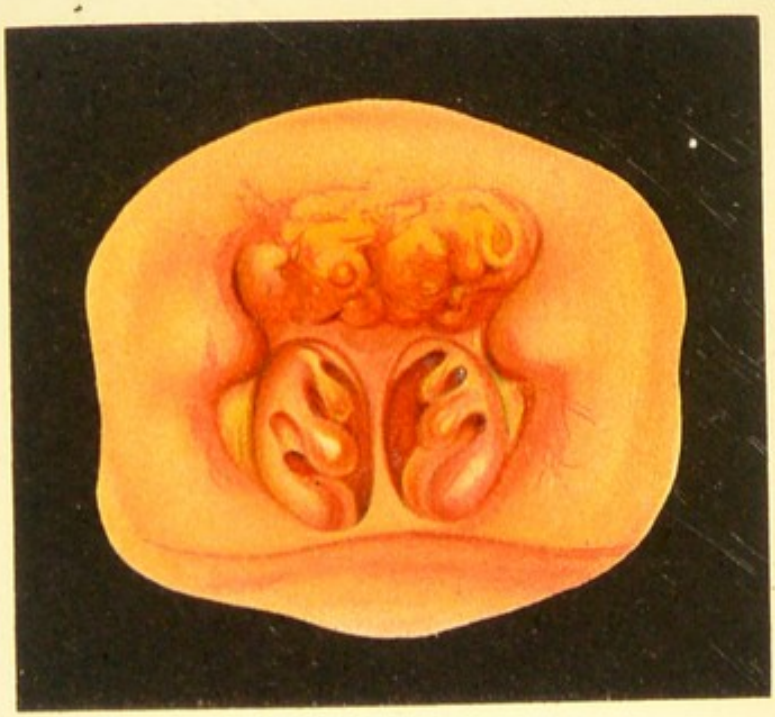

Fig. 1.

Fig. 2.

Adenoid Vegetations,

the well-known proliferations of lymphadenoid tissue or so-called pharyngeal tonsil. Although the hypertrophy is only moderate in degree, there is a good deal of interference with nasal respiration. The patient complains of this obstruction, as well as of marked impairment in phonation, so that the voice is muffled like the tone of a violin played with a sordine (damper).

PLATE 21.

FIG. 1.—A young man, twenty-two years of age, has come to consult the doctor for violent headache and pain in the throat radiating to both ears, a general feeling of depression, pain in the limbs, constipation, alternating chills, and a feeling of heat. These symptoms have existed for two days and point to some acute febrile disease. The tongue is thickly coated, the breath is fetid, especially when the mouth is closed; nasal breathing is also somewhat difficult. The pharynx is only slightly reddened. Although the severe general symptoms might be explained by the assumption of an influenza with mild catarrhal symptoms, this would fail to account for the violent local manifestations. A posterior rhinoscopic examination is therefore indicated.

The upper portion of the nasopharynx is red, while numerous lobules of tissue closely crowded together overhang the choanæ, especially on the left side. They are even more intensely reddened than the surrounding tissue, and present numerous small yellow masses of exudate which appear to grow from shallow depressions. The lobes represent swollen lymphadenoid tissue, which is now the seat of an inflammatory process in every respect analogous to that with which we are well acquainted on the palatal tonsils (see Plate 8, Fig. 1). We have to deal with a

Lacunar Inflammation of the Pharyngeal Tonsils.

The reason this affection, which is not so very rare, is not better known is that posterior rhinoscopy has hitherto usually been neglected in acute affections.

FIG. 2.—A woman, forty-five years of age, was taken sick about two weeks ago with fever and marked general symptoms, combined with nasal obstruction and a feeling of dryness in the throat. On the day of examination she began to perspire profusely, and thus suddenly discharged a large mass of pus from the nose. After this she felt very much better and began to improve, although the weakness continues.

Mucopurulent exudate is now found on the floor of the nose. The middle portion of the pharynx is free. In the nasopharynx the roof is greatly reddened, and the region of the pharyngeal tonsil presents a diffuse swelling. (To make the picture somewhat clearer, a purulent exudate which was present has been removed.) It is evident that we have to deal with the final stage of a

Retronasal Phlegmon.

PLATE 22.

FIG. 1.—This patient, a gentleman forty-two years of age, describes his malady as a "chronic pharyngeal catarrh." He chokes and hawks a good deal, especially in the morning, and expectorates tough, yellowish-green mucus with a great deal of difficulty. The throat feels dry, and he often has a sensation as if there was something in it.

The mucous membrane of the posterior wall of the pharynx is dry, and covered with a thin, tenacious layer of mucopurulent exudate.

Posterior rhinoscopy: The left side of the vault presents several flat swellings of the same color as the adjacent mucous membrane. Between the larger one on the right side and a group of smaller ones there is a deep cleft, from the lower extremity of which a purulent, inspissated secretion is discharged over the septum to the posterior surface of the soft palate.

The swollen tissue is to be interpreted as the remains of adenoid tissue, which sometimes persist to middle age, and the cleft between them is designated as the

Recessus Pharyngeus Lateralis.

A similar cleft is often present in the middle of the pharynx, corresponding to the point where the mucous membrane is more intimately attached to the bone. The secretory process which is kept up by an inflammation within the cleft is known as

Localized Retronasal Catarrh.

FIG. 2.—A man, twenty-eight years of age, ever since he was a boy has ejected both through the nose and mouth tough, greenish-yellow crusts filling the entire nose. He has been told that the crusts are offensive. He himself has no sensation of smell.

The nose is entirely filled with crusts, which emit a horrible fetor. Behind the crusts is some more fluid secretion. The mucous membranes are pale, and the turbinates are contracted so that the width of the nasal chambers is conspicuous.

The structures of the nasopharyngeal space are smaller than normal in every measurement; they are "emaciated." The general appearance of the mucous membrane is pale, except for a thickened portion above the right choana, which is slightly reddened. Below this there projects a grayish-green, dry mass, evidently consisting of inspissated secretion, which extends from that point over the septum and the choana as far as the posterior surface of the soft palate, concealing portions of the turbinates.

The condition, which is commonly spoken of as

Fetid Atrophic Rhinitis or Ozena,

merely tells us that a purulent process is at work, probably in the region of the swollen mass of tissue described. The products of this purulent process meet with obstacles in their passage through the nose, and thus gain time to dry out. As a matter of fact, we have to deal with an

Empyema of the Right Sphenoid Sinus,

a suppuration in the right sphenoid sinus, from the lower wall of which the secretion is discharged.

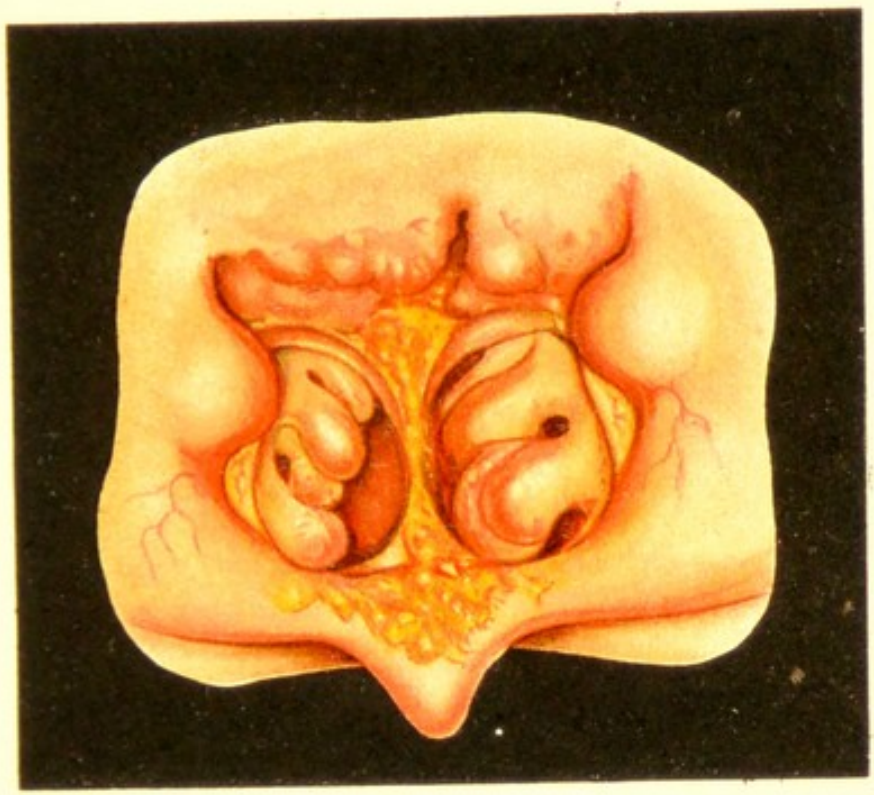

Fig. 1.

Fig. 2.

Fig. 1.

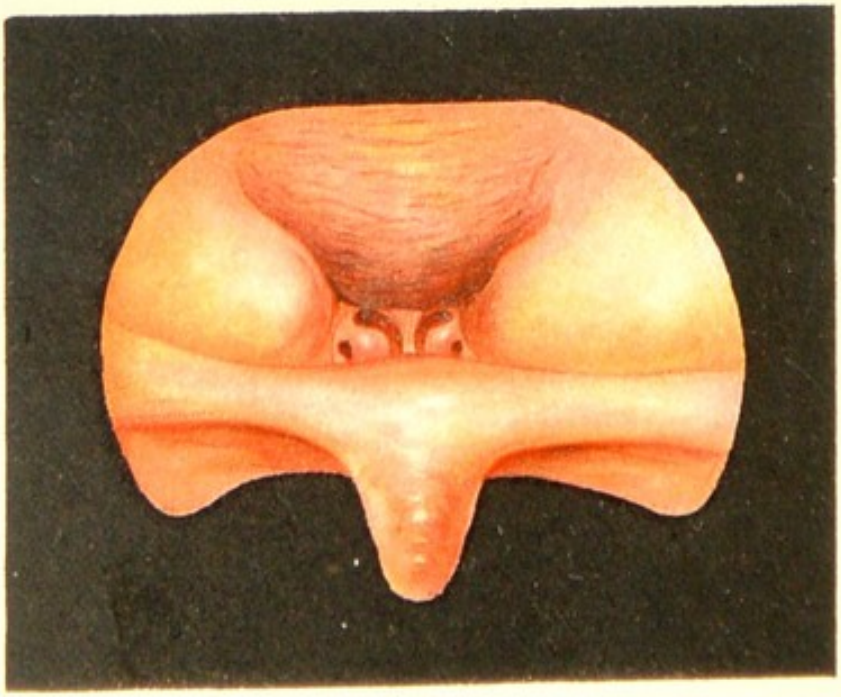

Fig. 2.

PLATE 23.

FIG. 1.—A woman, fifty-six years of age, complains of obstruction in the nose and some discharge. She says her troubles date back only a week or two. An anterior view of the nose presents nothing unusual, but the posterior extremities of the turbinates appear to be somewhat thickened.

The entire vault is filled by a grayish-red, slightly nodular mass, which merges into the tubal folds without any distinct delimitation. The vomer and the posterior choana present a similar appearance. On palpation, the tumor feels soft and somewhat friable, and at once begins to bleed.

The history is undoubtedly incorrect. The patient is of a torpid disposition, and although symptoms of the disease must have been noticeable for some time, paid no attention to them until the entrance of air was completely cut off. The tumor, which has infiltrated the surrounding tissue and set up a degenerative process, can be nothing but a malignant neoplasm which has existed for at least six months. A fragment removed for purposes of examination reveals under the microscope its nature. It is a

Sarcoma of the Nasopharynx.

FIG. 2.—A woman, thirty-four years of age, has been troubled with a gradually increasing obstruction of the nose for the past two to three weeks. Anterior rhinoscopy is negative.

Posteriorly, on the other hand, the fornix is found to be covered by a bluish-red tumor, slightly elevated above the surrounding level, and with a somewhat uneven surface. The tumor partially overhangs the tubal folds.

The woman has had several miscarriages. Two children died during the first months; the last one is the only one that lived, and is now well. Lately she has had marked defluvium capillorum, and she often suffers from headache. These things all point to lues. The general appearance of the tissues, and the painless, febrile, subacute course of the inflammation are in harmony with this diagnosis. We have to do with a

Retronasal Gumma.

PLATE 24.

FIG. 1.—Pain in the throat and ears occurring simultaneously in a girl sixteen years of age suggests the propriety of making an otoscopic examination. Both drumheads are slightly reddened and bulging, especially the left. The hearing is reduced to whispering at 10 cm.

Rhinoscopy: The vault presents slight, wavy ridges, arranged in two parallel rows, and extending laterally as far as Rosenmüller's fossa.

The tubal folds, of which the internal surfaces are chiefly seen (by rotating the mirror outward), are intensely red and somewhat swollen.

Yellow pus exudes from the opening of the left tube, and on the right side a drop of grayish mucus is seen issuing from the tube. We evidently have to do with

Acute Salpingitis.

The discovery of an acute otitis media tells us that the discharge comes not only from the mucous membrane of the tube, but also from the middle ear. The ridges on the vault of the pharynx represent ill-developed adenoid vegetations.

FIG. 2.—A man, thirty-eight years of age, complains of pain in and over the right eye for the past week. The examination of the eyes is negative. The patient states that he has recently had a free discharge of pus from the right nostril. Owing to a marked deviation of the septum, it is almost impossible to obtain a view from in front.

The vault of the pharynx is covered with pus, and the adenoid tissue is considerably swollen. The upper nasal meatus is entirely occluded by intense swelling of the greatly reddened middle turbinate, the surface of which is very irregular. The inferior turbinate presents similar, though less marked, changes. From the middle meatus pus flows over the vomer and bathes the posterior surface of the soft palate. It is the picture of

Acute Nasal Suppuration,

which cannot be more accurately localized as we cannot exclude a possible suppuration from an accessory cavity in addition to the evident disease of the nasal passages.

(The inflammation disappeared in three weeks under non-irritating treatment.)

Fig. 1.

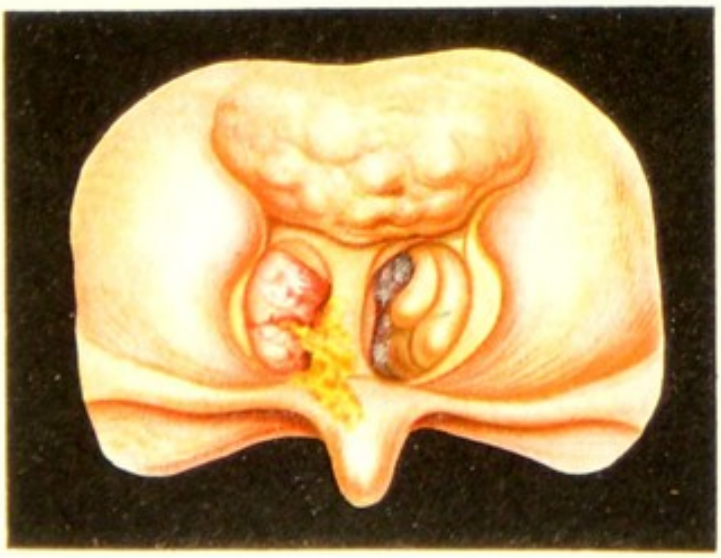

Fig. 2.

PLATE 26.

FIG. 1.—A middle-aged gentleman seeks relief from obstruction which almost amounts to total abolition of nasal respiration. In front the inferior turbinates are seen to be swollen, although not excessively so. The posterior extremities of the middle turbinates appear within the frame of the choanæ as narrow, club-shaped structures. Immediately underneath, two grayish-red, spheric bodies resembling cauliflower project above the edge of the choana and the septum. These bodies represent

Papillary Hypertrophy of the Posterior Extremities of the Inferior Turbinates.

FIG. 2.—A young man, twenty-three years of age, has experienced difficulty in breathing for some time, and for the past three months the left side of the nose has been completely obstructed. The lower part of the left choana is occluded by an almost spheric, smooth, grayish-yellow, slightly translucent tumor, about the size of a hazel-nut, which almost completely conceals the opening of the left Eustachian tube, as well as the lower portion of the middle turbinate and the septum. The tumor is traversed by large blood-vessels. At the first glance it is recognized as a

Retronasal Polyp.

The absence of adhesions and the integrity of the surface indicate that the tumor is benign, and by means of the probe it is found to be attached by a circumscribed pedicle from the posterior extremity of the middle turbinate.

FIG. 3.—A boy, twelve years of age, has been practically unable to breathe through the nose for almost a year. When he tries to blow his nose, he often brings blood. The mouth is held wide open. On anterior view, masses of mucus are found in the nose and the turbinates are seen to be somewhat thickened. The entire nasopharynx is filled with a brownish-red tumor about the size of a small apple, completely occluding the right choana and all but the lowest segment of the left. The opening of the right tube (*r t*) is completely concealed, while the left (*o*) is just barely visible. The surface of the tumor in places is irregular. It grows by a broad stalk from the roof of the nasopharyngeal space, and is, in addition, attached to the walls at two different points by adhesions. No ulcers are visible on any part of the surface.

The tumor, therefore, is a so-called

Fibroid of the Nasopharyngeal Space,

more correctly, juvenile sarcoma.

Tab.26.

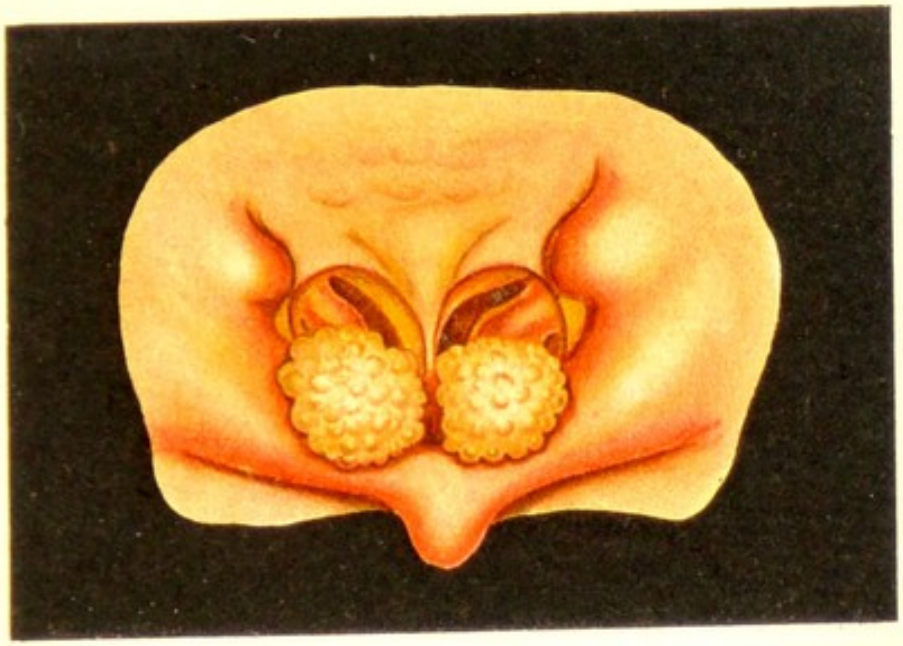

Fig.1.

Fig.2.

Fig.3.

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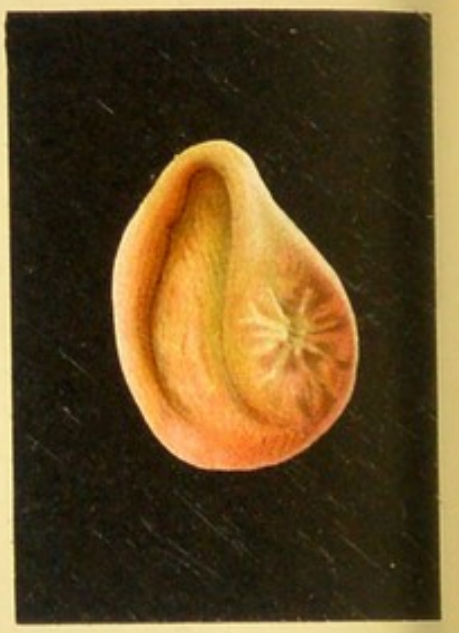

Fig.2.

Fig.3.

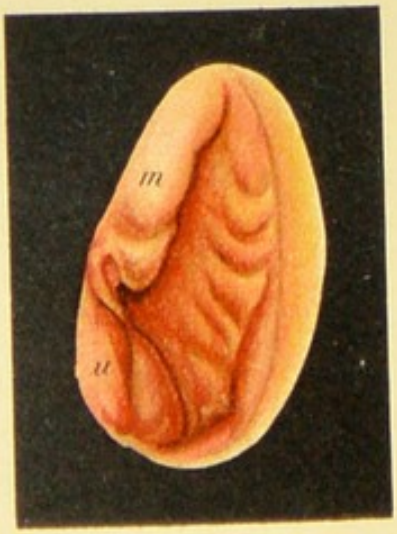

Fig.4.

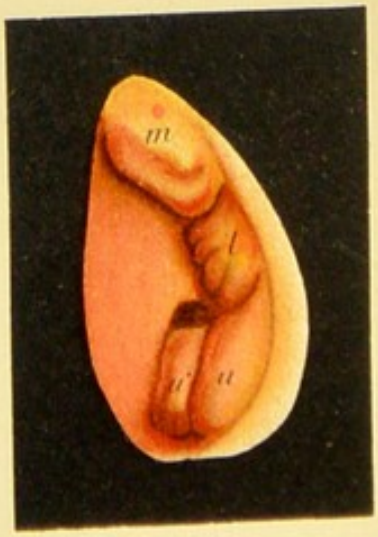

Fig.5.

PLATE 27.

FIG. 1.—In the right half of the nose (*a*, inferior, *b*, middle turbinate) a spinous process with a broad base projects horizontally from the septum toward the lower turbinate, with which it is in contact, so that the inner surface of the turbinate presents a shallow depression. The mucous membrane covering the cartilage of the septum is continuous with that of the spur, so that the junction of the latter with its base cannot be made out. It follows, therefore, that the spur consists of cartilaginous tissue, and this conclusion is confirmed by the probe. It is designated

Spina Septi Cartilaginei.

The region of the septum opposite the middle turbinate is greatly depressed on account of the bending of the cartilage toward the other (left) side.

The left side of the nose is encroached upon by a smooth, glistening wall of tissue, arching outward from the middle. The narrowing is so extreme that only a slender strip of the middle turbinate (*b*) is visible. It is evident both from the continuity of this wall of tissue with the floor of the nose and from the fact that it is entirely similar to the septum in color and consistency, that it is merely a lateral bulging of the cartilaginous, and possibly also of the bony, septum. It is, therefore, a

Deviation of the Septum.

FIG. 2.—A woman suffers from rather frequent attacks of inflammation, now of one ala nasi, now of the other, the attack ending with discharge of a small amount of pus from the separation of a small crust.

At present the nose is free. On the inner side of the left ala nasi there is a stellate scar of a whitish color, with a central depression. This represents the remains of repeated attacks of

Suppurative Folliculitis of the Meatus of the Nose.

FIG. 3.—A youth, seventeen years of age, has had frequent hemorrhages from the left side of the nose. He is continually picking his nose and tearing away the crusts that form at this point, a procedure that is always followed by renewed hemorrhage.

After carefully softening several flat crusts adherent to the left side of the vestibule, a pure white, rather narrow strip, surrounded by a pale-red areola, is seen running from before and below backward and upward on the anterior inferior portion of the septum. The strip of tissue can be removed, and there is disclosed underneath the ulcerated, somewhat granular, mucous membrane, that bleeds readily.

This process is repeated with the production of the same appearance during the next few days.

We have to deal with

Traumatic Erosion of the Wall of the Septum.

The exudate consists of epithelium which has undergone necrotic, and in part fibrinous, alteration.

FIG. 4.—The middle turbinate (*m*) is greatly enlarged, and almost completely obstructs the middle nasal meatus. The mucous membrane is slightly granular and of a pale-red color. As much of the septum as is visible is traversed by a number of ridges, some flat, some lobular in

shape, and most of them running horizontally. The color of these ridges is the same as that of the middle turbinate. The identity of this mucous membrane with that of the septum is unmistakable, and the affection is designated

Hypertrophy of the Mucous Membrane of the Septum.

FIG. 5.—Between the inferior (*u*) and middle (*m*) turbinates on the left side there projects a broad, somewhat lobular, red swelling, which at first gives the impression that the middle turbinate is double. As a matter of fact, the swelling has nothing to do with the latter, as is shown by means of the probe. It represents a hypertrophy of the inferior margin of the hiatus semilunaris; it is the so-called

Lateral Fold,

a hyperplasia sometimes produced by purulent or catarrhal processes in the inferior nasal meatus or adjacent nasal cavities.

PLATE 28.

FIG. 1.—In the right half of the nose, above the inferior turbinate, which is thickened and club-shaped, we see a number of spheric, closely aggregated tumors obstructing the middle nasal meatus as far as the septum. The tumors are of a pale, grayish-yellow color, translucent, and contain numerous vascular ramifications. In the left half of the nose a pear-shaped tumor of similar, although somewhat firmer, appearance fills out the choana as far as the floor of the nose, so that only a narrow triangular strip of the inferior turbinate is visible. The appearance of the tumors alone assures the diagnosis of

Nasal Polypi,

the multiple form being represented in the right, and the solitary form in the left, half of the nose.

It is possible that the latter may conceal some additional multiple polypi. The point of attachment of the masses (in the middle nasal meatus and roof of the nose, hence on the ethmoid bone) will have to be determined by the probe. Careful attention must also be given to the condition of the bone (caries) and the presence of secretion, as these tumors in the great majority of cases are due to more deep-seated affections.

FIG. 2.—In the right half of the nose it is possible to obtain a view of the middle nasal meatus above the narrow inferior turbinate. Corresponding to the lower boundary of the middle meatus is seen the dark posterior wall of the pharynx, while above is a prominent red tumor, hemispheric in shape, and built up, as it were, in two terraces. The upper portion corresponds to the anterior extremity of the middle turbinate, while the lower portion (*m'*) shows in perspective the lower portions of the same turbinate, which are also enlarged. From the color and other appearances of the mucous membrane, however, it is seen at once that we have to deal not with a heterologous tumor, but with

Hypertrophy of the Middle Turbinate.

On the left side we see the anterior extremity of the lower turbinate converted into a spheric mass of swollen tissue. The surface is smooth, and the hypertrophy occludes the inferior and part of the middle nasal meatus.

Hypertrophy of the Anterior Extremity of the Inferior Turbinate.

(The pale-red, wedge-shaped areas above the choanæ correspond to mucous membrane of the alæ nasi, which is compressed by the speculum and consequently bloodless and pale in color.)

FIG. 3.—A wide view of the interior of the nose is presented. Owing to the great distance between the middle turbinate (*m*) and the outer wall of the nose a much larger portion of the middle meatus (*h*) is visible than in ordinary cases. Above, the meatus forms a sharp angle between the middle turbinate and the outer wall of the nose. This angle is bounded below by an arciform fold. The approximately crescentic area represents the

Entrance to the Frontal Sinus.

It is only in rare instances that it can be seen as plainly as in this picture.

The remaining letters stand for the following structures: *r*, posterior pharyngeal wall; *m'*, lower surface of the middle turbinate seen in profile; *u'*, median surface of the lower septum seen in profile; *s*, septum.

FIG. 4.—In the left half of the nose a large portion of the posterior wall of the pharynx is seen through the choana, while the outlook is bounded on the median side by the septum (*a*), below by the inferior turbinate (*b*), and to the outer side by the anterior surface of the tubal fold. Above the upper margin of the choana there is seen a roundish, cup-shaped depression (*d*) with a sharply defined border, and lined with yellowish mucous membrane; it is encroached upon below by the middle turbinate (*c*), which is very much contracted. This depression represents the

Left Sphenoid Sinus.

The sinus is greatly enlarged as a result of an old suppuration, and therefore visible in so unusually large an extent. Below the middle turbinate several smaller depressions (*e*) of similar appearance are seen. They represent cells in the ethmoid bone where a similar suppurative process has been at work.

Tab. 28.

Fig. 1.

Fig. 2.

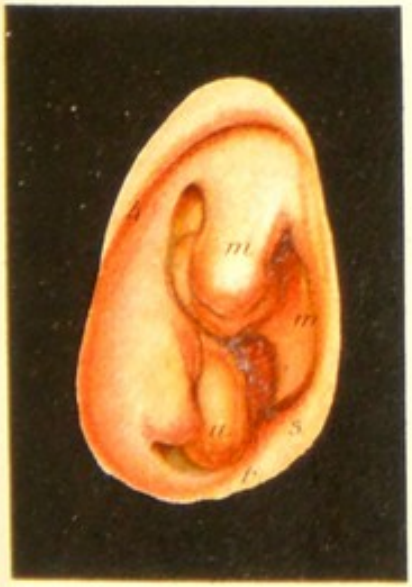

Fig. 3

Fig. 4.

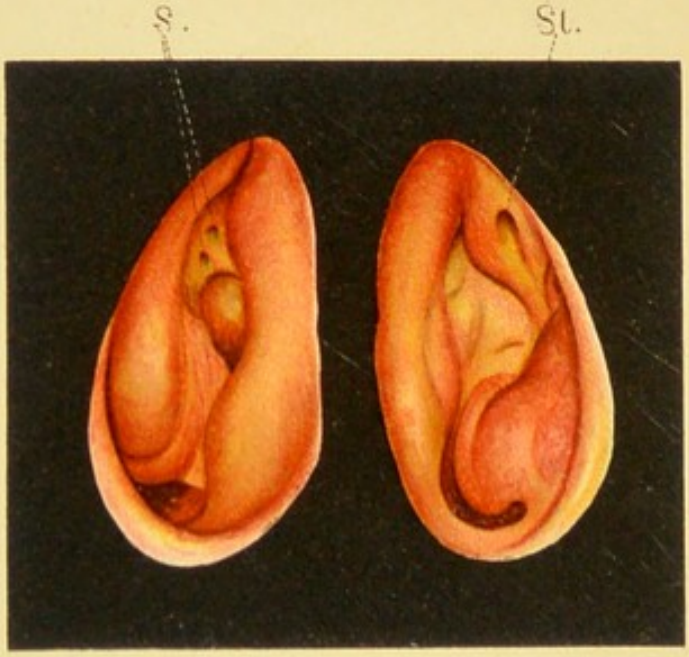

Fig.1.

Fig.2.

Fig.3.

PLATE 29.

FIG. 1.—In this patient both middle turbinates had been almost entirely removed on some former occasion. At the present time two spheric openings (*S*) are seen above the right choana. They represent the artificial orifices of two *ethmoid cells*. On the left side, on the remains of the middle turbinate, there is a cleft (*St*), deeper above than below—the *opening of the frontal sinus*.

FIG. 2.—A gentleman, forty-two years of age, is subject to frequent headache. From the left side of the nose plugs of mucus are constantly expelled, especially in the morning.

The anterior extremity of the middle turbinate is apparently double; it is thickened, and the surface at that point is somewhat redder than elsewhere, and presents an irregular, granular appearance. Above this somewhat club-shaped swelling there is seen a narrow, oval cleft, the *recessus meatus medii*, which in this case is exceptionally distinct. On further examination it is found that this is the origin of the secretion, and, as the jaw as well as the frontal sinus can be excluded as possible sources, the diagnosis of

Circumscribed Catarrh of the Middle Meatus

is arrived at.

FIG. 3.—After careful spraying and maceration, several offensive grayish-red crusts are removed from the right half of the nose.

After waiting a short time, the entire surface of the inferior turbinate appears covered with a number of small yellow drops of pus, the intervening mucous membrane being dry and rather pale.

The picture corresponds to what is sometimes called

"Ozena."

The secretion, which in this case comes from the antrum, forms a thin, uniform layer and becomes arrested by the projecting portions of the mucous membrane, where it collects to form drops which gradually enlarge sufficiently to be seen.

PLATE 30.

FIG. 1.—A woman, forty-two years of age, has noticed a dryness in the nose for about a year. There is also a feeling of tension, so that she is constantly scratching her nose and sometimes makes it bleed. The patient has always had the habit of scratching her nose, but the habit has increased since her husband's death. "Of what did he die, and when?" "Of pulmonary disease; six months ago."

The anterior portion of the septum in the right half of the nose is covered with small, flat, spheric, grayish-red prominences, which gradually subside toward the posterior part of the nose, where they merge with the healthy mucous membrane; they also extend laterally over the floor of the nose and to the anterior end of the inferior turbinate. The chief localization is on the crest of the septum.

The starting-point of the disease then awakes a suspicion of

Tuberculosis of the Nares,

a diagnosis that finds support in the nodular appearance of the lesions and diffuse distribution of the process.

Inspection is supplemented by palpation, which shows that the structures are of a hard consistency, with a great tendency to bleed, and the diagnosis is finally confirmed by microscopic examination, especially of the histologic structure, since bacilli are often not to be found. Infection is readily traced by the history.

FIG. 2.—For purposes of comparison we have here given the picture of a small, circumscribed, sessile tumor on the septum, resembling a strawberry, and pale red in color. It is a

Papilloma of the Septum.

This picture well illustrates the difference between this benign neoplasm, with its sharp limitation and uniform growth of the individual papillary elements, and the tuberculous infiltrate, which is ill defined and blurred and shows no distinct delimitation, but which is always characteristic, no matter how much it may assume the appearance of a tumor.

FIG. 3.—A young woman, twenty-two years of age, complains of violent headache, especially in the frontal region, for the past four days. There is also marked obstruction of the nose.

The nose itself appears to be fairly free. The nasopharynx presents a moderately thick layer of adenoid tissue. The diagnosis remains in doubt.

Four days later: The inferior turbinate on the right side is slightly swollen. After the application of cocain the headache diminishes, and disappears entirely after the entire septum has been painted with cocain. On the following day the improvement continues, but on the day after that the pain returns. A small crust of dried pus is now found on the anterior surface of the inferior turbinate; opposite the lower portion of the septum the middle turbinate is also somewhat thickened. After the crust on the septum has been removed, the latter appears slightly wrinkled and irregular, with a moderate retraction at the center. On being questioned the patient states that the hair of her head is rapidly dropping out. Her social standing is such as to forbid more inquisitorial questions, but the clinical picture is so suspicious that potassium iodid appears to be indicated.

Four days later: the wrinkling of the septum is more pronounced than on the last visit; the central retraction has extended from behind forward. The headache has now completely disappeared.

Three days later the following unequivocal condition is found:

Marked swelling of the middle and inferior turbinates on the right side. The inferior turbinate presents an irregular ulcer, the floor of which is covered with a lardaceous exudate and surrounded by an extensive area of injection. This ulcer is continuous, by way of the floor of the nose, with another ulcer in every respect similar to it on the septum.

A third, somewhat shallow, but very extensive ulcer of similar appearance and more distinctly sinuous outline occupies the middle turbinate.

On the floor of the septal ulcer the probe comes upon rough bone; everywhere the tissues bleed at the slightest touch.

A single glance would now suffice to establish the diagnosis of

Tertiary Syphilitic Ulcers.

The picture of the left half of the nose represents the *residuum* of a similar process, an *old perforation* and a cicatrix with loss of tissue of the middle turbinate.

FIG. 4.—The floor of the nose and the adjacent portions of the inferior turbinate and of the septum are intensely red. Within this zone there is a grayish-white exudate, apparently on a level with the mucous membrane. The middle nasal meatus, the middle turbinate, and the septum are covered with yellowish-gray masses of pus.

These collections of pus attest the intense reaction of the entire nasal mucous membrane to the inflammatory process going on in the anterior segment. The exudative nature of this process is recognized by the appearance and by means of the probe, which shows the wide patches to be tenacious but removable membranes. The inflammation is therefore a

Fibrinous Rhinitis.

[While fibrinous rhinitis is a distinct pathologic possibility, the bacteriologic experience of recent years has shown that many cases presenting the appearance described are in reality nasal diphtheria. This variety of the disease was formerly regarded as one of its most malignant manifestations, but in many cases in which the culture-test reveals the presence of the Klebs-Löffler bacillus, the constitutional and local symptoms are mild and the patient not very ill, recovering without any special difficulty. Various micro-organisms can cause here, as elsewhere, a membranous exudate.—ED.]

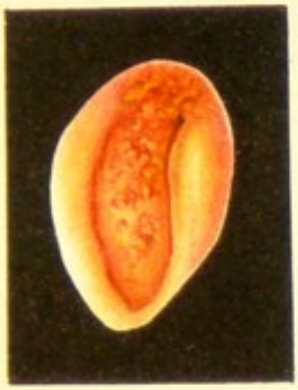

Fig. 1.

Fig. 2.

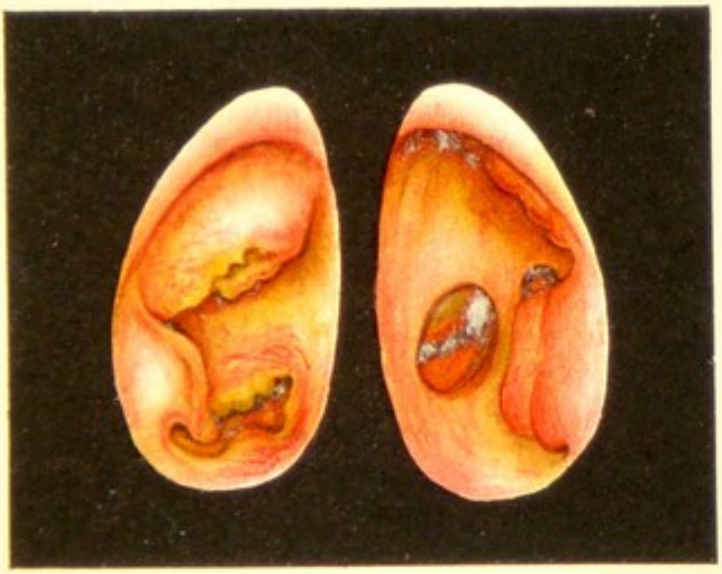

Fig. 3.

Fig. 4.

Tab. 31.

Fig. 1.

Fig. 2.

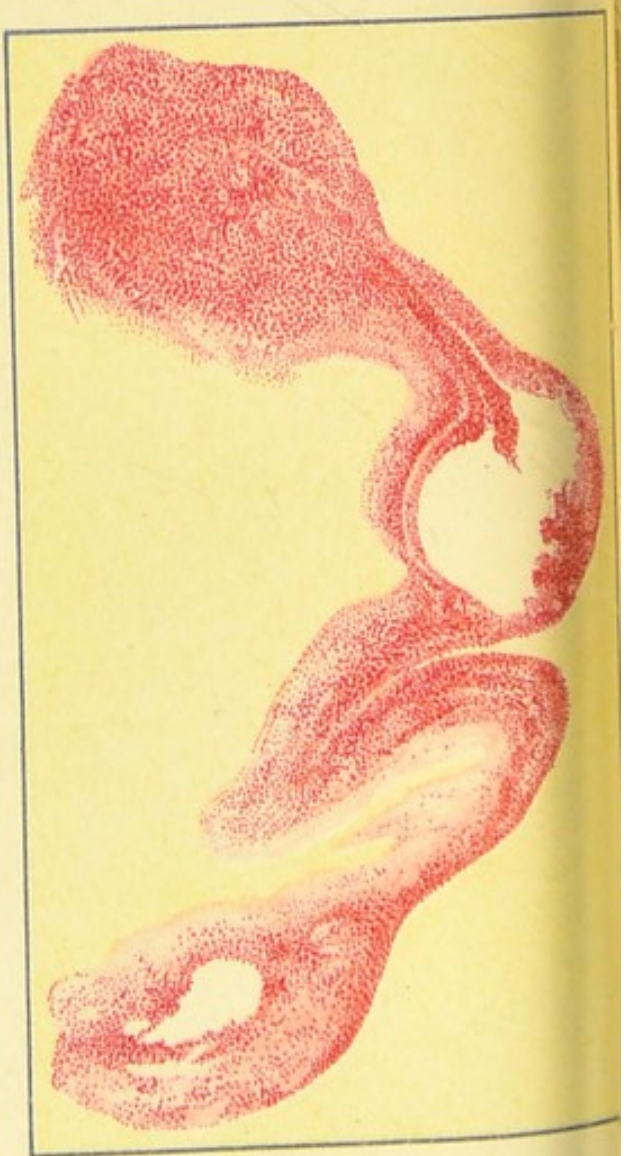

Fig. 3.

Lith. Anst. F. Reichhold, München.

PLATE 31.

FIG. 1.—**Sagittal Section of the Hyperplastic Pharyngeal Tonsil from a Child** (×17).

The tissue is almost entirely made up of various sized lymph-follicles. The loose-meshed intervening tissue consists largely of round-cells. A few blood-vessels appear near the base.

FIG. 2.—**The Same Tumor from an Adult** (×21).

The marginal zone of the follicles has a greater density. The follicles are scattered in the stroma, which is traversed by numerous capillaries and strengthened by connective-tissue trabeculæ of varying thickness. The picture represents the stage of involution.

FIG. 3.—**Frontal Section of a Pharyngeal Tonsil** (×53).

Above, the remains of lymphadenoid tissue are shown. The remaining portion presents three partially closed cavities, surrounded by thin layers of similar tissue, without any especial alteration in the walls. These **cystoid cavities** were undoubtedly produced by inflammatory degeneration of follicles.

PLATE 32.

FIG. 1.—This represents a pharyngeal tonsil already in advanced condition of involution. Near the median line there is a deep cleft, which becomes wider toward the base—a **pharyngeal bursa.** The section presents on the left side and below, the surface of the tonsil; on the right side and above, the inner wall of the cleft. The intervening layer exhibits the type of lymphadenoid tissue in process of involution (see Plate 31, Fig. 2). At one point the tissue rises to form a villous process, which almost touches the basal wall, so that, if the growth should continue, the epithelial surfaces would come in contact with one another and break down, with the production of a closed cavity or cyst. The epithelium on these surfaces is in places greatly hypertrophied, and has undergone an epidermoidal change, while that of the inner surface has preserved the type of cylindric cells arranged in a single layer ($\times 18$).

FIG. 2.—**Small, Soft, Pedunculated Tumor, Growing from the Upper Surface of One of the Palatal Tonsils** ($\times 9$).

The right wall is formed by a thin strip of connective tissue, while the left wall, toward the inner side, consists of the remains of tonsillar tissue, and, on the outer side, of a more homogeneous fibroid tissue, deficient in cellular elements and containing only a few sparse remains of cells. The outer and inner walls of the cyst are covered by cylindric epithelium, in part laminated, making it obvious that the cavity could have been produced only by the union and cohesion of different portions of the surface of the tonsil.

FIG. 3.—Section of the tumor represented in Fig. 3 of Plate 26, being a **juvenile sarcoma.** Below the surface, a few lymph-follicles with a border of densely aggregated cells are observed. The remaining tissue consists of loosely arranged round-cells with an enormous vascular development, explaining the rapid growth ($\times 12$).

Fig. 1.

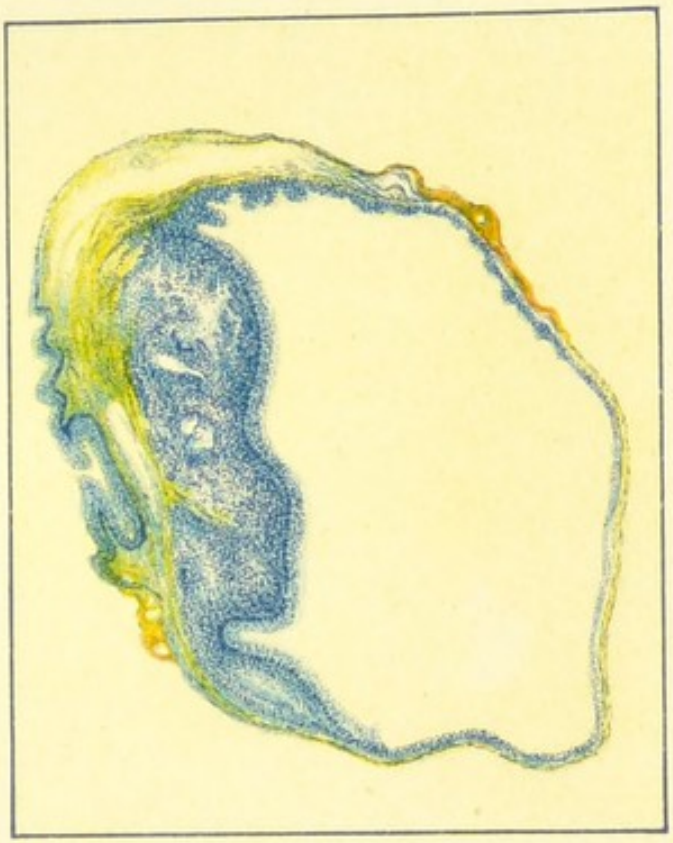

Fig. 2.

Fig. 3.

Lith. Anst F. Reichhold, München.

Tab. 33.

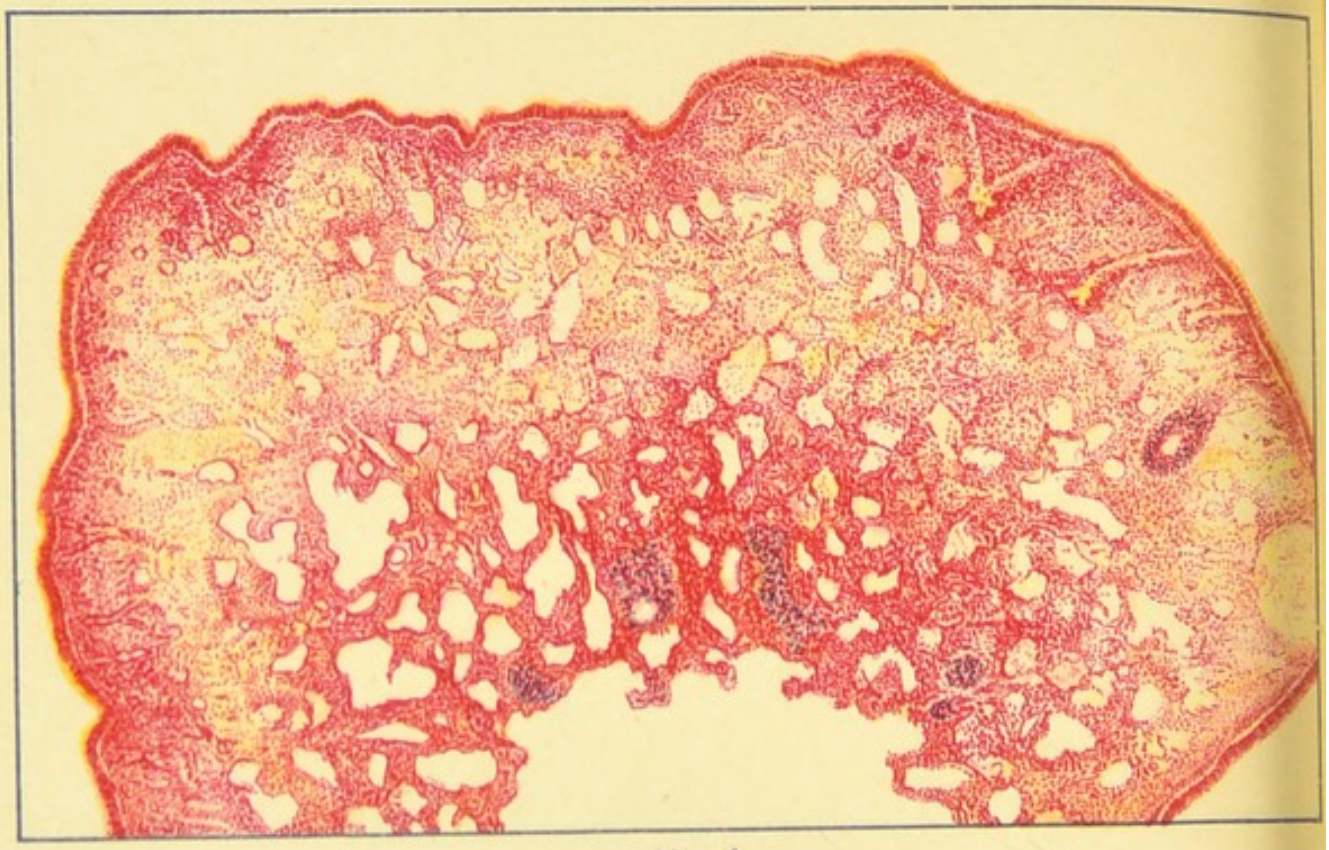

Fig. 1.

Fig. 2.

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PLATE 33.

FIG. 1.—**Section of Smooth, Club-shaped Hypertrophy of the Anterior Extremity of the Inferior Turbinate** ($\times 12.5$).

Below the slightly wavy surface there is a narrow layer of connective tissue, infiltrated with round-cells. For the rest the entire body of the tumor is occupied by dilated veins with thick walls representing a *hyperplasia of the corpus cavernosum*. Here and there arteries surrounded by an intense inflammatory proliferation are seen. Around the periphery numerous smaller vessels pass to the surface.

FIG. 2.—**Combination Picture from a Mucous Polyp** ($\times 90$).

(The stroma is narrower in the picture than in reality, and the glands and vessels therefore appear crowded together in a smaller space.)

The foundation consists of loose, connective tissue composed of extremely thin fibers, reinforced by elastic fibers, and very poor in cells. Below is seen a coil of dilated glands. The gland on the right side has degenerated into a spiral tube, and the surrounding tissue is infiltrated with small cells. The smaller vessels near the center of the section (cut longitudinally) present endo- and peri-arteritic proliferations. The same condition is observed in the larger arteries, in which the lumen is almost completely occluded by the round-cells. In the large veins above and on the left-hand side of the picture there is a conspicuous thickening of the intima, suggesting trabeculæ, with great narrowing of the lumen.

The constriction in the vessels explains the development of edema in tissues of this character.

PLATE 34.

Pale-red, Slightly Bosselated Tumor on the Anterior Extremity of the Inferior Turbinate ($\times 10$).

The loose-meshed tissue, which is traversed by a number of blood-vessels, is moderately rich in cells, and contains four large cavities and a number of smaller ones. The inner walls of these cavities are lined partly with a single layer of squamous epithelium, and partly with cylindric cells, arranged in a single or in several layers. The lumen of one of the cavities is encroached upon by several broad papillæ, while the lumen of another is invaded by infiltrated connective tissue.

The cavities have been formed by dilated glands, and the mass is to be designated a *cystadenoma*.

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Tab. 35.

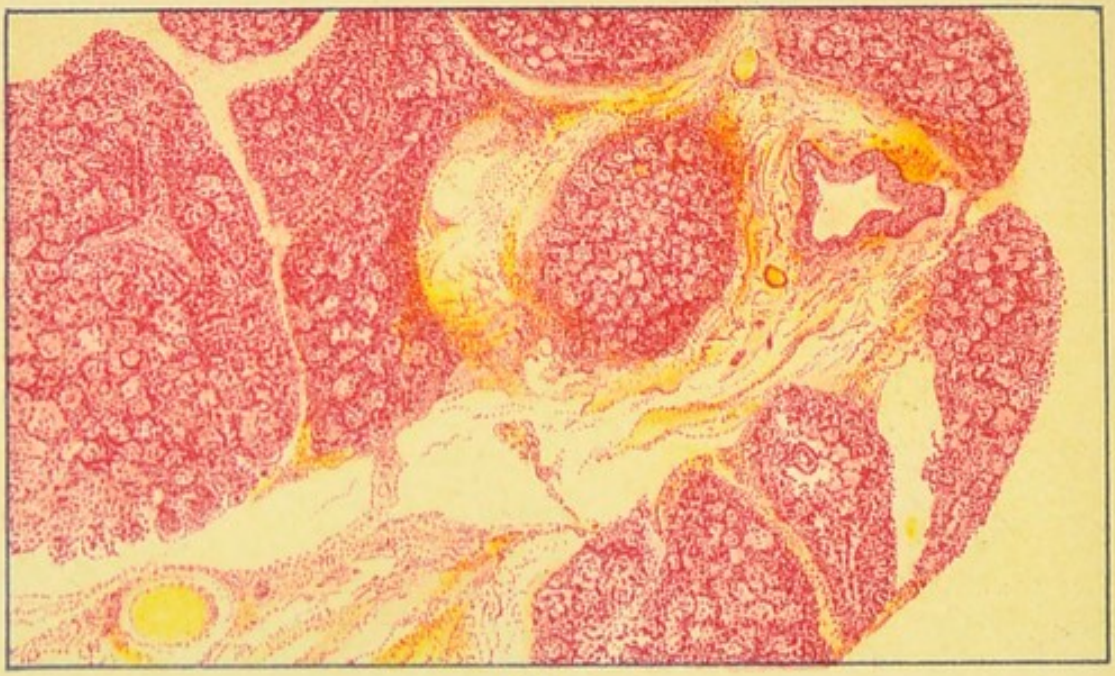

Fig. 1.

Fig. 2.

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PLATE 35.

FIG. 1.—**Part of a Section of a Pale-red Tumor from the Anterior Extremity of the Middle Turbinate** ($\times 13$).

The tumor is almost exclusively composed of roundish coils, the integral parts of which, under higher magnification, reveal themselves. The scanty interstitial tissue is almost entirely composed of blood-vessels. On the right side and above there is a dilated artery with thickened and infiltrated walls: *adenoma.*

FIG. 2.—**Part of a Cauliflower Tumor from the Middle Turbinate** ($\times 19$).

The surface is covered by cylindric epithelium, in places greatly hypertrophied. Within the supporting tissue, which is poor in cells, there are a number of approximately oval depositions, consisting exclusively of epithelium. In the central portion of the tumor the cells are degenerated (loss of nuclear pigmentation).

We evidently have to deal with atypical proliferation of the surface epithelium into the deeper strata, accompanied by papillary hypertrophy of the connective tissue. It is a malignant papillary fibro-epithelioma, malignant because in its growth it has broken up and destroyed normal tissue.

PLATE 36.

FIG. 1.—An extremely friable tumor with a great tendency to bleed, taken from the edge of a middle turbinate, which had been destroyed by a syphilitic ulcer. The single layer of cylindric epithelium is in places capped by a thin, amorphous layer containing isolated round-cells. In the upper portion the epithelium is wanting and the tissue itself presents a deep, sharply defined, somewhat undermined defect. The ground-substance is composed of a cellular network containing numerous, and in part greatly dilated, veins, which lend to the entire mass a spongy appearance. Toward the periphery there is a more compact infiltration of round-cells without blood-vessels, which on the left side and above extends in the form of papillæ into the scanty-celled tissue. Below, there is a roundish accumulation of cells presenting central softening:

Gummatous and Diffuse Syphilitic Hyperplasia (×11).

FIG. 2.—Pale-red, slightly bosselated, soft tumor from the lower section of the wall of the nasal septum, removed with a snare. The tumor consists almost entirely of small round-cells arranged in more or less distinct, chiefly spheric and oval nests, the central portions of which are characterized by a deficiency of the nuclear stain and contain small blood-vessels. On the right and below three smaller aggregations (*R*) are visible, which, under higher magnification, reveal themselves as giant-cells containing an enormous number of nuclei. The tubercular nature of the large conglomeration (*T*) therefore clearly establishes:

Tuberculous Tumor of the Septum (×30).

Fig. 1.

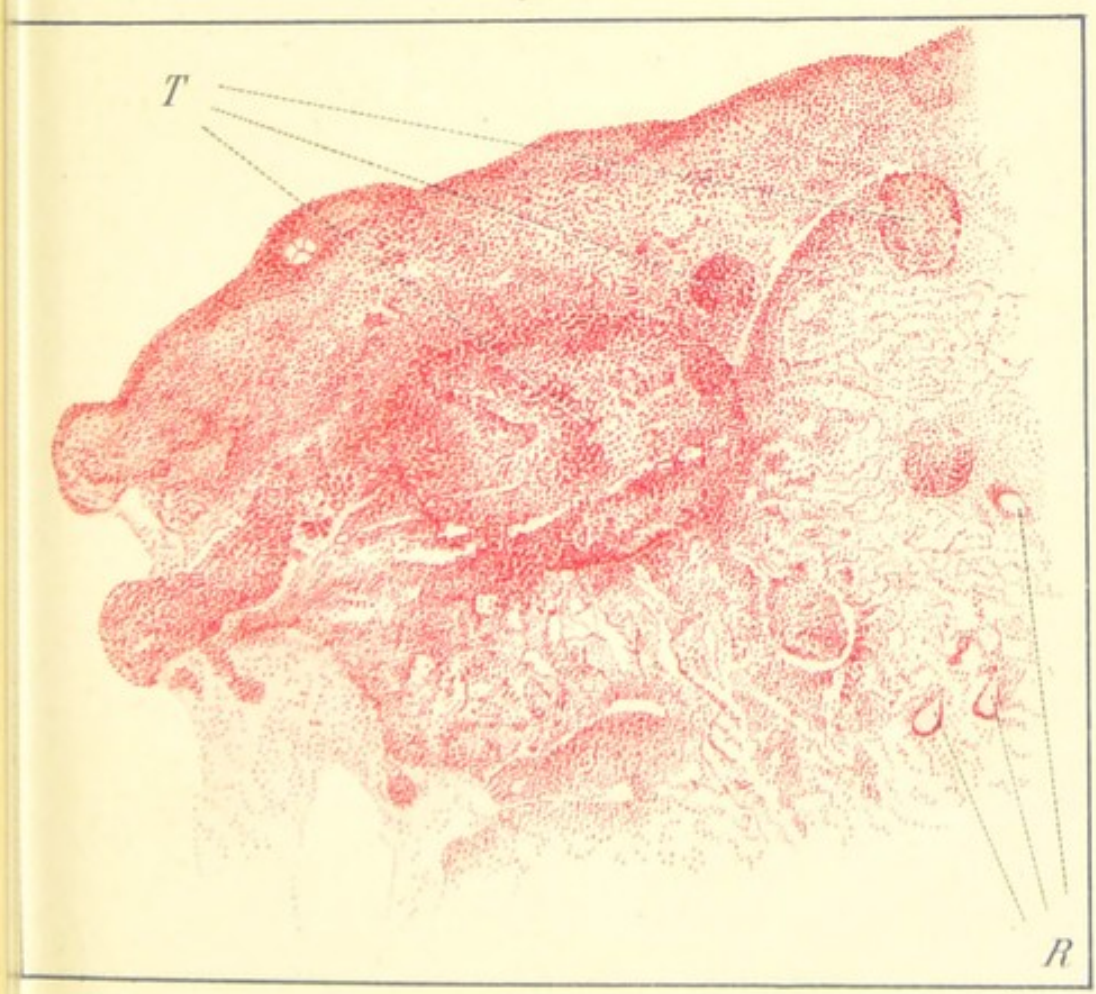

Fig. 2.

Lith. Anst. F. Reichhold, München.

Tab. 37.

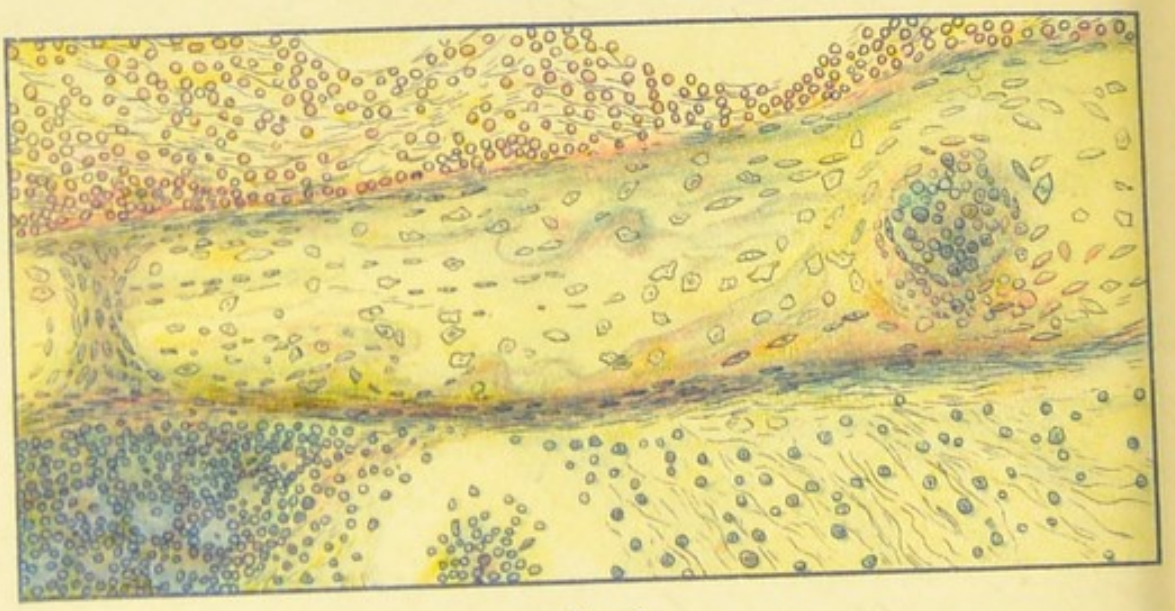

Fig. 1.

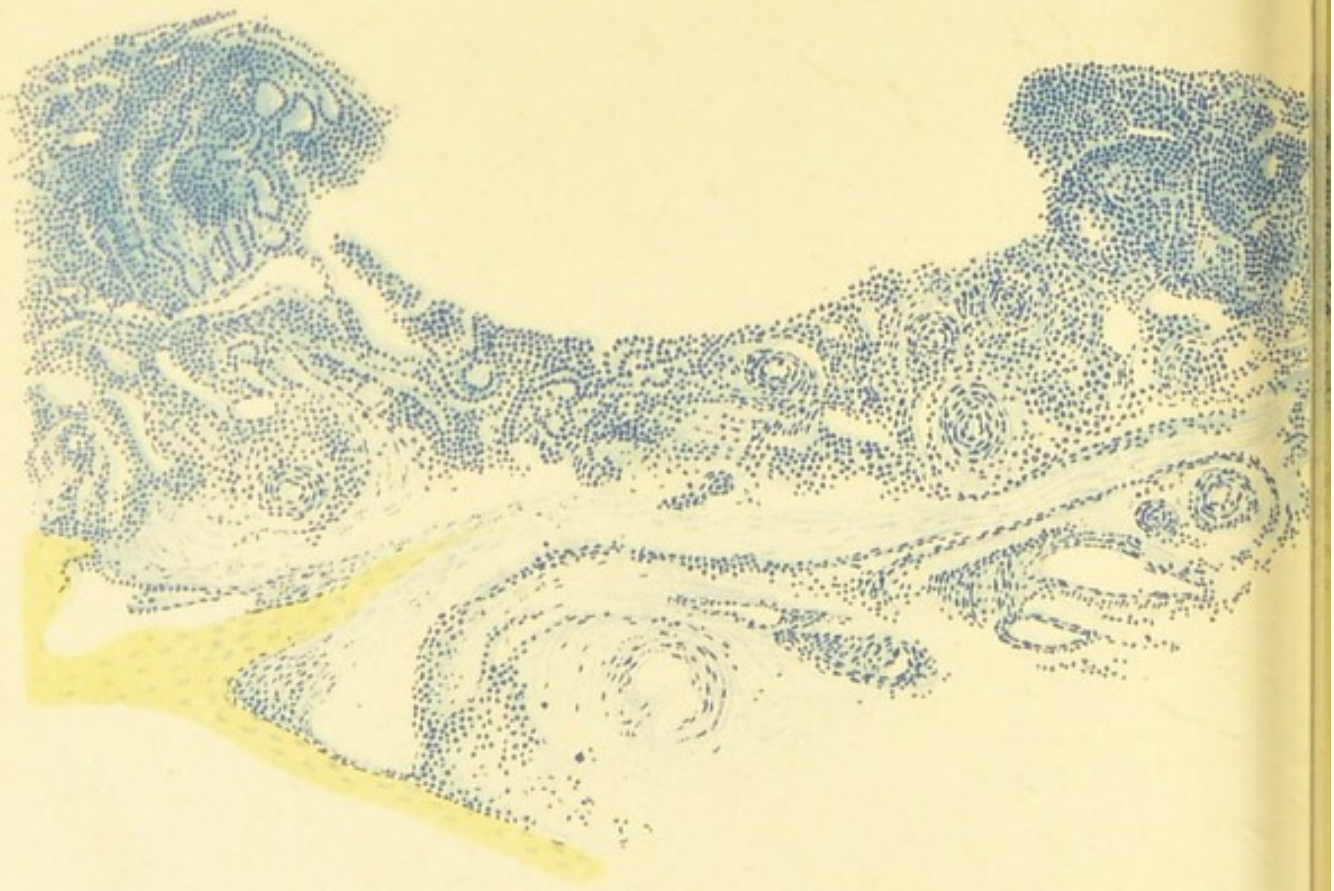

Fig. 2.

PLATE 37.

FIG. 1.—Central portion of a section through the wall of a **bone cyst in the middle turbinate** (see p. 105), which was filled with pus and exhibited polypoid degeneration of the mucous membrane on its outer and inner walls.

The center of the section is formed by the bone, the continuity of which in two places is interrupted by softer tissue. The patch on the right is a spheric collection of cells bounded in every direction by bone. On the left-hand side the opposite layers of the periosteum are connected by a bridge of tissue. The bone-corpuscles surrounding the collection of cells present a different arrangement from that observed in the rest of the bone, and by their size, irregular shape, and nuclear proliferation, declare themselves as osteoclasts.

Near the periosteum similar transitional cells are seen. The adjacent tissue is studded with masses of cells, due to active proliferation of round-cells, which in the upper portion of the picture completely disguise the true structure of the periosteum.

Two processes are, therefore, at work: destruction of bone and conversion of bone into connective tissue by inflammatory proliferation (×420).

FIG. 2.—Transverse section of a middle turbinate in **antrum disease.** The median surface of the turbinate was occupied by an **ulcer.**

The bone of the turbinate in the section is largely replaced by connective tissue. The mucous membrane of the median surface (above) everywhere presents marked inflammatory infiltration, and in the middle, an ulcer extending into the submucosa and undermining the tissue on each side.

PLATE 38.

FIG. 1.—In a case of suppuration of the frontal sinus a *rough, worm-eaten area* was felt on the outer surface of the middle turbinate in the right half of the nose. At this point a deep ulcer, extending to the bone and surrounded by ragged tissue, was discovered. The bone at this point and here and there at a deeper level imperceptibly merges into connective tissue or granulation tissue. The entire mass is so infiltrated with round-cells as to be practically unrecognizable. On the surface the nuclei can barely be made out:

Superficial Ulcer with Granulating and Rarefying Osteitis.

FIG. 2.—A middle turbinate in a case of suppuration of an accessory cavity, with a broad superficial ulcer and exposed worm-eaten bone.

The bone in the middle is completely bared and raised into a spheric prominence. On the surface and at various points in the depths of the tissue it fades away into fibrillar and round-celled tissue. The lateral portions are still covered with greatly thickened and infiltrated periosteum. Only on the extreme right it is covered by a similarly inflamed and altered granular layer of mucosa. On the other side the bone breaks up into trabeculæ forming various hollow spaces:

Granulating, Hyperplastic, and Rarefying Osteitis Underneath an Ulcer Involving the Entire Thickness of the Mucous Membrane.

Fig. 1.

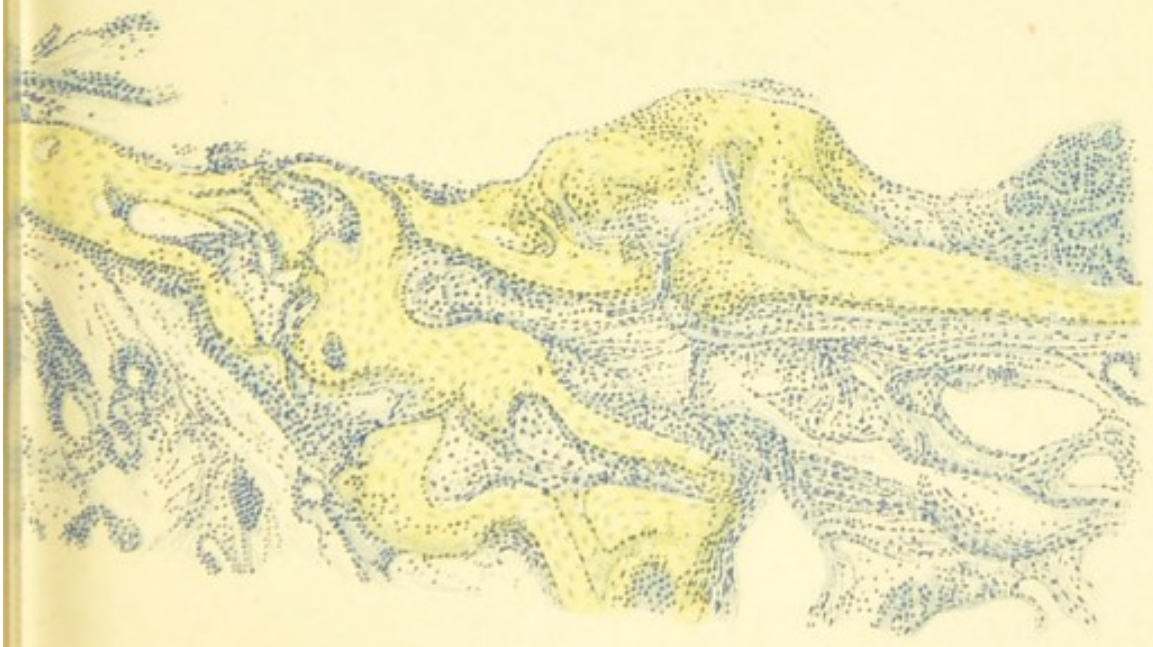

Fig. 2.

Lith. Anst. F. Reichhold, München.

Tab. 39.

PLATE 39.

Grayish-red **polypoid, sessile tumor** from a middle turbinate; the adjacent **ethmoid cells** were destroyed by the suppurative process.

The ground-substance of the tumor is formed by a loose-meshed reticular tissue composed of round-cells, and containing within its meshes finely granular, structureless masses—coagulated dropsical fluid (edema). Toward the base the density of the tissue increases, and there are numerous minute blood-vessels, while in the peripheral portion they are very sparingly present. The surface is covered with cylindric epithelium, some parts are smooth, while others are raised to form minute papillæ which often present a villous appearance. The left-hand portion is traversed by a dense infiltration of round-cells parallel to the surface; at one point the round-cells are aggregated around a gland and simulate a follicle. We accordingly have to do with proliferation of the mucous membrane in the form of

Edematous Fibroma with Inflammatory Infiltration ($\times 20$).

PLATE 40.

Slightly Lobulated, Dark-red Tumor from the Anterior Extremity of an Inferior Turbinate ($\times 21$).

The interior of the tumor presents several veins from the erectile tissue of the turbinate; the walls of some of the veins are hypertrophied. Overlying this stratum is a dense mass of connective tissue with a reticulated growth of round-cells. The epithelium is hypertrophied at almost every point. In some places it is arranged in massive layers, and forms processes which at one point are mingled with greatly infiltrated glands and extend to a great depth. The entire surface, including the epithelium, is infiltrated with round-cells.

Tab. 41.

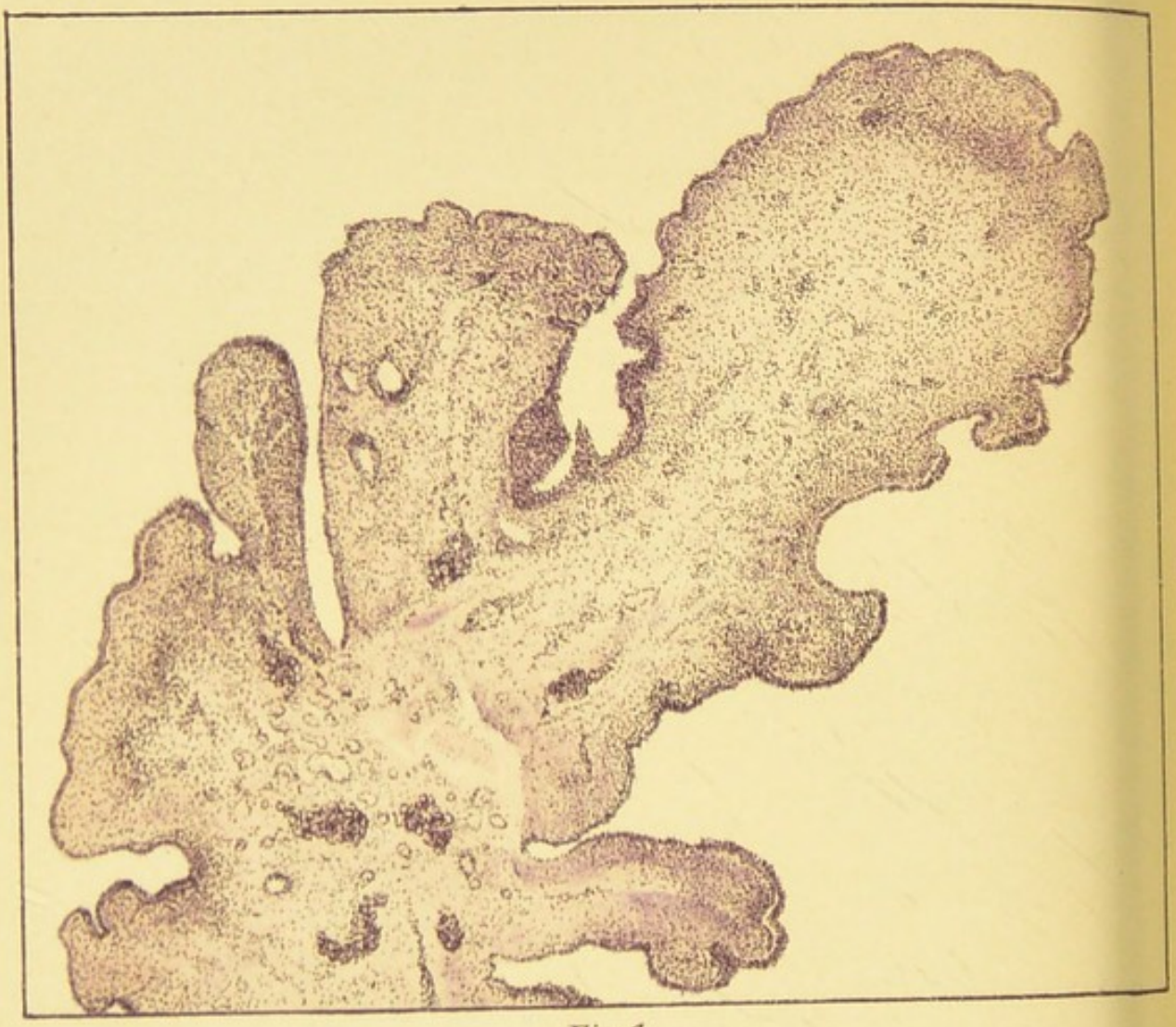

Fig. 1.

Fig. 2.

PLATE 41.

FIG. 1.—**Lobulated, Grayish-red, Sessile Tumor from the Anterior Portion of an Inferior Turbinate** ($\times 15$).

Remains of erectile and glandular tissue are found only in the middle of the tumor. The rest, especially near the surface, consists almost entirely of cellular connective tissue containing slightly thickened blood-vessels, and drawn out in places into papillæ of varying sizes. The covering consists almost exclusively of a single layer of cylindric epithelium:

Soft Papillary Fibroma.

FIG. 2.—**Hard, Smooth, Dark-red Tumor from the Anterior Extremity of an Inferior Turbinate** ($\times 15$).

Barring the surface, where the cellular element is fairly well represented, the entire tumor is practically made up of small arteries; at the center a few remains of the cavernous plexus of veins are seen:

Angiofibroma.

PLATE 42.

Grayish-red tumor of rapid growth, removed from the vestibule of a girl four and one-half years old (the tumor probably grew from the middle turbinate).

Loose, spongy tissue traversed by open spaces of varying size and shape. The spaces consist of dilated blood-vessels, the walls of which are formed directly by the cells of the structure.

Under a higher magnification the entire tumor appears to consist chiefly of round-cells containing a delicate intercellular substance. These cells grow from the inner and outer walls of the larger blood-vessels, and form within the apparently avascular, more compact areas a network, the meshes of which represent blood-spaces without walls:

Angiosarcoma.

PRELIMINARY REMARKS ON ANATOMY AND PHYSIOLOGY.

THE pharyngo-oral cavity may be regarded as the first portion of the digestive tract, charged with the duty of preparing the food for digestion. As it is intercalated in the course of the air-passage, which intersects the digestive tract, the only true pharyngeal portion is the so-called pars oralis or intermediate portion, also known as the mesopharynx; the lower, laryngeal portion, or hypopharynx, belonging to the larynx, and the upper, nasal portion, or nasopharynx, to the nasal cavities. The pharyngo-oral cavity proper, therefore, is bounded in front by the lips; behind by the cervical portion of the vertebral column and overlying muscles; above by the hard and soft palate and by an imaginary plane drawn through the pharyngeal cavity to the vertebral column at the level of the hard palate; below by another imaginary plane at the level of the superior aperture of the larynx, coinciding with the upper surface of the epiglottis. In front the pharyngo-oral cavity communicates with the extremely irregular basin formed by the soft parts of the floor of the mouth. Laterally, the pharynx is bounded by the cheeks and the inner surfaces of the deep muscles of the neck.

It is only during the act of deglutition that the posterior boundary of the oropharynx is clearly defined, for during that act the epiglottis shuts off the larynx; the soft palate is raised and forced against the structures at the back of the cavity, so as to shut off the nasopharyngeal space.

It is important, in order to understand the histology as well as the neoplasms of the oropharynx, to know that

most of the parts of the mouth proper—namely, the lower jaw, the soft parts of the cheeks, the palate, as well as the anterior half of the tongue, which first makes its appearance as a mesial node at the symphysis of the mandibles—develop from the first branchial arch; while the derivatives of the second branchial arch, advancing from behind forward, help to form the pharynx proper and the posterior half of the tongue. The lower boundaries of these two developmental portions form a triangle that is open posteriorly; immediately below is the rudiment of the superior thyroid gland, the remains of which persist during extra-uterine life, as the foramen cæcum of the tongue. This difference in the mode of origin of the two halves of the mouth explains why the oral cavity is lined and the anterior half of the tongue is covered with squamous epithelium of a distinctly epidermal character, the tongue even showing papillæ, whereas in the posterior parts the glandular structures predominate and the epithelium shows an increasing tendency to present the cylindric mucous-membrane type.

The deeper layers of the mucous membrane vary in character according to the substratum. Where the latter consists of soft connective tissue made up of long fibers, the mucous membrane is able to follow the varying movements of the muscle layers in the floor of the mouth, of the cheeks, and of the soft palate without any difficulty. On the other hand, it is intimately attached to the bones of the upper and lower jaws by means of short bundles of fibrous tissue, so that at the thinnest portions the periosteum and submucosa imperceptibly merge into each other. In regions like the lips, supplied by sphincters with only moderate excursions, the connection between the muscle and the mucous membrane is so close that the latter is forced to adapt itself to the changes of volume in the muscle by wrinkling. These anatomic relations, which harmonize perfectly with the greater abundance of fat and lymph clefts in the looser layers of tissue, cast a light on the spread of infection downward. It is only

necessary to call to mind the behavior of infiltrations in the spongy, loose structures of the floor of the mouth, their marked tendency to spread, and the great destruction of tissue that they are apt to produce. The surface of the mucous membrane in the main adapts itself to the underlying stratum; on the hard palate, however, a number of transverse ridges are formed by the presence of hard strands of fibrous tissue. These transverse ridges unite in the median line to form an anteroposterior ridge, known as the raphe.

Similar structures are the *frenum*, or *bridle of the tongue*, a fold of tissue passing from the posterior alveolar border over the floor of the mouth to the inferior free surface of the tongue, and two other bands, known as the *frenula labii*, running parallel to the former, between the anterior alveolar margin and the inner surface of the lips, and finally the *frenulum epiglottidis*, connecting the tongue and epiglottis at the back. The tissue proper of these structures belongs to the submucosa, and is covered by smooth mucous membrane which is not included within the fold. Hence they may escape if the mucous membrane affection is merely superficial. The tonsils, which consist of adenoid (gland-like) tissue, do not possess a submucosa, being covered merely by a thin layer of epithelium. In this respect they resemble the other structures of the so-called adenoid pharyngeal ring or *lymphatic ring*, consisting of the lingual and pharyngeal tonsils, which almost appear like foreign structures inserted in the continuity of the oronasal cavity and pharynx—originally a single structure.

The *posterior* and *anterior pillars of the fauces* (plicæ salpingopharyngeæ, and glossopharyngeæ), which, so to speak, form a frame around the tonsils, are supported on each side by a bundle of muscle tissue projecting into the cavity—the *palatoglossus* and *palatopharyngeus* muscles. The mucous glands are most numerous in the looser tissues in which they are imbedded, and sometimes attain the size of a pea; quite frequently they are observed on the

surface of the tongue and within the dense connective tissue that occupies the intervals between the ridges of the hard palate; and they also exist sparingly in the posterior wall of the pharynx.

Structures peculiar to the mouth are the *salivary glands;* the *parotid glands* that empty their secretion through the duct of Steno on a so-called caruncle; the *sublingual glands,* which form the conspicuous transverse ridge crossing the bridle of the tongue in the floor of the mouth, and the ducts of which—namely, the sublingual ducts or ducts of Bartholin—empty about a finger's-breadth to one side of the point of intersection near or in conjunction with those of the *submaxillary glands* or ducts of Wharton; the small *glands of Blandin* or *Nuhn* on the lower surface of the tip of the tongue; and, finally, the rudimentary *incisive glandule.* Sometimes the sublingual gland possesses a number of small ducts—the ducts of Rivinus—which empty behind the sublingual caruncle.

The lymph-vessels of the oropharynx empty their contents into a number of glands, the submaxillary, submental, cervical, and jugular glands, of which the first two are the most important. In the case of circumscribed swellings it is possible to locate the causal irritation in the region from which the corresponding afferent vessels take their origin.

The *follicles,* both solitary and agminated,—*i. e.,* collected in denser groups,—that are found in the pharyngeal mucous membrane and within the palatal mucosa are also of lymphatic nature and form the true substratum of the lymphatic ring (Plate 31, Fig. 1). The embryonal character of these structures is shown by the fact that they normally undergo involution during adolescence and become reduced to mere rudiments, as also by their tendency to excessive, although not atypical, growth. The capacity of these structures to undergo alteration is one of the most important among the fundamental pathologic principles in this region of the body.

The *blood-supply* is effected by branches of the external

carotid: the lingual, facial, posterior auricular, temporal, and internal maxillary; the venous blood is carried off in the anterior and posterior facial and lingual veins, and in the anterior and posterior venous plexuses. For the surgeon the most important vessels are the *tonsillar artery*, which pierces the capsule of the tonsils in such a way that it may be prevented from retraction if it chances to be injured, and thus give rise to hemorrhage; and the *ranine artery*, which enters the muscular tissue of the tongue alongside of the tonsillar. Injury of this vessel was often attended with danger, especially in the days when the practice of severing the frenum linguæ was more common.

In regard to the *nerves* of the oropharynx, it is important to know that the sensory nerves of the mouth and tongue are branches of the third division of the trigeminal; those of the pharynx proper—the posterior or small palatine nerve—are derived from the second division of the trigeminal and parts of the glossopharyngeal. Gustatory sensations are conveyed by fibers of the glossopharyngeal and the chorda tympani. The motor innervation of the tongue is effected by the hypoglossal nerve, that of the muscles of mastication by the third division of the trigeminal, and that of the lips, of the uvula, of the levator palati, and of the palatoglossus and palatopharyngeus muscles by the facial nerve. The tensor palati is controlled by the third division of the trigeminal, and the superior constrictor of the pharynx by the spinal accessory nerve.

The *functions* of the pharyngo-oral cavity include articulation, mastication, and deglutition. The first of these is effected chiefly by the position of the lips and tongue, and is practically confined to the inside of the mouth. Hence inability to protrude the tongue does not affect the speech, but interference with lateral and vertical movements of the tongue results in indistinct and lalling speech or lallation. Under these circumstances deglutition is also impaired, for this act begins with elevation of the tip of

the tongue, a movement that is transmitted in vermicular fashion along the entire dorsum of the tongue, so as to force the bolus gradually downward. In order that the morsel of food may enter the esophagus, the oral portion of the pharynx must be shut off, at least for an instant, from the larynx and nasal portions—in other words, a continuous digestive tract must be temporarily supplied. This is effected partly by forcible elevation of the base of the tongue, completely occluding the superior aperture of the larynx, and partly by elevation of the soft palate and uvula, which completely shuts off the nasopharynx, while at the same time the so-called *Passavant's fold* or eminence, on the posterior pharyngeal wall, is forced into intimate contact with the soft palate by contraction of the superior constrictor of the pharynx. The lateral muscles of the pharynx, the palatoglossus and palatopharyngeus, at the same time force the bolus into the median line and act as lateral "*points d'appui*" for the contraction of the soft palate. From this point to the esophagus the bolus is propelled exclusively by the momentum it has acquired and which suffices to hurl it down bodily.

The act of deglutition, both in its origin and in all its subsequent automatic phases, is under the control of a deglutition center on the floor of the fourth ventricle. This center may be irritated reflexly through the superior and inferior laryngeal nerves.

The great importance of the soft palate for respiration and speech is well known. During ordinary nasal respiration it is relaxed and rests loosely on the base of the tongue. During oral respiration it is drawn upward and shuts off the nasopharynx. If, owing to paralysis or imperfect reflex innervation, as during sleep, the soft palate fails to contract when the mouth is open, its lower edge is thrown into coarse vibrations by the current of air and the individual snores.

The soft palate likewise plays an important part in the production of speech. Except during the formation of the nasal sounds "m" and "n," it shuts off the nasopharynx

from the mouth, its anterior horizontal portion being utilized chiefly for this purpose. If this closure fails to be effected, part of the air escapes through the nose, and nasopalatine dyslalia or rhinolalia aperta results. The causes of this condition therefore are: congenital or acquired defects, either of the soft or of the hard palate; insufficient closure of the nasopharynx, due to paralysis or to shortness—that is, insufficiency of the soft palate, or, in some cases, merely to habit and functional insufficiency following paralyses in childhood.

The pharynx also contributes its share to speech-production, though it is rather a negative one—that is to say, it comes into play in the presence of pathologic changes. Great enlargement of the tonsils interferes with the free action of the soft palate and posterior portion of the tongue in exactly the same way as a large bolus in the mouth—the individual speaks as if he had his mouth full. The vibration of the pharynx lends to speech its sonorous quality. If there is marked obstruction or hyperplasia of the tonsil, speech becomes "dead," the sound is dull, and, owing to the impossibility of the air escaping into the nose, the nasal sounds "n" and "m," during the production of which the soft palate does not shut off the nasopharynx above, are imperfectly pronounced, the sound "b" being made instead of "m" or "n." This is called "rhinolalia clausa posterior."

The **framework of the nose** rests on the hard palate, the maxilla, and the premaxillary and palatine bones, which give support along the median line to the vomer and vertical plate of the ethmoid bone. The lateral boundaries are formed in front by the outer portions of the maxilla, in the middle by the os planum of the ethmoid bone, and behind by the pterygopalatine process of the frontal bone, which is intercalated between the nasal processes of the maxillæ; the upper boundary by the frontal bone proper, the lamina cribrosa of the ethmoid bone, and the sphenoid. The external nose, in addition, possesses a central support in the quadrangular cartilage of

the septum. The junction of this cartilage with the premaxillary bone, which projects into the floor of the nose and forms a vertical ridge, is indicated in the living subject by the crista septi. The many variations of this cartilagino-osseous junction, especially in a lateral direction, are often erroneously regarded as outgrowths of the septum (Fig. 1, *c s*).

The upper portion of the septal cartilage is bent over laterally in the shape of wings that form the alæ nasi, which are chiefly supported by the cartilaginous ring situated lower down. The latter is formed by the union of the two septal cartilages, and, in addition, contains the greater and smaller alar cartilages, besides a few interposed sesamoid cartilages that are not constantly present. The lowest portion of the septum, which is movable and connects the tip of the nose with the upper lip, forms part of the median ridges of the large alar cartilages, the lateral portion of which acquires a special importance from the fact that it lends to the lowest segment of the alæ nasi the necessary stiffness to enable them to resist the pressure of the inspiratory air-current. If this portion of the alæ is too soft, owing to prolonged mouth-breathing or atrophy due to disuse, or if the dilator muscles contained in its substance are insufficient, serious impediment to respiration may result from collapse of the alæ, and can be obviated only by wearing some supporting apparatus. The antero-inferior corner of the bony septum contains on one side the orifice of the nasopalatine canal, which empties behind the first incisors. In the living subject this canal, which in the embryo is lined with epithelium, is obliterated, and is represented, on the palate, by the palatal papilla, and, in the nose, by the nasopalatine recess. A

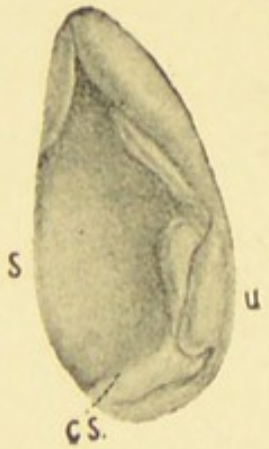

FIG. 1.—Anterior view of the left half of the nose; the head is rotated far to the right: *s*, Septum; *cs*, crista septi; *u*, inferior turbinate.

similar rudimentary epithelial appendage of this canal is found on the lowest portion of the septum in the shape of the so-called Jacobson's organ, which is found fully developed only in embryos and in various species of mammals, in whom it subserves the function of smell.

The bony and cartilaginous structure just described contains the two nasal cavities. Within these are found the labyrinth of the ethmoid bone, and the two lateral masses forming the superior and middle turbinates, and the processes of the superior maxillæ that form the inferior turbinates. The cavity of the nose is surrounded on all sides by a collection of small pneumatic spaces, the accessory sinuses, consisting of three large pairs: the maxillary sinus or antrum of Highmore, the frontal, and the sphenoid sinuses; and the labyrinth of the ethmoid, which is made up of a number of pneumatic cells. The larger cavities may also be converted into a system of cells by the presence of projecting bony or membranous septa. In the accompanying illustration (Fig. 2) these sinuses are shown in sagittal section, parallel with and a little to the left of the septum, the turbinates having been removed.

The anterior insertion of the inferior turbinate (*c i*) conceals a deep recess (*r m i*) which contains the orifice of the lacrimal duct; another somewhat shallower and more linear depression, known as the recessus meatus medii, is present in rudimentary form below the anterior rest of the middle turbinate (*c m*), near the frontal sinus (*F*). From the lower orifice of the frontal sinus a funnel-shaped cavity, known as the "infundibulum," extends between the most anterior cells (*E a*) of the os planum of the ethmoid and the middle turbinate into the middle meatus toward the large opening of the antrum, designated the *ostium maxillare*. The latter communicates with the openings of the anterior and middle ethmoid cells (*E a*), the most prominent of which has received the unnecessary designation of ethmoid bulla, while the group of posterior cells (*E p*) open on the mesial side of the middle

turbinate, about the middle of the superior meatus, at a point known as the spheno-ethmoid recess (*r s e*).

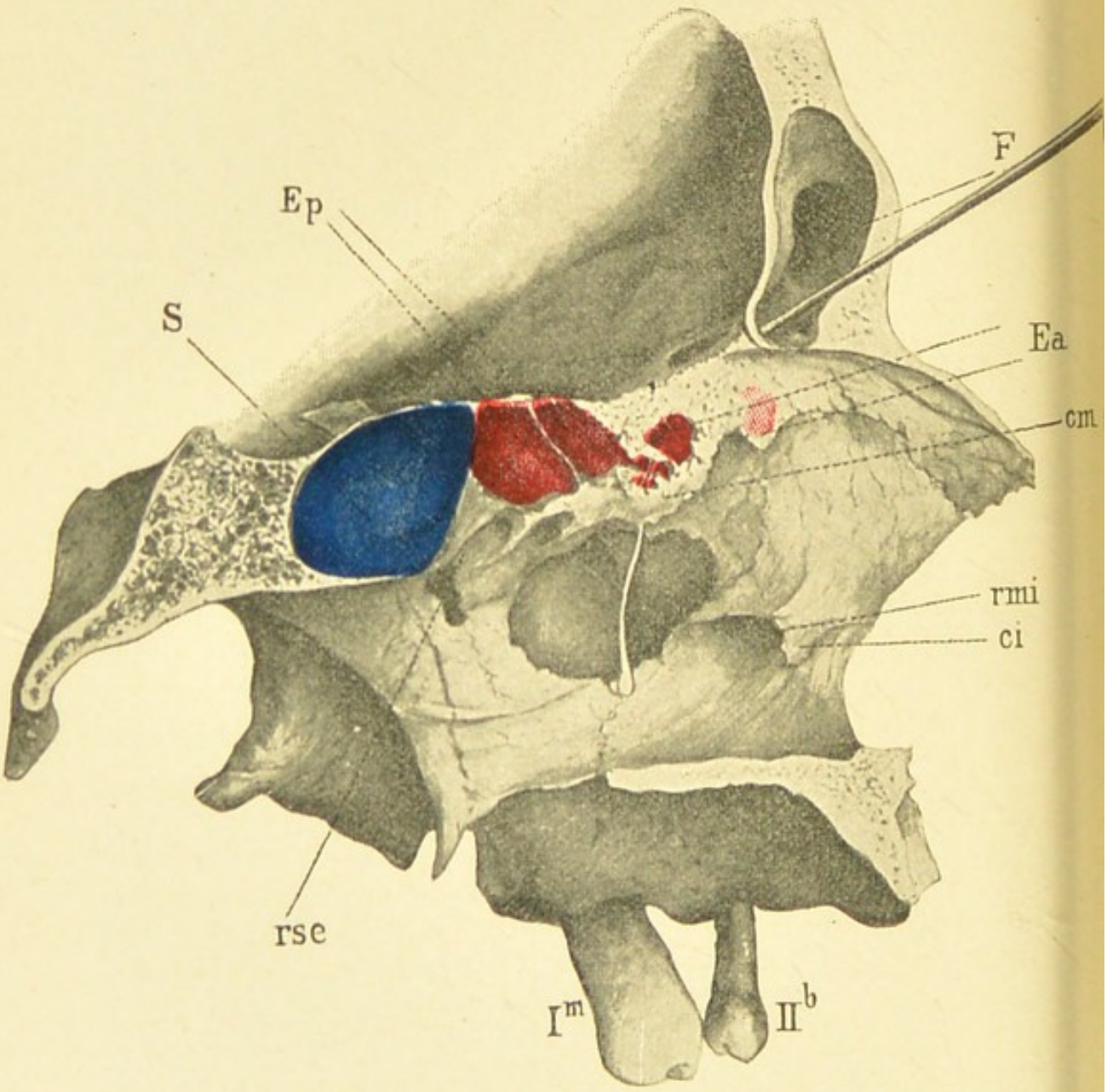

FIG. 2.—Sagittal section parallel with and a little to the left of the septum. The turbinates and the inner walls of most of the ethmoid cells (colored red) have been almost completely removed. One of the turbinates is seen through the intact wall. A portion of the os planum has also been removed, so that a wide view of the antrum is afforded. The probe has been introduced into the infundibulum by way of the frontal sinus. The sphenoid sinus (*S*) is colored blue.

The opening of the **antrum** (Fig. 3) forms a wide cleft running into a point in front and above. In the living subject it is considerably smaller on account of its mem-

branous lining. It is bounded below by the inferior turbinate, above by the lowest portion of the os planum of the ethmoid bone and a portion of the labyrinth. The lining membrane sometimes contains accessory orifices in addition to the large main opening of the antrum. The inner wall of the antrum forms the outer wall of the inferior nasal meatus; the upper wall corresponds with the inferior surface of the orbit, and the anterior wall with the malar surface of the maxilla. The floor terminates in a moderately wide sagittal furrow, known as the alveolar recess, and, when the cavity is very large, extends over all the molar and bicuspid teeth, giving rise to the formation of numerous "haustra," or circular depressions bounded by projecting ridges of bone. Similar depressions are found in the other accessory sinuses, especially in the frontal sinus.

When the bony or membranous projections are unusually well developed, they may form complete or partial cells. The accessory cavities vary widely in size; the antrum may be the size of a walnut, or may be reduced to a mere shallow pit, or may even be entirely replaced by spongy or solid bone. Abnormal reduction in size, or absolute deficiency of the frontal and sphenoid sinuses, is not noticeable on the exterior of the skull. Underdevelopment or absence of the ethmoid labyrinth reveals itself by an abnormal width of the nasal meatus; if the antrum is small or obliterated, it leads to flattening of the face, production of a high palate, and lateral enlargement of the inferior nasal meatus.

Hypoplasia of the turbinates involving both the bone and the soft parts is observed with especial frequency in brachycephalic individuals in whom the nasal cavities are usually enlarged. The extraordinary increase in the size of the nasal meati predisposes to the development of "ozena," a condition in which abnormal secretions originating in some portions of the nose stagnate and become inspissated or undergo decomposition, because the retarded air-current in the dilated meati is unable to expel

them. The presence of these decomposing masses exerts an injurious influence on the epithelium and on the already meager submucosa. Accordingly, it is extremely difficult in all these cases to distinguish between congenital aplasia and acquired atrophy.

The principal development of the system of accessory

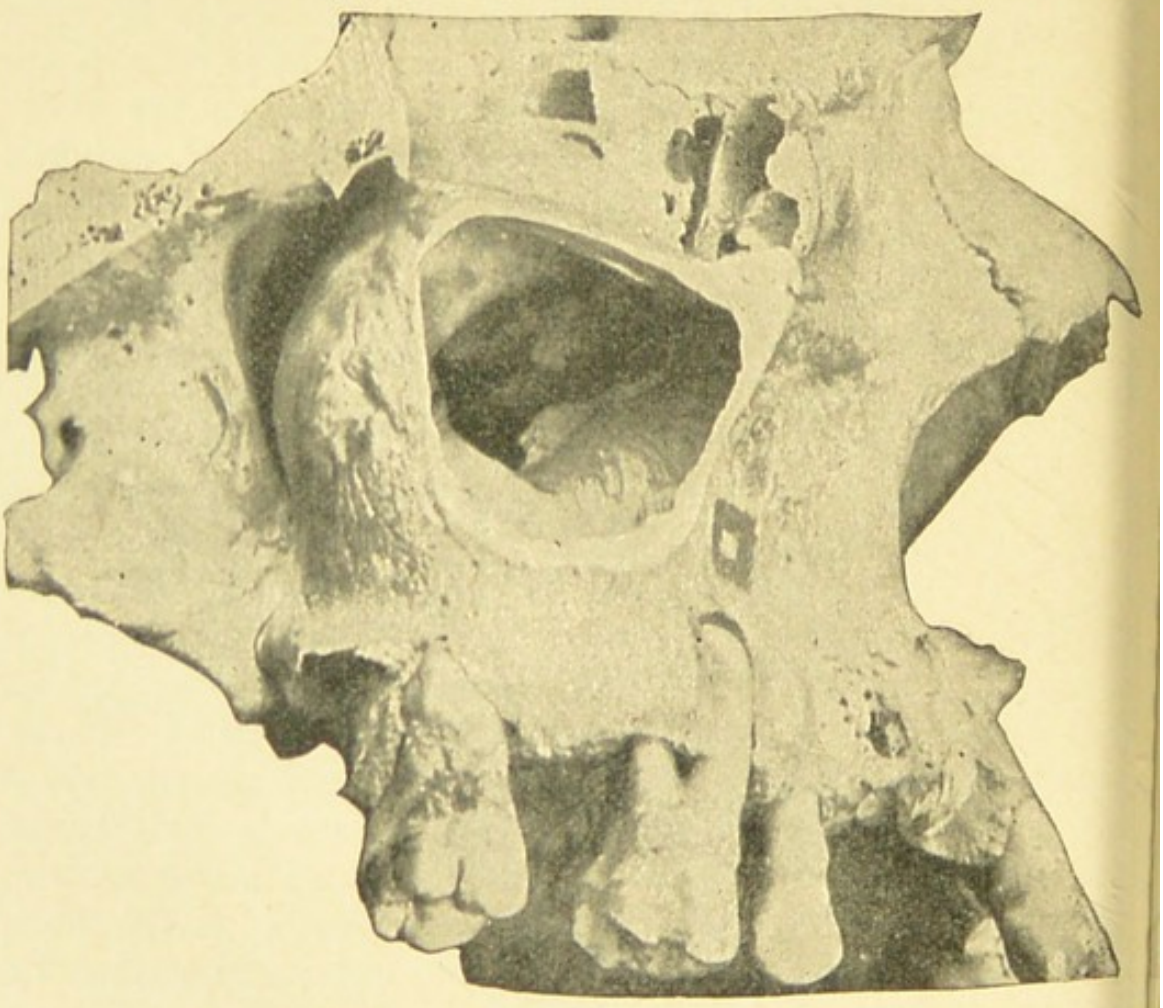

FIG. 3.—Antrum of Highmore laid open by means of an exterior sagittal section. The ostium maxillare is seen on the floor of the sinus. Above the sinus, part of the os planum has been torn away from the orbit, affording a view of the anterior ethmoid cells.

sinuses begins after the completion of first dentition, as the odontoblasts at first practically fill the antrum as far as the orbit. The other cavities also do not acquire their true shape before the third or the fourth year of life.

The *lining membrane* of the nose in the anterior portion, known as the *vestibule*, is composed of stratified

squamous epithelium very similar to the adjoining epidermis, and contains sebaceous glands, hair-follicles, and hairs, or vibrissæ. The boundary between the vestibule and the internal nose proper, as may be remarked incidentally, corresponds to the junction of the cartilaginous external nose with the bony portion; and, on the floor of the nose and septum, to a line connecting the nasal spine of the maxilla with the tip of the nasal bone; this line also includes the anterior extremity of the inferior turbinate. In this region there is a *transitional zone* of roundish epithelium, but still destitute of glands. The true mucous membrane is said to begin at the point where glands first make their appearance. That portion of the mucous membrane which contains the olfactory cells is known as the olfactory region; the remaining portion is called the respiratory region. For practical purposes it is well to retain these inadequate and, at least so far as the latter is concerned, incorrect designations.

The investment of the mucous membrane proper consists of several layers of cylindric epithelium, the uppermost cells of which are provided with cilia that set up an outward current. The stroma of the mucosa is rather thin, and its subepithelial basal layer is traversed by minute lymph-clefts that appear to communicate directly with the lymphatic plexus. These lymph-clefts convey to the surface a watery lymph containing very little albumin, which provides the cilia with the fluid necessary for their vibratory function as well as the respiratory air with its necessary amount of moisture. The direct communication between the olfactory region and the basal lymph-channels of the dura mater has been demonstrated beyond a doubt.

The thickness of the mucous membrane is increased wherever the characteristic nasal erectile tissue is imbedded in the stroma. The erectile tissue is interposed in the continuity of the venous plexus, which receives the finest venous capillaries of the surface and empties into the veins of the submucosa. The erectile tissue, although,

strictly speaking, a venous structure, contains in the walls of its individual vessels a more robust muscular layer than is found in arteries, the muscle-tissue forming large, beam-like projections into the lumen. Erectile tissue is found on the lower turbinate, at the edge and posterior extremity of the middle turbinate, at the posterior extremity of the upper turbinate, and finally on a prominence of the septum opposite the anterior extremity of the middle turbinate, known as the *tuberculum septi*. Under ordinary circumstances the erectile tissue is contracted. When filled with blood, however, it represents a thick red cushion which completely fills the nasal cavity, even when it is normal in width, making it absolutely impermeable to air. Several degrees of obstruction are, of course, observed.

The mucous membrane is thinnest in the accessory sinuses, where the stroma is represented by the periosteum of the bone. The membrane lining the sinuses contains a few blood-vessels, and only at long intervals an occasional gland, so that it appears as a delicate gray film. The glands in this region and in the respiratory portion of the nose generally are mostly of the acinous variety. Their secretion consists chiefly of mucus, although some of them produce serum. The glands are most abundant at the tuberculum septi.

The glands of the *olfactory region*, on the other hand, are tubular albuminous glands producing a watery secretion. This region includes an area of about 2 to 3 c.c. on the roof of the nose, the superior turbinate, and the septum on each side, occupying approximately the center of the sagittal diameter of the nose, and is characterized by a yellowish-brown color, in contrast to the remaining mucous membrane, which is red. The region is interspersed with small islands of ordinary mucous membrane covered with ciliated epithelium. The olfactory membrane proper rests directly on the lymphadenoid base, consisting of accumulations of round-cells forming follicles, and covered by non-ciliated sustentacular epithelium interspersed with a few true olfactory cells. The latter

are epithelial cells provided with delicate olfactory hairs at their free extremity, and with their basal extremity emerging directly, through the medium of delicate fibrils, with the terminal ramifications of the olfactory nerve. The subepithelial layer of lymph-cells, like the basement membrane, is traversed by minute basal canaliculi which have been shown to be in communication with the subarachnoid and subdural lymph-spaces.

Scattered masses of lymphoid tissue are also distributed over the entire respiratory portion, sometimes collected to form follicles.

The *blood-supply* of the nose is as follows: the facial artery nourishes the external nose, the septum, and the internal mucous membrane; the frontal and ophthalmic arteries are distributed to the external nose; the ethmoid artery supplies the anterior portion of the septum; the sphenopalatine artery goes to the posterior portion of the septum; remaining branches of the internal maxillary artery are variously distributed. The veins of the external nose empty into the angular vein; those of the internal into the sphenopalatine and ethmoid veins: and in addition communicate with the cavernous plexus and the longitudinal sinus.

The vascular arrangement in the so-called "locus Kiesselbachii," an area situated at the antero-inferior angle of the septum, is peculiar: under a delicate covering of squamous epithelium a number of narrow and high papillæ are found, containing large veins and a dense capillary network, an anatomic condition which favors the occurrence of stubborn hemorrhage at this point, which by its location is already exposed to injury, such as scratching with the finger or the removal of crusts.

In addition to the branches of the olfactory nerve within the olfactory membrane the *innervation of the nose* is effected by branches of the first and second divisions of the trigeminal nerve. These nerves contribute to the perception of smell by conveying the stimuli produced by so-called sharp odors, such as ammonia. Irritation of

the sphenopalatine ganglion is followed by engorgement of the erectile tissue in the lower turbinate. The motor fibers for the few muscular bundles of the external nose run in the buccal branches of the facial nerve. The main *functions* of the nose are the perception of odors and preparatory warming, cleansing, and moistening of the inspired air. For this purpose the inspired air must come into contact with as great an extent of the olfactory membrane and the moist warm surfaces of the mucous membrane covering the turbinate as possible. Accordingly the inspiratory air-current, instead of hugging the floor of the nose, follows an elliptic course from the vestibule to the middle and superior turbinates, and from this point along the roof of the nose and beneath the sphenoid sinus to the posterior extremity of the inferior turbinate. During this course it does not remain in the same vertical plane, but deviates toward the median line soon after it leaves the anterior extremity of the middle turbinate. The expiratory air-current follows the same course. It is obvious, therefore, that respiration is impeded only when there is an alteration of the lumen along the track described, and that even an extensive obstruction in other portions of the nose, as, for instance, on the floor of the middle meatus, may produce no symptoms, while, on the other hand, even marked deviations may be present without interfering with respiration if their position is such as to permit the respiratory current to avoid them and pass into some other cavity.

The mechanism of nasal respiration is as follows: The column of air which during apnea is under the same pressure as that of the atmosphere follows the inspiratory negative pressure which is propagated from the trachea upward, and thus makes room for the external air to rush in and take its place. The change in air-pressure likewise affects the air within the accessory sinuses, and in these, as well as in the nose, a positive change of pressure is observed during expiration. It is at this moment that the pneumatic spaces assume a physiologic importance.

Most of them empty into the infundibulum; a few into the upper nasal meatus. As during inspiration, the air is drawn out of the sinuses and a negative pressure is produced, the outer air immediately makes for these cavities instead of for the inferior meatus, and thus passes over and comes in contact with the olfactory region, to which it conveys olfactory impressions. This explains why odors are perceived at the very beginning of inspiration, and why the presence of objects within the nose is detected by the sense of smell only when the object is lodged in the infundibulum or its accessory spaces. Hence the odor from offensive crusts or sequestra on the floor of the nose is not perceived by the individual, and, on the other hand, offensive suppurations within the antrum, for instance, betray themselves by subjective cacosmia, although the observer cannot detect the odor in the expired air. The mechanism also explains the occurrence of subjective anosmia in stenoses, even in the presence of abnormal dilatation of the inferior nasal meatus; in both cases the inspired air fails to reach the olfactory region, and although the olfactory membrane is intact, the smell is abolished. Bizarre variations between anosmia and hyperosmia also certainly occur during local treatment, explained by the fact that olfactory cells which usually lie fallow are irritated by a sudden inrush of stimuli, and the patient reacts to the novel smell with headache.

The importance of nasal respiration for the well-being of the entire organism is not confined to preparatory warming and moistening of the inspired air. There is no doubt that the amount of air that can be aspirated through the mouth is quantitatively inadequate for the needs of the organism. Whether this is owing to the retardation of the air-current produced by its striking the hard palate and posterior wall of the pharynx, or whether air that has not been previously warmed acts as an expiratory reflex stimulus before inspiration, has been completed, it is certain, on experimental grounds, that exclusive mouth-breathing of acute origin rapidly

leads to dyspnea, while habitual mouth-breathers, either because their sensibilities have been blunted or because they have become habituated to the abnormal condition, do not complain of shortness of breath, although the tissues of the body distinctly show the effects of insufficient oxygenation.

Finally, nasal respiration exerts an important influence on the circulation at the base of the skull; when the nasal passages are unobstructed, every inspiration empties the ethmoid veins, and through them the longitudinal sinus and the cavernous plexus. If the nose becomes obstructed and this mechanism is interfered with, venous hyperemia of the meninges is apt to occur, and then favors the development of those cerebral phenomena with which the reader will be made acquainted more intimately in the section on Mouth-breathing.

GENERAL REMARKS ON PATHOLOGY.

The **causes** of most diseases that form the subject of this discussion, other than the general infectious diseases, are to be sought in irrational ways of living; coddling, want of cleanliness, excessive exertion, and imprudence generally, both in health and in disease.

The infectious diseases, especially the diseases of children, produce and leave in their wake a great number of more or less important sequelæ: in the pharyngeal space, inflammations and hyperplasia of the lymphatic ring; in the nose, hyperemia, hyperplasia, and, above all, localized catarrh or suppuration. The acute inflammatory diseases are often followed by grave consequences, and chronic secretory anomalies due especially to the failure of applying rational treatment in time. In the early stage, during the fever and during convalescence from the acute exanthemata and other infectious diseases, especially typhoid fever, it is of the greatest importance to be on the lookout for nasopharyngeal complications.

In both a state of nature and in civilized life the demands on the mucous membrane are considerable, and the individual should be taught in early childhood not to avoid these demands, but to learn how to enable his tissues to satisfy them. The muscles of the blood-vessels must learn gymnastics—*i. e.*, they must be taught to meet sudden effects of heat and cold by a corresponding contraction or dilatation. This object is attained by sleeping under a light covering which permits evaporation to take place, and not so warm as to cause the sleeper to uncover himself partly during the night. If possible, the win-

dows should be opened, without, however, the production of a draught. In the summer-time one should bathe in cold water, and every warm bath should be followed by a cold affusion. Children should be made to indulge in gymnastics, swimming, and running. The practice of protecting the throat is especially objectionable, and will revenge itself the first time that the individual is forced by circumstances to expose himself. Among injurious influences must be included our irrational way of dressing in the winter-time. Our clothes are made of too heavy material, which makes the wearer perspire in the warmth of the room, whereas a warm upper garment over a suit of lighter material would be much more appropriate. Another bad practice consists in wearing woolen underwear, which is needed only by those who have to work themselves into a perspiration, and must therefore avoid too sudden cooling when they stop working. In city people the woolen underclothing only produces a disagreeable smell of perspiration and excessive sensitiveness of the skin. Among the injurious influences are included also steam-baths, which have become so popular, and the too frequent indulgence in which robs the skin of fat, thus reducing its powers of resistance.

Cleanliness is a point of the greatest importance. Water is the most effective stimulus for the cutaneous vessels, and in addition removes decomposition-products of the secretion that irritate the skin, and an untold number of dangerous carriers of infection. A sense of cleanliness keeps one from first dusting his boots with a handkerchief and then blowing his nose with it; from patting a dog and in the next instant carrying the hand to the mouth; from shaking hands with a patient and immediately afterward picking particles of dirt out of the nose or taking a piece of bread; from kissing our neighbor's child and wondering at the disagreeable odor, which, as a matter of fact, has its origin in our own precious mouth with its few remaining decayed stumps, that do not, it is true, trouble the owner because, forsooth,

they do not hurt. A sense of cleanliness protects us against a number of infections because it teaches us not to poke our noses and our fingers into all sorts of things, and not to eat or drink anything that we have good reason to suspect is not what it should be. Finally, it teaches us to change our clothes often enough to keep the skin in the proper state of irritability and evaporation.

On the other hand, one should not expect too much from the natural protections and the power of reaction of the organism. If a man with irritable mucous membrane smokes all day, he need not wonder that he has to spit all day. Daily or even fairly frequent abuse of alcohol robs the general powers of resistance, acts as a direct stimulant to the oral and pharyngeal mucous membranes, and brings on oral and venous hyperemia, with the well-known result of morning vomiting, which is brought on by some condition in the throat, and not, as is usually supposed, in the stomach. Feverish activity without a proper amount of relaxation, combined with mental excitement, such as the greed for professional reputation or the striving for social prominence, prepares the soil for neurasthenia, after which the slightest local causes may start up the symptom-complex of the reflex neuroses, of paresthesia, and of hypochondriasis. The question of hardening must be carefully considered, and the line drawn at the boundary where an individual whose powers of reaction have already been weakened by disease, worry, or other similar causes, responds to fatigue by relaxation of his blood-vessels instead of by renewed tension, and so becomes ill, either directly or because his resistance to infection has become diminished. Anemic women and children, syphilitic individuals, or those afflicted with or predisposed to tuberculosis; patients recovering from acute infectious disease; or those who, for some other reason, have been bed-ridden or confined to their rooms for some time; and, lastly, the subjects of arteriosclerosis or venous hyperemia—need to be cautioned against the effects of heat and cold rather than encour-

aged to expose themselves for the purpose of taking exercise.

Both the nose and the mouth in civilized man require a certain amount of care. Failure to cleanse the teeth regularly, as well as a habitual incorrect method in brushing the teeth, will invariably lead to caries of the teeth, and will also predispose to oral and pharyngeal catarrh, as well as to disease of the nose, which so frequently accompanies caries of the teeth. The usual practice of cleansing the teeth by brushing them in the horizontal direction is especially to be condemned because the tendency of this method is to force the foreign matter into the interstices of the teeth instead of removing it. The teeth, especially if they have begun to decay, should be cleansed after eating and before retiring at night, when it is much more important than on getting up in the morning. After taking alcohol or smoking it is especially important to rinse the mouth. In this dusty age of ours, even the healthiest individuals whose mucous membranes secrete practically nothing need to blow their noses, and in children, whose mucous membranes are always irritable and more or less prone to secrete, it is absolutely indispensable. As a rule, the child is taught to do this improperly in earliest youth. He is told to close both nostrils tightly and then to blow with all his might. There is no better way to force secretions and pathogenic germs from the tubes into the middle ear and accessory sinuses of the nose, and, by producing an excessive expiratory pressure, to increase an already existing hyperemia of the turbinates, which brings about permanent catarrh, not to mention the fact that, of course, nothing, or at least very little secretion, is removed. The rational way to blow one's nose is to leave one side completely free, and to increase the velocity of the air by pressing the other side; this should be practised alternately on each nostril.

A good many people have an abiding faith in the efficacy of snuffing up cold water every morning to cure

their nasal catarrh. To show the utter fallacy of this simple and "healthful" practice, it is only necessary to place a few freshly removed cells of cylindric epithelium on the microscope, and note how the lively vibration of the ciliæ is immediately checked by the addition of nothing more powerful than a little cold water, which is rank poison to the nasal mucous membrane. Solutions intended for use in the nose should have a temperature of not less than 25° C. (77° F.), and should contain about as much salt as the blood—0.6 per cent.

How irrational it is to neglect the mucous membranes of the upper air-passages in disease, especially in children! No one thinks of allowing a stuporous patient to remain long in his urine or feces—the skin would show the effects soon enough, not to speak of our own subjective sense of smell; but no care is taken to remove the excessive secretion in the mouth, nose, and especially nasopharynx, which speedily undergoes decomposition, as evidenced by the odor of the breath, whereas systematic cleansing of these structures would undoubtedly suffice to prevent the development of, let us say, otitis in measles and scarlet fever. When the throat is inflamed, it is customary to use ice-cold gargles to allay the sense of thirst produced by the dryness of the mucous membrane, and this pernicious practice tends merely to produce an increased hyperemia when reaction takes place, whereas warm or even hot gargles would relieve the venous engorgement.

Symptoms.—A number of symptoms are common to all the diseases of the region with which we are concerned. Any acute or more than temporary inflammation produces a bad taste in the mouth, which is not necessarily present in uncomplicated gastric affections, even if the tongue is coated. Another symptom that almost regularly accompanies inflammations of the oropharynx and makes its appearance at the very outset is the well-known fetor of the breath, the quality of which will enable the expert at once to distinguish the various

kinds of inflammatory conditions. All inflammatory conditions of the mouth, and many of those that affect the pharynx, are accompanied by profuse salivation, which may be the most troublesome symptom complained of by the patient. If the inflammation lasts, calcareous deposits separate from the secretion and adhere to the tissue in the form of tartar. The alkaline reaction of the saliva favors the growth of saprophytic colonies, especially in children. Diseases of the pharynx are usually characterized by a sense of dryness and scratching in the throat; pain, that may be burning or stabbing in character, and, if intense, may radiate to the ears; and, finally, by dysphagia. Hoarseness always points to some disease of the larynx, and should lead the physician to examine that structure as well as the pharynx. Both pain and abnormal sensations in the throat are always incorrectly localized by the patient, being usually referred to a point deeper than their origin. If the physician finds an irritative point of this kind, he must be very careful to avoid letting the patient know, either by allowing him to watch the introduction of the probe or by directly telling him that the irritation is situated somewhere else and usually higher up than the patient thinks. The physician is more apt to lose his patient than the patient is to give up his preformed conviction.

A prominent symptom in nasal disease is obstruction. Its earliest and most reliable sign is a feeling of dryness in the throat on waking up. In minor grades of respiratory obstruction the mouth will be closed reflexly in waking hours. During sleep, however, the reflex is abolished, the air penetrates to the throat without being previously warmed and moistened, producing the symptom of dryness, for which the patient, as a rule, is quite unable to account. The dryness also occurs whenever an additional demand is made on the respiration during rapid walking, climbing of hills, and other active exercises. Severer grades of obstruction lead to permanent mouth-breathing and its unpleasant consequences. The loss of moisture

by evaporation in the pharyngeal mucous membrane favors the action of infectious organisms, which, under normal circumstances, are suspended in the mucus, and thus rendered innocuous or expelled. But little attention is paid to the bad effects on the gums and teeth, which in juvenile mouth-breathers especially are rarely found to be intact, because the constant liability of the oral mucus to be decomposed by the innumerable bacteria must be combated for the protection of the delicate enamel by restoring normal conditions of secretion. That this is true is shown by the ragged edges of the incisors which are first exposed.

The failure on the part of the mucous membrane to arrest organic and inorganic foreign matters in the inspired air during its passage and to supply the necessary moisture is not a matter of indifference, just as the changes in the direction of the inspiratory and expiratory air are not without influence on the upper air-passages and the lungs. The first condition favors the mechanical production of catarrh in the larynx and bronchial tree, as well as that chronic irritative condition which prepares the way for the growth of the tubercle bacillus, the direct introduction of which, as well as of other bacteria in large numbers, is thereby greatly facilitated, while the second factor —*i. e.*, the failure to moisten the inspiratory air—is followed by a number of injurious results. The air, instead of being conveyed in a continuous arching stream through the nasopharynx and downward in a line almost parallel with the posterior pharyngeal wall, impinges directly on the latter, becomes arrested at that point, and then requires to reach the lower air-passages a greater inspiratory effort, and, similarly, its removal from the lungs requires increased exploratory pressure. The result is diminished ventilation of the lung and its sequelæ: anemia from insufficient oxygenation of the blood; diminished powers of resistance against infection; in severe grades a permanent increase in the residual air, with the production of pulmonary distention,—emphysema of occult origin,—

which is still further increased by repeated excessive expiratory efforts made in the attempt to expel the increased masses of secretion which often accompany nasal obstruction, so that even the formation of a hernia may in some cases be attributed to these faulty conditions. In the same way deformities of the thorax (see page 152) and, what is still more important, insufficient aspiration of the venous blood and of the lymph-stream, especially in the skull, are produced.

It is this interference with the circulation that is often responsible for symptoms which, as they are the only ones complained of, are apt to cause the original nasal affection to be overlooked. A feeling of fulness and heat in the head; pressure in the head, sometimes aggravated to actual pain; disinclination to work; psychic depression or actual mental confusion; inability to concentrate one's thoughts,—aprosexia,—diminished resistance to influences affecting the vascular system, such as psychic emotions, alcohol, tobacco, and "penetrating" odors, manifesting itself in exacerbation, especially of the head symptoms—such are the most important phenomena which but too often are incorrectly interpreted. To these are added actual pain localized in the face or in the head in the form of "neuralgia," or pains of a paroxysmal character in the form of true attacks of "migraine," which are so apt to be provoked by vasomotor disturbances affecting definite and usually inflamed regions in the interior of the nose, more even than by venous stasis, which, it is true, always acts as a predisposing factor. All the other "reflex neurotic" phenomena that accompany nasal affections depend on a similar mixture of impressions.

In infants, mouth-breathing may be directly dangerous to health, if not to life. Being forced to keep the mouth closed for considerable periods at a time, instead of only at intervals, they are unable to breathe through the mouth, although they have no other way of breathing if the nose is obstructed, and thus, in order to satisfy their air-hunger, refuse to nourish themselves. If the impedi-

ment persists, the infant speedily dies, unless the questionable expedient of artificial feeding with a spoon or the stomach-tube is resorted to. The accumulation of carbonic acid gas in the brain, which often takes place in mouth-breathing children during sleep, is also the cause of those mysterious attacks of pavor nocturnus in which the child is suddenly roused from sleep with a loud outcry, and is also the almost exclusive cause of nocturnal enuresis, the sensory nerve-channels being dulled to such an extent that the irritation of the accumulated urine is insufficient to wake the sleeper and merely produces reflex relaxation of the sphincters.

The occurrence of epilepsy of nasal origin in children cannot be doubted. Its origin in impaired nutrition of the brain and its membranes is quite intelligible if we consider the effect of disturbances in the circulation at the base of the brain on the frontal lobes, where inflammatory diseases are very prone to produce epileptic phenomena.

The character of the nasal secretion is a symptom of importance in nasal disease. Under normal circumstances there is no discharge from the nose, a fact that is in opposition to the popular conception of normal discharges. The scanty secretion produced by the various irritants of civilized life—dust, smoke, and the like—is readily distinguished from a morbid secretion by its grayish-black color, due to the admixture of these foreign substances. In many cases, especially in recent catarrhs, pure water is discharged. As a matter of fact, this is not, as a rule, pure serum, but a very watery mucus, as evidenced by the fact that it may be drawn out in threads even when it is greatly diluted. When more or less leukocytes or mucin are present, the secretion assumes greater consistency and deeper color: grayish, tenacious masses of mucus alternate with thin, yellow, creamy pus; firm, yellowish-green lumps are replaced by discolored hard crusts; an admixture of blood not infrequently appears as a hemorrhage, due to diapedesis or a complicating traumatism.

The inspired air, and still more frequently the discharges, are often very offensive, the odor being due in every instance to saprophytic decomposition of the secretion or of necrotic shreds of tissue, which in themselves are without odor. The character of the secretion in individual diseases will be discussed in the appropriate sections.

Permanent mouth-breathing exerts a special effect on the ear. Normally, the opening of the tube which accompanies every act of deglutition establishes communication between the external ear and the middle ear, thereby securing a permanent equilibrium between the air-pressure on both sides of the drum-head. But in nasal obstruction an insufficient amount of air or no air at all is able to enter; the air within the middle ear is absorbed, and the pressure is permanently diminished. The result is impaired mobility and retraction of the drum-head and deafness. But there is another danger which, though less frequent, is even greater: a tubal orifice may be partly open, or, if the nasal obstruction is not excessive, may retain its normal valve-like function and the expired air may thus penetrate to the middle ear when the individual blows his nose, even if the act is performed in a rational manner (see p. 22). In this way hyperemic conditions in the middle ear are produced in the course of acute catarrhs and during the exanthemata; or infectious material from the masses of secretion almost always present in an obstructed nose may be directly introduced and lead to the production of otitis media.

The changes in the skin and in the eye frequently observed as the secondary result of nasal disease are due not to transportation of the infection, but to propagation of the inflammatory process. In children even acute catarrh is accompanied by marked inflammation of the upper lip, and if a chronic hypersecretion is superadded, eczema and crust-formation commonly result. The glandular tissue of the upper lip becomes swollen, and the characteristic thickening of the nose and lip, with secon-

dary swelling of the lymph-glands at the angle of the jaw, combine with eczema of the eyelids and keratitis to produce the well-known picture of scrofula. Not infrequently tubercle bacilli enter the lymph-passages and establish themselves in the glands, although the skin itself may not be specifically involved. In adults sycosis of the upper lip is more likely to develop from the constant maceration and the irritation produced by rubbing the infectious nasal secretion into the mustache, and unless the cause is removed, the condition is never cured.

In the eye it is the lacrimal apparatus that most commonly participates in nasal affections. Even the irritation attendant upon introducing a speculum or probe into the interior of the nose is immediately followed by reflex lacrimation in the eye of the same side, and, in a similar way, swelling at the orifice of the lacrimonasal duct in the inferior nasal meatus may lead to obstruction of the lacrimal flow and lacrimation. An inflammatory process may also follow an ascending course through the lacrimonasal canal, and produce conjunctivitis. Chronic inflammation of the eyelids is practically always to be attributed to a latent nasal disease. Phlyctenular keratitis, often of a very grave type, so commonly follows chronic nasal suppurations in children that the causal connection between the two conditions cannot be doubted. As has been pointed out, keratitis forms part of the symptom-complex of scrofula, which, as we have seen, is usually of nasal origin. The purulent form of dacryodochitis, with its consequences, stenoses and hypertrophies, is almost invariably due to nasal suppuration, although it can be treated independently of the latter condition.

Certain less common and more profound disturbances of the eye, such as iritis, glaucoma, orbital abscess, and the like, occasionally, but not regularly, exhibit a causal connection with the nose. On the other hand, subjective asthenopic phenomena are more commonly to be attributed to the variety of headaches characteristic of nasal disease. In such cases eye-strain first excites the symp-

tom-complex that we attribute to nasal disease, and a feeling of fatigue and diminished optic receptivity rapidly develop in the same way as when errors of refraction are insufficiently or improperly corrected.

Pharyngeal and laryngeal symptoms form an integral part of chronic nasal affections. Chronic pharyngeal catarrh in the great majority of cases is merely a masked symptom of nasal hypersecretion. As the secretions are discharged only posteriorly, their effects become apparent on the posterior wall of the pharynx and soft palate. The habit of hawking and clearing the throat in the morning, and the laborious clearing of the nostrils by a forced inspiration, followed by expectoration, can be attributed only to nasal, or more correctly postnasal, processes. Chronic laryngeal catarrh very frequently is also due simply to the hawking and the attendant abuse of the vocal cords, and in part to direct maceration of these structures by the tough, purulent nasal secretion containing densely adherent crusts. Sometimes very characteristic pictures are produced in this way, which are reproduced elsewhere (see *Atlas of Diseases of the Larynx*). Even without this direct injury to the mucous membrane the quality of the voice is impaired, especially if nasal obstruction occurs in early youth. Owing to insufficient resonance the individual muscles of the larynx are injured by overexertion in the attempt to phonate distinctly.

The rare, and usually severe, sequels of proximal infection or metastasis will be discussed later in a special chapter. Of secondary importance are the disturbances of the sense of smell, although a good many patients find them exceedingly troublesome. Mechanical anosmia is observed both in total obstruction of the nose and in those forms of partial obstruction in which the access of air to the olfactory region is interfered with or completely blocked. Accordingly, they include chiefly tumors and inflammations in the domain of the middle meatus. The access of the odor-laden air to the olfactory membrane may also be mechanically impeded by secretions dropping

down from above, which at the same time exert a directly deleterious influence on the membrane. Anosmia of ozena patients is in part due to the fact that, although the air which is drawn into the abnormally dilated inferior meatus becomes laden with the odors that are so offensive to another person, it never comes in contact with the olfactory membrane, and can, therefore, produce no olfactory sensation in the patient himself. In addition, the anosmia in many cases of this kind is aggravated by atrophy of the olfactory cells. Hence, if the ozena is cured, the sense of smell can be restored only if some of the organs of smell are preserved, and the course of the inspired air can be brought to follow the normal courses—that is to say, complete restoration of the sense of smell is rarely attained. In the case of inflammations and tumors the prognosis, though still doubtful, is very much better.

Parosmia sometimes occurs in acute nasal suppurations, especially during influenza. All other varieties probably rest exclusively on hysteric, neurasthenic, or other psychogenic foundation.

Subjective cacosmia is always a sign of a latent decomposition process in the pharynx, nasopharynx, or, most frequently, in one of the accessory sinuses, and every effort must be employed to search out the seat of this putrefactive process. The source may be incorrectly referred by the patient sometimes to the exterior, but the condition never occurs without some objective reason.

Examination.—This should begin with simple ocular inspection. A good deal of valuable information is often to be gathered from the patient's face: the expression; the lines about the nose and mouth; the external character of the nose, lips, region of the jaw, and neck—are often very significant. The mouth, too, should at first be inspected without the aid of the hands or instruments. The teeth, the tongue, and the gums are first subjected to inspection. If the surgeon is looking for syphilitic infection in the mouth, he must not neglect to note the condi-

tion of the inner surface of the cheeks and lips, and the floor of the mouth underneath the tongue. For this purpose the mouth-hook shown in the accompanying figure (Fig. 4) will be found useful. After this has been done, a tongue-depressor is used, and the soft palate and posterior pharynx are inspected. In ordinary cases a common flat tongue-depressor like a paper-cutter with blunt edges answers every purpose. If the tongue offers unusual resistance, this is best overcome by means of an instrument bent at right angles, like that devised by Fränkel, or by means of Türck's tongue-depressor, which comes in three sizes, and which may be held by the patient if the surgeon has to use both hands. Reflex choking is overcome by exerting firm, uniform pressure on the tongue, taking care that the instrument does not extend as far as the base.

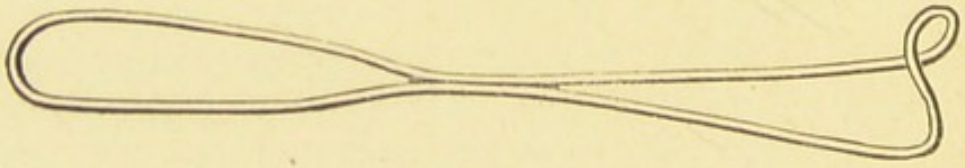

FIG. 4.—Mouth-hook (one-half size).

Ordinary daylight arranged so as to fall over the examiner's shoulder suffices for inspecting the pharynx. In the evening, and when the nasopharynx is to be examined, an artificial source of light placed between the eye and the object is necessary. As posterior rhinoscopy particularly requires central vision,—*i. e.*, adjustment of the visual axis approximately in the line of the incident rays of light,—it is best to use a reflector with a central opening, which should be adjusted exactly in front of the surgeon's eye. The light, which is derived from any suitable lamp, is thus thrown into the throat and on the small rhinoscopic mirror. The luminous source may be direct sunlight, or, what is better, sunlight reflected by a concave mirror fastened to the window, or any sufficiently powerful artificial illumination. The electric incandescent lamp, which is adjusted between the eyes, is quite appro-

oriate in ordinary cases, but on account of its unavoidable size it sometimes prevents the surgeon from seeing as far down as necessary, and does not permit of central vision, which appears to be indispensable for the inspection of very narrow passages. The reflector or electric incandescent lamp may be fastened to the head with a strap or metal

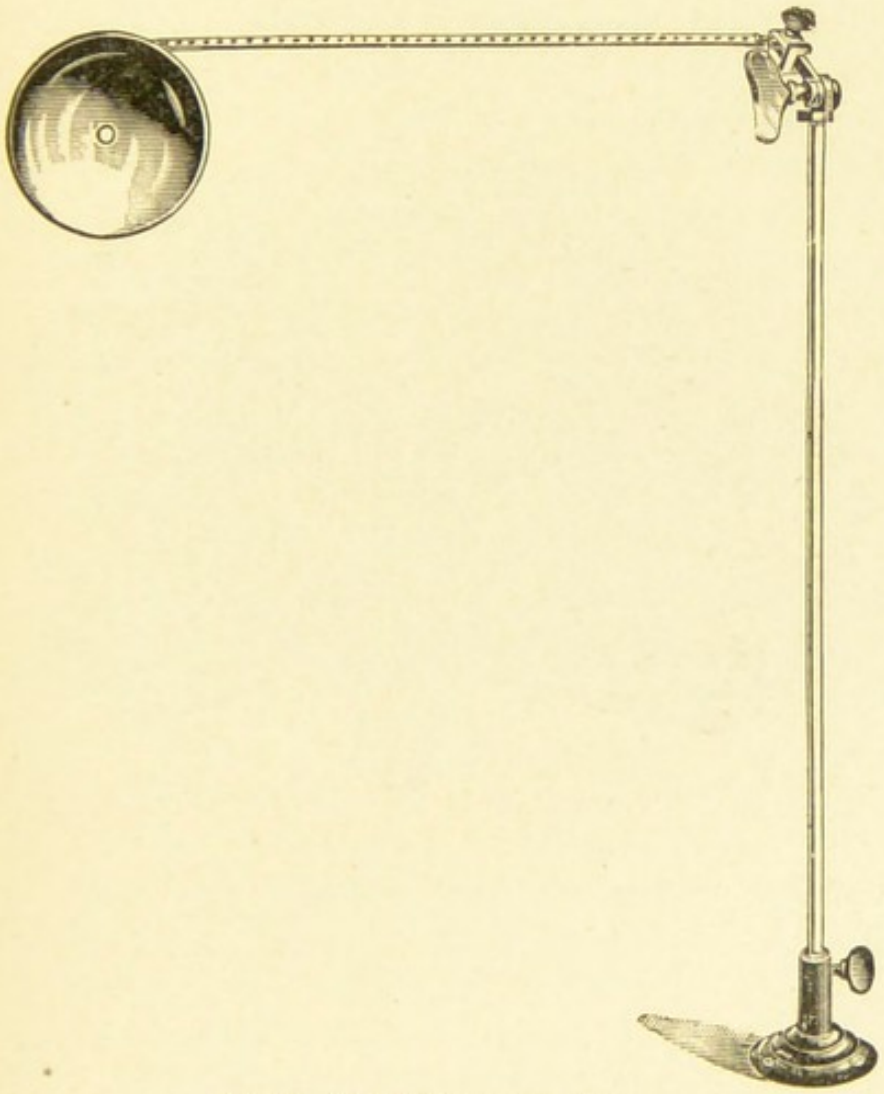

FIG. 5.—Stationary reflector.

frame for ambulant practice or occasional examinations at the office. For one who does a great deal of this work, however, the stationary reflector, illustrated in Fig. 5, which automatically fixes itself in any desired position, will prove more useful. The author has used it during a practice extending over many years. The rhinoscopic

mirror, which should be warmed or immersed in a solution of lysol to prevent its being dimmed by the patient's breath, must be carried directly behind the uvula, without touching anywhere, and placed in such a position that, by turning it in various directions, a complete image of the nasopharynx and of the choanæ is obtained.

The necessary relaxation of the soft parts is best achieved by having the patient breathe quietly in and out.

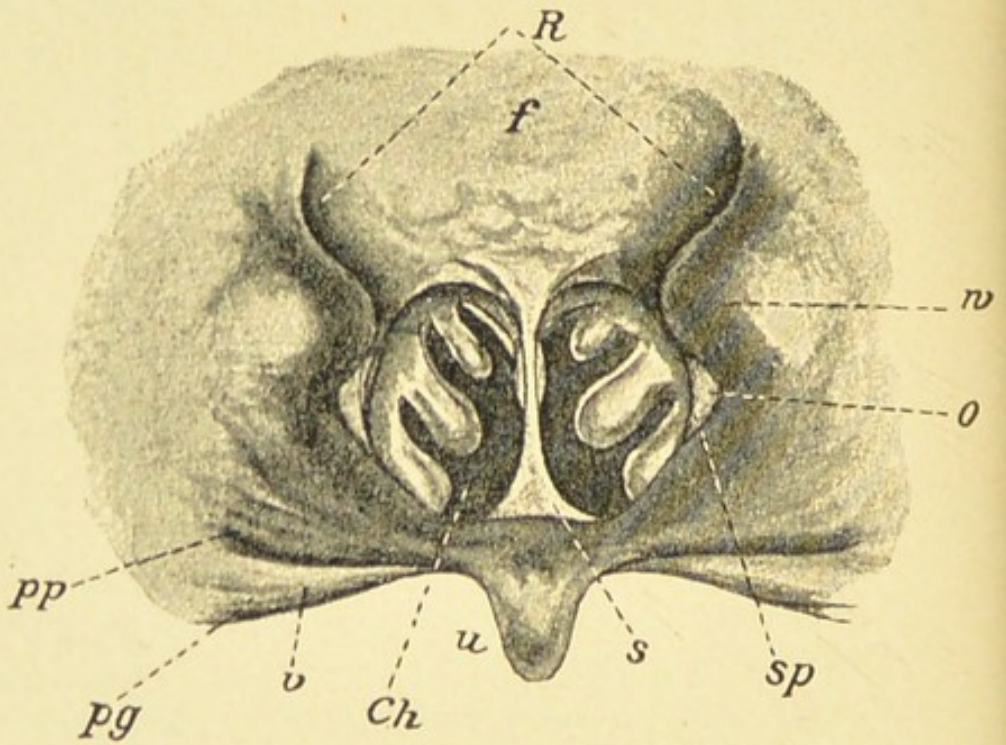

FIG. 6.—Image obtained by posterior rhinoscopy: *R*, Rosenmüller's fossa; *Ch*, choanæ; *w*, tubal fold; *o*, tubal orifice; *f*, fornix or vault; *s*, septum; *u*, uvula; *v*, soft palate; *sp*, salpingopharyngeal fold (posterior pillar); *pp* and *pg*, palatopharyngeal and palatoglossal arch.

Most people merely contract the soft palate when they are told to hold their breath. If the patient continues to contract the soft palate nervously, he should be told to snore, the surgeon, if necessary, giving him an object-lesson. The practice of asking a patient to intone a nasal sound, such as the French nasal "n," is impracticable, since the patient generally does it wrong, and thus brings about the very thing that the surgeon wishes to avoid—namely, shutting off of the pharyngeal from the oral

cavity. I do not recommend using any instrument for drawing down the soft palate, except in very rare cases. For my part I have always been able to dispense with instruments. A practised examiner can do without them, and an unskilful one will derive no benefit from them.

It may be said that posterior rhinoscopy requires not only constant practice, but a certain art dependent upon individual skill. Introducing the instrument fearlessly, and at the same time delicately, and seizing the favorable moment with lightning rapidity, will bring success under the most difficult circumstances. But even the most skilful and careful examiner will not always find this method practicable. Although, according to the author's experience, about 95 per cent. of all individuals can be examined rhinoscopically, there are 5 per cent., consisting chiefly of children, who are more or less intractable. As in the latter the condition that we have to deal with, in the great majority of cases, is a tumor in the naso-pharynx, the surgeon can find out by palpation what he was unable to make out by inspection. Even in adults palpation is sometimes necessary to determine the length of foreign bodies, of a sequestrum, of a tumor, or the like. The surgeon stands behind the patient, who, if he is an adult, may sit down; if he is a child, he is held lightly between the surgeon's knees, his hands being at the same time secured by a third person, merely to guard against premature resistance. As soon as the patient opens his mouth, the mucous membrane of the cheek is forced in between the teeth with the right forefinger, while the head is at the same time securely held against the examiner's chest. By this means the patient is prevented from closing his mouth and also from biting. The examining finger, which then requires no protection, is passed rapidly back along the hard palate, and to one side of the uvula, behind the soft palate, which is usually tensely contracted. The choanæ, the roof of the pharynx, and its lateral walls are palpated as rapidly as possible to avoid prolonging the unpleasant process any more than is neces-

sary. It hardly needs to be said that the nail of the examining finger must be trimmed quite close, and that the hand must be washed before it is introduced into the mouth. Any substance brought out with the finger is then carefully examined by inspection and palpation.

In the examination of the nose, central reflected light is practically always required. The light is first thrown on the vestibule of the nose, which is examined without the use of an instrument by merely raising the tip. Next a speculum is inserted in front, between the cutaneous septum and the ala of the nose, which brings the anterior

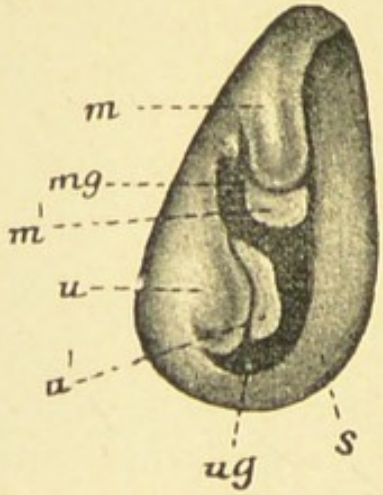

FIG. 7.—Rhinoscopic image of the right half of the nose: *m–m'*, Middle; *u–u'*, inferior turbinate; *mg*, middle; *ug*, inferior meatus; *s*, septum. The illustration has been constructed from several images obtained with the head turned slightly to the right.

angle of the vestibule into view. The instrument is then introduced farther into the nose with the blades closed, and after its complete introduction, the blades are separated gently. The procedure ought not to be followed by hemorrhage except in very rare conditions, such as hemophilia and the like. The different makes of specula are legion; the author is in the habit of using the old Kramer instrument exclusively. The position of the speculum should never be altered, but the surgeon lays his hand on the patient's head and gently turns it forward and backward, or the head may be placed in a rather uncomfortable position of backward extension, so as to

enable the examiner to obtain a full view of the interior of the nose from the floor to the roof. If any doubt remains as to the position, attachment, resistance, or other factors in connection with any object seen within the nose, or if it is desired to follow up an opening, a probe is brought into use. In most cases the tip has to be bent at an angle. The probe should always be handled with the greatest lightness and delicacy, both to avoid inflicting an injury and to guard against errors. Its special uses will be discussed farther on. If there is any secretion in the nose, the patient is told to blow his nose, or it may be wiped out carefully with a narrow pledget of cotton held in the nasal forceps. Secretion on the floor of the nose is often difficult to remove by wiping out from behind forward, because it may be lodged in a deep depression. Dry crusts are frequently so firmly adherent that they cannot be removed without producing a hemorrhage; in such cases they should be covered for several hours with a cotton tampon, after which they will readily come away, as they have been macerated by the after-coming secretion, which, owing to the irritation of the foreign body, is more watery than usual. Crusts may also be softened with an ointment.

To examine the contents of the antrum, an exploratory opening is made with a heavy, firm trocar. [A trocar and cannula curved through not quite a quarter of a circle enables the puncture to be made the more easily, as with such an instrument entrance is effected more nearly at a right angle to the bony surface of the inner antral wall under the inferior turbinate. With a straight instrument there is some danger of slipping under the mucosa and not entering the cavity.—Ed.] After anesthetizing the depression underneath the anterior extremity of the inferior turbinate (see Fig. 2) with a 20 per cent. solution of cocain, the cartilaginous portion of the septum is bent to one side, the trocar applied as vertically as possible to the bone immediately below the region of the turbinal bone, and introduced into the cavity by an

auger-like movement. The bone in this region is usually as thin as paper, and the trocar can be introduced very easily. In rare cases the bone is thicker and more resistant, sometimes making it impossible to introduce the trocar. As soon as the operator feels that the point has entered the cavity, the point is withdrawn and the cannula inserted a little further, in order to make sure that the trocar has not entered the opposite outer wall of the cavity. A speculum is then introduced, the middle meatus being kept carefully in view, and a rubber bulb attached to the cannula for the purpose of insufflation. This in many cases will be followed by the escape of some variety of secretion through the hiatus maxillaris. If no secretion makes its appearance, a 1 per cent. solution of carbolic acid is sprayed in, the patient holding his head bent forward and toward the opposite side, after which the fluid that remains in the cavity is rapidly evacuated and examined before it has been modified by the after-coming hemorrhage. Mucus floats on the surface; pus sinks to the bottom. If there is reason to suppose that the cavity contains very little secretion, it is well to dam it back by means of a plug of cotton introduced in such a way as to obstruct the middle meatus and leave the inferior meatus free. The plug is left in place for twenty-four hours. This is especially necessary in the case of cavities that constantly empty themselves without accumulating any residual secretion.

This method of tamponade is also useful in determining from what particular cavity a secretion takes its origin.

In examining the pneumatic accessory sinuses, transillumination with small incandescent lamps is also employed. The results obtained by this method are often ambiguous; obscuration may be due to abnormal position or deficiency of a cavity, and, on the other hand, a cavity that is constantly discharging may contain too little secretion to intercept the light. The method has a positive value only when a cavity which before had been dark is found to be translucent after operation, which may,

therefore, be presumed to have been successful; otherwise the method is of no value, except for purposes of demonstration, and does not require further notice in this work, which is solely devoted to practical considerations. Radioscopy, on the other hand, although rarely indicated, has firmly established its claims in determining the presence of foreign bodies, and, in many cases, the condition of the cavity as well. It is, of course, absurd to conclude that because regions containing pneumatic cells appear dark under Röntgen-ray illumination, a discharge is present, any more than in the case of ordinary transillumination. But when, for instance, a probe has been introduced into the frontal sinus, it is unquestionably useful to determine, by means of a Röntgen-ray photograph, whether the probe really has entered the sinus or merely occupies one of the frontal ethmoid cells, which are often found in a very abnormal position. The presence of septa into the cavity, converting it into several chambers, may also be determined by means of radiography.

Treatment.—The treatment of diseases of the mouth and pharynx is based on the fundamental principle that all offensive and excessive secretion must be removed, so as to get rid of the constant irritation set up by the decomposition products. Disinfection is possible only under quite exceptional circumstances. As a rule, it is not to be attempted. Mouth-washes and gargles should, therefore, be as nearly indifferent as possible, owing to the danger of some being accidentally swallowed, the chief purposes that they have to fulfil being to restrict secretion and dissolve the secretion already formed. The alkalis have been found by experience to accomplish the latter object better than any other substances. It is also desirable to prevent, as far as possible, by means of aromatic substances, the distressingly bad taste in the mouth. In health the mouth and throat can usually be cleansed sufficiently with cold water. Cleansing of the teeth does not require any special tooth-powder, but the tooth-brush

should be of the proper shape—not concave and not too hard. If large masses of mucus are to be removed, a lukewarm 1 per cent. solution of common salt should be used. Mild grades of inflammation demand some astringent wash in the form of a warm 1 per cent. solution of alum containing a small amount of salt.

A useful mouth-wash and gargle may be prepared by adding half a teaspoonful of the following solution to ½ liter of cold water:

℞ Tinct. myrrhæ,
Tinct. rhatanæ, āā f ℥ss;
Ol. menth. pip., gtt. iv.

Or the undiluted solution may be directly painted on the gums. Severer grades of pharyngitis may be alleviated by gargling with warm or hot solutions, preferably infusions of sage or chamomile tea. Ice pellets and ice-cold gargles, which are so popular with some people, should be forbidden. The momentary anemia produced by the cold is followed by a corresponding engorgement of the relaxed arterial vessels, whereas a warm application produces a lasting passive hyperemia, and therefore acts as a better derivative from the inflamed areas. Externally the same object may be accomplished by means of a moist warm throat compress, which in diseases affecting the glandular region is not to be applied around the throat, as it fails to reach the angle of the jaw, but rather under the chin, and fastened on the top of the head, as in Fig. 8. As the bandage applied in this way covers the ears, the compress itself—that is, the wet cloth and impermeable covering—must not extend higher than the lobes of the ears, so that the latter are covered only by the dry bandage. In every acute disease of the upper mucous membrane especial attention must be given to the condition of the bowels, a mild or even a powerful laxative being administered at the very beginning of the attack. In chronic inflammations of this region, also,

the digestion must be carefully looked after. The patient should be in a room that is free from dust, and the air should not be too warm, nor, if possible, too dry. For the same reason mild sea-climate and moist forest regions are to be recommended as resorts. If the patient wants to get well rapidly, he must give up tobacco; in any event, chewing and taking of snuff must be prohibited.

Wounds in the oral cavity and in the nose should be dressed, if necessary, with iodoform or nosophen gauze,

FIG. 8.

the only disinfectants of mucous membranes that have proved themselves absolutely reliable. After extraction of a tooth, and particularly when several teeth have been extracted, the alveoli should be packed with a small strip of gauze, which is allowed to remain until the following day. After operative wounds, such as the wound made in opening the antrum, and after any accidental injuries, especial care must be exercised to pack the pockets that tend to form in the loose connective tissue, especially of

the mucous membrane covering the cheeks. If this precaution is neglected, dangerous abscesses may result. The disagreeable taste of iodoform in the mouth may be overcome advantageously by means of gargles with diluted "Waldmeisteressenz" (botan., *Asperula*, wood-rowel), which can be had at any delicatessen store. In the nose, iodoform and packing with gauze may, as a rule, be dispensed with. The best means to prevent infection in this region consists in operating in such a way as to leave a broad open surface. Such surfaces in the mouth are sufficiently cleansed by the movements of the tongue and the constant bathing of mucus, and in the nose by the constant expiratory air-current, particularly as mucous membranes possess an extraordinary tendency to heal. Packing in the nose, even with aseptic gauze, is more apt to do harm than good, on account of the exceedingly complex arrangement of the cavities, making it practically impossible to avoid introducing the packing in such a way as to produce retention and its disastrous consequences. And yet, packing has been used more in the nose than elsewhere—namely, for the purpose of controlling hemorrhage.

Spontaneous hemorrhages almost always have their origin in the anterior portion of the nose. In the mouth they are practically unknown. In most cases the hemorrhage can be controlled by sitting with the head slightly bent forward, so that the blood continues to flow from the anterior nares and nasal respiration is still possible. The latter is an important point, as nasal respiration tends to unload the blood-vessels of the head. Most spontaneous hemorrhages cease of their own accord in this position, but if the bleeding continues, the patient should be told to sniff up a few drops of freshly expressed lemon-juice; to apply a cold-water cloth to the nape of the neck; or to swallow a pinch of salt. If packing really becomes necessary, it is to be remembered that it can arrest a hemorrhage only when it is applied to the bleeding point, which in almost every instance is found in the anterior portion of the nose (see p. 15). There

can be nothing more senseless than the barbarous method of packing the entire nasopharynx with the aid of a Bellocq cannula. The nose should be wiped dry, whereupon the blood will be seen issuing from a point near the anterior extremity of the septum, and permanent packing can usually be dispensed with by applying a small pledget of cotton saturated with peroxid of hydrogen under pressure, and holding it in position for several minutes. If the hemorrhage still continues, the cotton compress is left in place several hours, or even until the following day. If the hemorrhage has a deeper origin, the indication to apply the packing directly to the bleeding point is even more urgent. It is absolutely useless to pile on the gauze in front of the bleeding point, and the resulting nasal obstruction may even be harmful. Operative hemorrhage should always cease of its own accord if the operative wound is smooth, no fragments of tissue have been left behind, and nasal respiration is not interfered with. The hemorrhage may be arrested more rapidly if the operator desires to continue his work by the application of a pledget of cotton saturated with peroxid of hydrogen, but the best and most reliable means of arresting hemorrhage, after operation, and especially of preventing secondary hemorrhage, consists in doing the work in a cleanly and thoroughly workmanlike manner, so as at least to secure free nasal respiration. The most profuse hemorrhage—such, for instance, as occurs in noses obstructed with polypi—ceases almost instantly as soon as free ventilation is established. In such cases packing is especially undesirable, because of the almost invariable presence of pus, which under the most favorable circumstances is sure to infect the wound. Even fatal results have been recorded from the retention of pus behind the tampon.

One of the chief indications in the treatment of nasal disease is to secure free escape for the excessive secretion. Although it may not effect a cure,—and this is often impossible, even in comparatively mild cases, speaking from

a pathologic point of view, without serious surgical intervention,—perfect drainage, by relieving the deeper air-passages from the injurious influence of the secretions, often suffices to remove a deep-seated trouble, or at least to render it latent. This is accomplished in the first place by frequent and rational cleansing of the nose (see p. 22). Children need constant admonition in this respect, as their noses are often filled with secretion which, although a day old, is readily expelled by blowing.

[The question of hemorrhage from the nose, whether spontaneous or induced by any variety of trauma, surgical or otherwise, suggests the mention here of a new therapeutic agent which is a most valuable addition to our resources. It is the active principle of the suprarenal gland, which has been variously named. For a while the saccharated extract was employed, it being mixed with distilled water and then filtered. For convenience of use, however, it has been superseded by the commercial "adrenalin," which is a solution of the muriate of the active principle, 1 part to 1000 of normal sodium chlorid solution, preserved by the addition of 0.5 per cent. of chloretone. This may be diluted several times with its bulk of water, and yet be strong enough for all practical purposes.

It is not too much to say that the value to the rhinologist of this remedy is second only to that of cocain. Its hemostatic properties are little short of marvelous. It acts on the unstriped muscular fiber of the vessel-walls. (Cocain constringes through the medium of the vasomotor nerves.) The adrenalin may be used in the same solution with cocain, though we prefer to use the two separately, the cocain preceding. Adrenal is not itself distinctly anesthetic. It quickly blanches the mucosa, and with the combined use of the two remedies named, we can render the operative field anesthetic and bloodless; in other words, can obtain ideal conditions for operating quickly, safely, and agreeably.

Concerning the physiologic office of this agent in the

human body, it may be said that it is supposed to assist in maintaining the normal blood-pressure. It quickly revives a flagging heart, even when merely dropped on a normal mucous surface. For a long time it was supposed that it was decomposed in its passage through the gastro-enteric canal. Testimony on this point is still somewhat conflicting. But the results obtained in many cases of the hay-fever type seem to suggest the view that it is not so decomposed. The adrenalin solution can be repeatedly sterilized without any alteration of its hemostatic effect.

Obviously, after the use of so powerful an agent there must come a strong vascular reaction, and the question has been much discussed as to whether secondary hemorrhage following operations in which adrenalin has been employed is more common than formerly. Here, again, there is a conflict in clinical testimony. So far as differing views on this point have been collated, there is a preponderance in favor of the likelihood of more frequent bleeding.

Another disadvantage of the remedy, and one that in any given case cannot be foreseen, is that an idiosyncrasy following its use occasionally produces a violent reaction in non-operative cases—as, for instance, when it is employed to check an incipient coryza. Often the reaction with violent sneezing and nasal occlusion renders the patient's last state worse than his first. Several cases have been reported of edema of the palate, pharynx, and epiglottis following the application of the remedy to the throat. In these cases scarification has been followed by relief. Constitutional symptoms have been wanting.

Finally, it may be said that the remedy has been found to be of service in all commencing inflammations of the upper air-tract, where circumstances permit its direct application. It will frequently abort a commencing laryngitis. In the pharynx it will often bring about a like happy result, though patients sometimes complain of a disagreeable dryness, owing to its powerful constringent properties.—Ed.]

Next in order is irrigation. In many cases a lukewarm physiologic salt solution suffices; if the secretion is tenacious, a solution consisting of half a teaspoonful each of sodium chlorate, sodium carbonate, and sodium biborate in ¼ liter (quart) of warm water may be used. The use of sprays and nasal douches is to be discouraged, on account of the danger of the secretions being carried into accessory sinuses and into the ear, but the patient may be allowed to introduce the fluid with a spoon or one of the glass nose-cups that can be bought at any store. Personally, I always have the patient snuff up the solution from the palm; the advantage of this method lies in the fact that the middle meatus is also bathed, as the aspirated fluid follows the same path as inspired air (see p. 16), and thus, without producing a dangerous pressure, gets into the upper portions of the nasal cavity. The excessive pressure gives rise to the sudden occurrence of headache, and the patient must, therefore, be expressly warned to desist when this symptom declares itself. It goes without saying that the nostrils must be separately blown out after each aspiration of fluid.

To loosen hard crusts or to induce a more serous secretion, a 10 per cent. solution of ichthyol in paraffin or liquid vaselin may be introduced with great advantage. The same solution may be painted on the throat if that structure is covered with crusts. The "fluid ointment" may be made of any desired consistency by adding ordinary vaselin.

One of the things that the rhinologist is most frequently called upon to do is to restore the permeability of an obstructed nose. If the obstruction involves extensive portions of the lymphatic pharyngeal ring, the measures described in a subsequent section become necessary. In the nose itself cauterization is the method most frequently resorted to. The sovereign remedy is trichloracetic acid. There is no need of any special applicator; the tip of a protected probe is simply dipped into the acid, which, on exposure to the air, rapidly becomes converted into

a tenacious liquid, and the crystal or drop, as the case may be, which readily adheres, is carefully applied to the proper spot. Any excess is at once removed with a cotton-wound applicator.

If a greater destruction of tissue is necessary, the galvanocautery is employed. While a flat application may be indicated in destructive processes, it is usually better to insert the cautery more deeply into the tissues in removing ordinary benign hyperplasias, which are the conditions that most frequently require treatment; as a rule, the obstruction is due to hypertrophy of the erectile tissue in the inferior turbinate. The point of the cautery, which should be red-hot, is inserted through the anterior naris into the inferior turbinate, where it at once enters the spongy tissue; the cautery is then carried along the bone as far as possible,—or as far as may be considered necessary,—and then is carefully withdrawn before it is cold.

This method is greatly preferable to superficial cauterization in furrows, which is still recommended by many authors. In the first place, the instrument is applied to the chief seat of hyperplasia; then it produces practically no hemorrhage and only a very small scab at the point of insertion. Hence no danger of secondary hemorrhage after it comes away. The pain is insignificant, and, what is more important than anything else, there is no danger of an adhesion with the septum, which is often scorched by the radiating heat when the superficial method is employed. [A valuable method of cauterizing the turbinates is that suggested by Goldstein, of St. Louis. He inserts a fine trocar and cannula under the mucosa, passing them along any desired distance. The trocar is then withdrawn and replaced by a small probe of the same size, on the end of which is fused chromic acid. The end of the probe projects a little beyond the cannula. The entire apparatus is then withdrawn so that a linear submucous cauterization is made.—Ed.]

After the galvanocautery has been used in the nose, an

examination should always be made within the next few days. If large crusts have formed by secondary exudation of fibrin, they should be loosened with liquid vaselin. Deodorized iodoform or nosophen makes a good protective powder for cauterization wounds and other wounded surfaces.

Electrolysis is used chiefly for the purpose of reducing the size of malignant tumors which evince a great tendency to bleed. A fine double platinum needle is used, and after its insertion a current of 20 to 30 milliampères is gradually turned on. It may be allowed to act for from three to twenty minutes. The actual cautery should be used only when the interior of the nose has been widely laid open in an operation; under such circumstances it is to be preferred to the more inconvenient and less radical galvanocautery.

Tumors are removed with a cold snare or the galvanocautery snare. The best material for use in the cold snare, I consider, is soft, thin brass wire; for the galvanocautery snare I prefer platinum. [Iridoplatinum wire is preferable for this purpose. The addition of the iridium increases the stiffness of the wire without interfering with its electric properties.—Ed.] The guides in the cold snare must be completely open in front, not held together with a cross-piece, so that the snare may be completely drawn into the tubes, and thus cut through the entire tumor-mass. Soft tumors with inaccessible pedicles are difficult to seize with the snare, and are much more readily removed with the forceps. The instrument to be used is not the old style of coarse dressing forceps, which was introduced without the aid of the eye and seized tissue at random, but the modern bone-forceps, delicate yet strong, which is introduced under guidance of the eye, and enables the operator to seize a fragment of soft tissue without cutting, and to hold it fast until it can be removed by avulsion or torsion.

This procedure is to be preferred to a clean cut, because in the so-called polypi, which are usually sub-

jected to this treatment, radical removal of the periosteum, or even of the bone to which the polyp is attached,

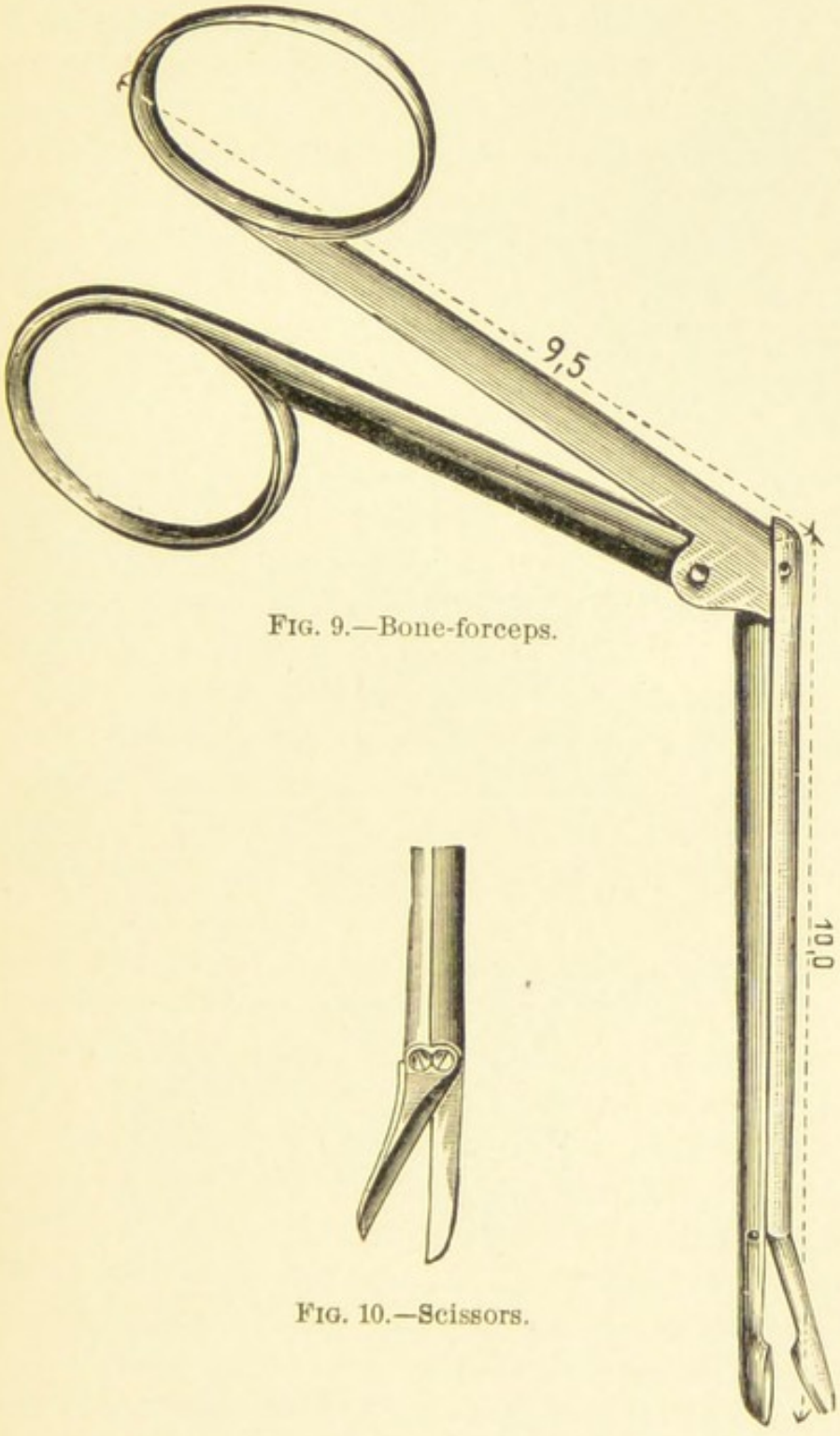

FIG. 9.—Bone-forceps.

FIG. 10.—Scissors.

is the only means of preventing recurrence. The procedure does not produce any more pain or hemorrhage

than follows the use of the snare. The same forceps is used to remove diseased or obstructing portions of bone, the instrument making a clean cut. Scissors of similar shape, also introduced under the guidance of the eye (Fig. 10), are indispensable in dividing adhesions, removing shreds of tissue, and other like minor operations.

A typical operation employed to secure more room in the nose, and not infrequently indispensable in opening up the small system of accessory cavities, consists in removal of the middle turbinate or of its anterior half, and should be mentioned at this point. In the illustrations (Figs. 11 and 12) the instruments, for purposes of clearness, are drawn in a position more horizontal than that really occupied. In actual practice the position of the external nose interferes with an absolutely horizontal position; the instrument must, therefore, be introduced more from below upward. The two jaws of the forceps, as shown in the illustration, are applied to the base of the anterior extremity of the turbinate, which is cut through by rotating the instrument on its longitudinal axis. The part is thus prepared for the snare, which is then immediately applied. Either the cold or the hot snare may be used. If everything goes well, the hemorrhage ceases at once.

For scraping away granulations, removing thin plates of bone, or new growths situated in deep recesses of the nose, the sharp curet (Fig. 13) is the best instrument; it should always be used under the guidance of the eye. Most operations confined to the interior of the nose can be completed without resection, but in the presence of malignant tumors, tuberculosis, and similar conditions it may be impossible to do a thorough operation because the neoplasm extends far beyond the visible regions of the member. In such cases the nose must be laid open. In the treatment of processes confined to the nasal fossæ and more or less accessible, the typical Langenbeck operation for temporary resection of the nasal bone will, as a rule, suffice. Bardenheuer's operation for laying open the face

is indicated only in exceptional cases. For the purpose of exposing conditions localized in the anterior portion of the septum and on the floor of the nose I have re-

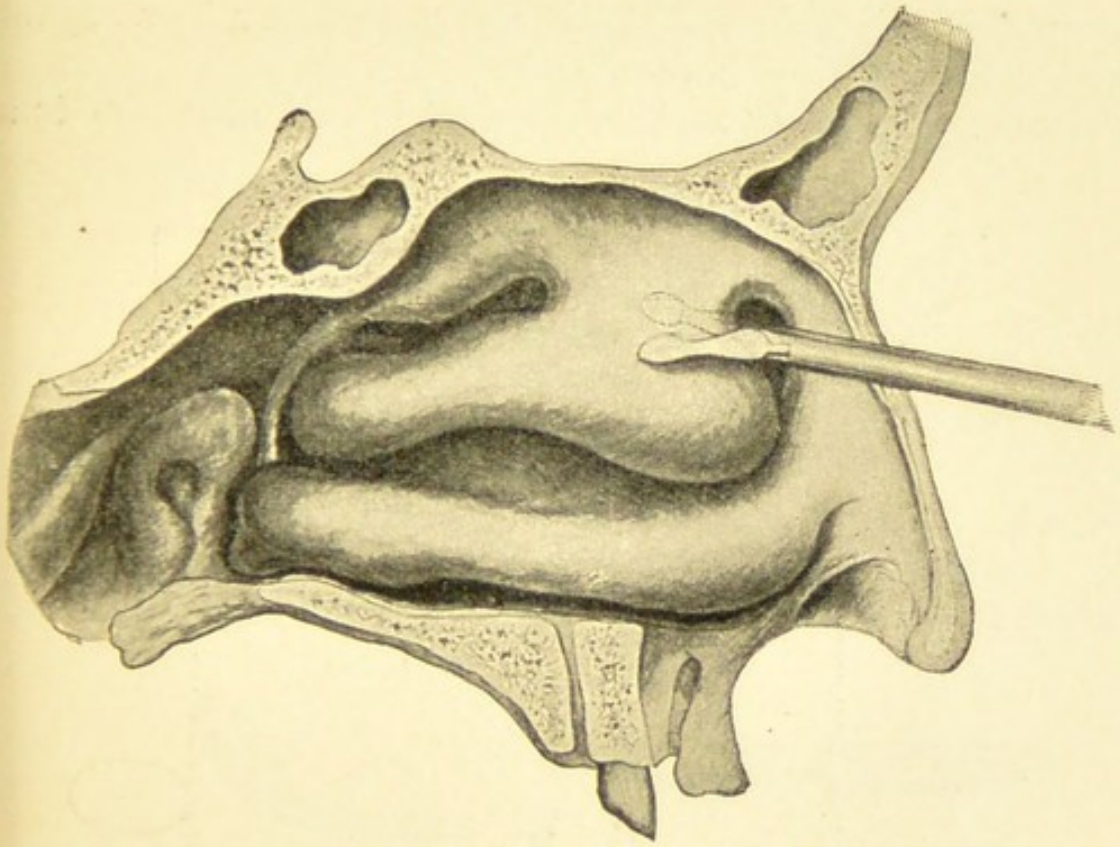

FIG. 11.

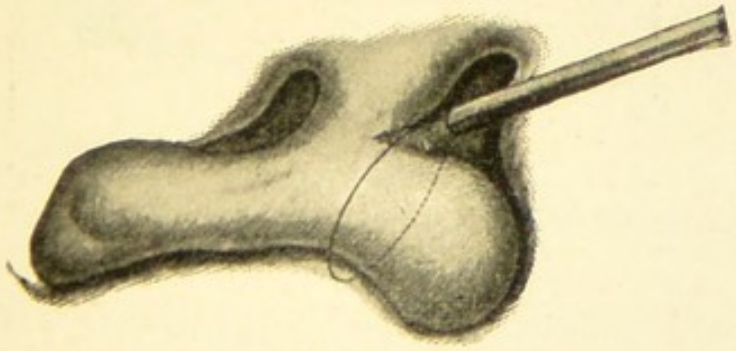

FIG. 12.

FIGS. 11, 12.—About three-fifths natural size.

peatedly employed the following typical procedure: An incision is made at a distance of $\frac{1}{2}$ cm. from the septum through the cartilaginous portion, upward as far as the nasal bone, and then along the apertura pyriformis. The two

edges are then clamped with Pean's forceps, and a completely bloodless operative field, every portion of which can readily be seen, is obtained. The tumor itself, and the portion of the septum or of the nose to which it is attached, may then be removed with the actual cautery, again without producing hemorrhage.

In conclusion, I must not neglect to call attention to a

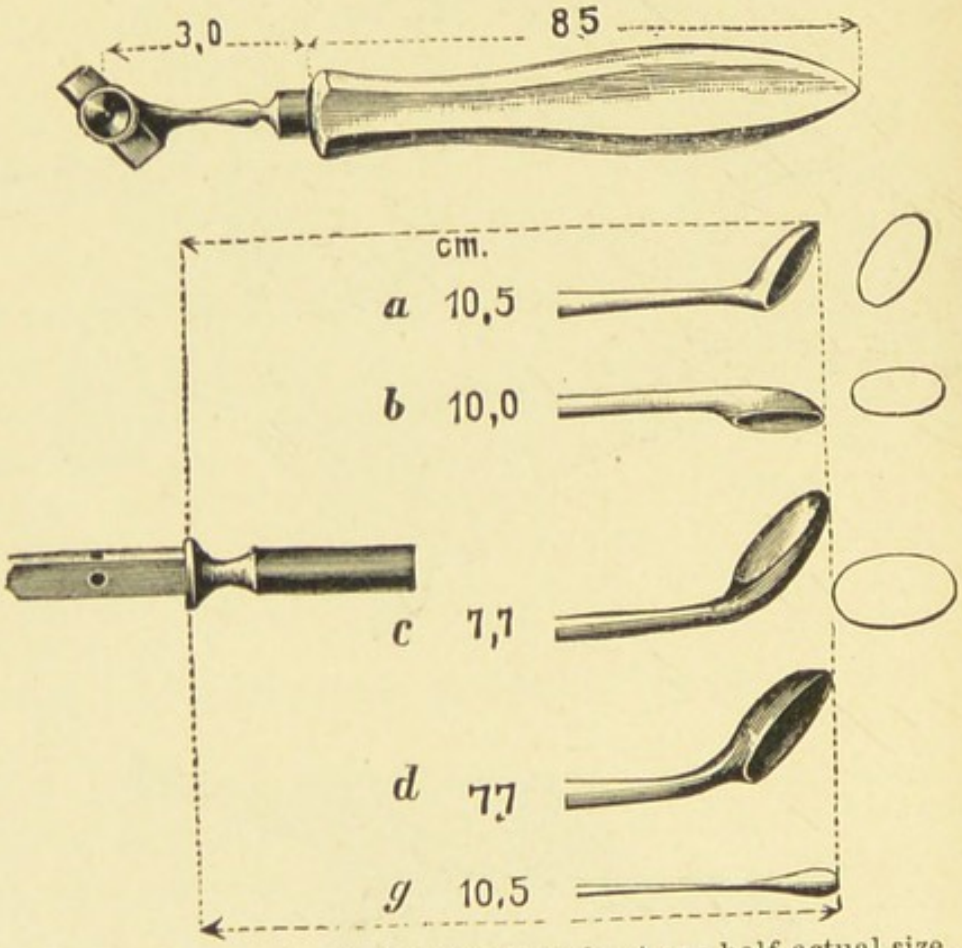

FIG. 13.—Curets, actual size; handles about one-half actual size.

few practical points in nasal operations. When operating in the nose, we should strive to effect the following results:

1. The removal of obstacles to respiration.
2. The establishment of free drainage.
3. Free exposure of the orifices of diseased accessory cavities.
4. Removal of secondary changes which tend to keep

up the original or a similar morbid process even after removal of the primary cause.

5. Radical removal of malignant tumors or infectious processes.

To accomplish these objects and avoid postoperative accidents the following precautions are indispensable :

1. Rapidity combined with the highest possible degree of thoroughness.

2. The establishment, at the first sitting, of perfect ventilation on the side subjected to treatment.

3. Cleanliness in operating and care to avoid leaving shreds of tissue or other matters behind.

The use of antiseptics of any kind is absolutely unnecessary. The introduction of infectious materials is to be avoided by keeping the hands scrupulously clean and using none but sterilized instruments and dressings. In operations *per vias naturales* general anesthesia is unnecessary, except in children.

SPECIAL PATHOLOGY AND TREATMENT.

Of all the organs in the body, the mouth and the throat are most exposed to injuries from without. Their anatomic position brings them into contact with all the ingredients of the ingested food and of the respired air, and their function of initiating the process of digestion makes it impossible for them to avoid these injuries. Hence it is readily understood that this region often becomes the site of an independent traumatic or infectious disease, and, on the other hand, presents the initial stage or a concomitant condition in the general infectious diseases which select this region as their point of attack.

The first group includes typical localized and extensive idiopathic diseases, which derive their peculiar character from the anatomic alterations on which they are based. The second group embraces more extensive symptomatic affections of a mixed character. We are accordingly justified in taking account of this natural difference in describing the special pathology.

INFLAMMATIONS.

This is the commonest manifestation of disease. We will first discuss the *acute forms*. Among the milder, more superficial varieties, *simple catarrh* is the most frequent.

SIMPLE ACUTE CATARRH.

Simple acute catarrh of the mouth almost always represents a mere concomitant symptom of a neighboring inflammation, or it is the result of direct injury, such as the

ingestion of irritating food, a dental operation, excessive smoking, and the like. On the other hand, simple inflammation of the pharynx, like acute coryza,—the two being usually associated,—is, in the majority of cases, due to infection from catching cold.

The mucous membrane presents varying degrees of redness. In the mouth it is often slightly clouded by swelling of the epithelium; in the nose the picture is complicated and characterized by the hyperemia of the erectile tissue, which is often very great.

SUPERFICIAL FORMS.

In the mouth the epithelium is constantly maltreated by the movements of the muscles and by the food, and is accordingly abraded, especially between the folds of the mucous membrane: *superficial abrasions* are produced (Plate 3, Fig. 1). Secretion is at first diminished, and this produces a feeling of dryness, which is aggravated by the hyperemia and heat of the mucous membrane. In the mouth this feeling manifests itself as a bad ("pasty") taste; in the throat, as a feeling of intense thirst; later the secretion may be augmented to an excessive degree. Salivation and nasal discharge in coryza occasionally assume astonishing proportions. In the nose the secretion at first is exclusively serous, being derived from the serous glands of the olfactory region. The mucous glands of the turbinates do not participate in the process until later on, when they are compressed by the hyperemia of the erectile tissue. The secretion then becomes thready, later contains greater masses of mucus, and sometimes is even purulent. The presence of thick purulent lumps indicates that the accessory sinuses are involved. This is also the cause of severe headache. Moderate headache may be produced by the pressure of the swollen mucous membranes on the nerve-endings, but the severest types are observed when there is retention of the secretions behind the swollen tissues.

The **skin of the upper lip** often becomes irritated, especially in children; and a mild grade of eczema may develop. The conjunctiva is always involved to a greater or less extent, either mechanically by stagnation of the lacrimal fluid or as a result of infectious irritation. At the end of a week, at the latest, unless the healing process is disturbed by improper mode of life or too active treatment, an acute inflammation begins to subside; salivation diminishes; the irritation of the throat disappears; and only a little mucus is expectorated at long intervals. Nasal respiration is restored; the secretion becomes more periodic and almost exclusively mucous, and soon ceases altogether. If the infection has been unusually severe, or the anatomic conditions are very unfavorable, inflammation of an accessory cavity may remain. It is recognized by persistent pain, and especially by unilateral hypersecretion.

The *treatment* calls for immediate prohibition of every form of indulgence that may be productive of irritation, such as smoking, taking snuff, and indulgence in alcohol. A bland diet should be ordered; active diaphoretic laxative measures employed; and the patient should be told to avoid, as much as possible, sudden changes of temperature and air contaminated by admixture of dust and other injurious matters. Angina is agreeably alleviated by gargling with lukewarm alum water. In the nose the aspiration of salt solution is grateful. In children boric acid ointment must be ordered for the upper lip, and in nursing infants the nutrition requires special attention (see p. 27). Headache is relieved by means of an ice-bag.

In regard to internal remedies, if the coryza is severe and the general infectious symptoms and the headache appear to demand treatment, salipyrin in doses of 1 gram (15 gr.) may be given two or three times a day.

If the local symptoms are severe and persistent, the middle meatus may be cocainized, and the middle turbinate cautiously pushed to one side with a probe. The temporary removal of the secretions secured in this way

is often followed by disappearance of the swelling and permanent drainage. Inflammations of accessory sinuses remaining after the attack has subsided require no special treatment unless exceptionally alarming symptoms make their appearance or the condition persists without improvement for several weeks (see p. 91). As a rule, they subside of their own accord if the patient takes ordinary care of his health.

True inflammation of the middle ear rarely occurs as a complication in ordinary catarrh, but a slight hyperemia of the middle ear and at the orifices of the tubes, with earache, is quite often observed.

A superficial inflammation never goes on to **ulceration** except for some special reason or under certain peculiar local conditions. Ulceration of the frenulum linguæ may be produced in infants by chafing against prematurely sharp incisors; in new-born infants suffering from sepsis, the process beginning with infection of the glands of Bartholin; in older children suffering from whooping-cough, by chafing of the tongue against the incisors while it is protruded during a paroxysm of cough. During the height of an attack of oral catarrh, especially when it is secondary to catarrh of the nose and is at first neglected, shallow and very painful ulcers are occasionally observed, situated preferably on the edge of the tongue. In chlorotic women the resistance of the mucous membranes is lowered, and inflammatory ulcers of this character have been observed to recur at regular intervals, and have, accordingly, been designated, perhaps with good reason, "chronic recurring aphthæ."

One of the more common severe forms of oral catarrh is **mercurial ptyalism.** If the condition is neglected, an extensive or even gangrenous ulceration (Plate 3, Fig. 2) may result, which, however, possesses no characteristic features. The salivation is a consequence and not a prodrome of the catarrh, as was formerly supposed. A peculiar form of oral catarrh is the so-called "**benign pharyngeal ulcer,**" which consists of a shallow ulceration, occur-

ring almost always on one of the anterior pillars above the tonsil, and productive of slight discomfort. It subsides of its own accord in ten days at most. Whether in this case, as in Bednar's aphthæ, certain special conditions are present that enable a traumatic cause to act must be left undecided. Bednar's aphthæ are unquestionably caused by the practice of wiping the infant's mouth with a cloth. This irritates the mucous membrane which is stretched over the pterygoid processes, and leads to inflammation and finally to ulceration (Plate 14, Fig. 2).

The constant maceration to which this region is subjected is responsible for certain differences in the appearance of ulcers. From whatever cause and in whatever structure ulcers in the oropharynx may have been produced, they eventually always become covered with a fibrinous exudate, so that a true ulcerative surface is rarely seen. The new epithelium grows underneath the covering of fibrin. At the margin of the tongue, however, and at the bridle, the floor of the ulcer sometimes becomes exposed by the constantly repeated injuries.

The **treatment** varies with the origin of the ulcer. Incisors with sharp edges must be filed off; wiping the infant's mouth must be interdicted altogether; attacks of whooping-cough must be suppressed as much as possible. The quickest way to remove the pain from an open ulcer is by a single application of the solid stick of silver nitrate, combined with the constant use of an astringent mouth-wash (see p. 40). Mercurial ptyalism calls for an immediate withdrawal of mercury, constant washing of the mouth with a 1 per cent. solution of potassium chlorate, and dusting of the deeper ulcerations with iodoform. If the gums are greatly infiltrated, it is a good plan to paint them daily with a 4 per cent. solution of silver nitrate.

An exceedingly common disease of childhood is so-called **aphthous stomatitis,** consisting of disseminated deposits of fibrin in the necrotic epithelium overlying the somewhat infiltrated submucosa. They appear as yellowish-white, slightly elevated patches, varying in size from

the head of a pin to a lentil, and surrounded by a narrow inflammatory border (Plate 5, Fig. 2). They come away very slowly, so that epithelialization occurs at the margin before the center of the patch has separated. At this point the process recurs again and again, so that all the various stages of development can be observed at the same time. General symptoms, such as a feeling of infection and fever, may be present in moderate degree from the very outset, and may vary with the severity of the case. The discomfort and pain may be considerable on account of the excessive salivation. Adults are rarely attacked by the disease, except under conditions that favor the production of stomatitis, and therefore facilitate infection, such as menstruation, pregnancy, chlorosis, and especially the acute infectious diseases. Even in children the disease presupposes some debilitating influence. Those chiefly attacked are the "scrofulous," or those whose mucous membrane is already irritated by a catarrh complicating the existing rhinitis; bottle-fed infants and children suffering or recovering from one of the acute exanthemata. With proper care of the mouth the disease subsides of its own accord, but recovery should be hastened as much as possible, especially in children, on account of the attendant disturbance of nutrition. The alkalis are the most useful remedies; for older children a boric-acid mouth-wash may be ordered. In infants the parts should be painted with the following solution:

Sodium biborate,	5.0
Syr. flor. rhœados (poppy),	100.0

The deeper layers of the mucous membrane when diseased present

EXUDATIVE INFLAMMATIONS.

The rarest and most peculiar form of this group is found in the **gonorrheal infection** of small children.

A cellular exudate consisting principally of pus is deposited immediately beneath the true mucosa, and, when the latter comes away, appears on the surface. At first the deposits are flat, of a yellowish-white color, and quite extensive; later they become converted into yellow membranes that peel off and leave flat yellow ulcers which subsequently become red and slightly uneven, but rapidly renew their epithelium. The process is, on the whole, benign, and is confined to the palate between the two points where Bednar's aphthæ are localized, the anterior portions of the tongue, not including the edges, and the alveolar margins.

The **diagnosis** is based on the localization, the presence of gonorrhea in the mother, or, if necessary, on bacteriologic examination. No special treatment is necessary.

Another form of fibrinous exudation, equally benign, is occasionally met on the tonsils in the form of **benign fibrinous angina** (see Plate 8, Fig. 2). It is distinguished from true diphtheria by the fact that it is confined to the surface of the tonsils, while diphtheria, though it is apt to appear first in the tonsils, later invades all the structures of the pharynx and covers them with discrete or coalescent membranes (Plate 8, Fig. 3). The patches are thick, moderately raised above the surrounding level, and present a dull white luster. As the exudate occupies the submucosa, it cannot be removed without destroying tissue, and therefore causing hemorrhage; after spontaneous separation raw surfaces remain which soon become covered with epithelium; rarely and almost always with a fatal result. A diphtheritic deposit extends more deeply and becomes gangrenous, as the grayish-green discoloration of the membrane indicates.

Diphtheria.—In adults this is frequently confined to the central portions of the pharynx; in children the process may extend downward to the larynx, and is particularly apt to invade the nasopharynx and the nose. Laryngoscopy is practically impossible, and the laryngeal involvement is recognized by the nasal quality of the

speech, the snoring, and the early paralysis of the soft palate. The nose is found to be filled with thick, yellowish-white membranes. In the rare cases in which the disease appears primarily in the nose, a flat, membranous deposit is observed at the vestibule, especially at the anterior extremity of the septum, surrounded by an inflammatory areola (Plate 30, Fig. 4). Sometimes the disease is altogether confined to this area, probably owing to traumatic local infection produced by picking and bruising the nose with the finger or conveying carriers of infection with the handkerchief. The general symptoms are quite insignificant, and the clinical picture is that of a "fibrinous rhinitis," which, however, on bacteriologic examination, is almost always found to be a true diphtheria.

Either the general symptoms pointing to severe infection, such as continuous high fever, great depression, and headache, more or less depressed heart action, predominate, or the local symptoms—dysphagia, sore throat, and nasal obstruction—may be the most conspicuous. The clinical picture may be greatly modified by complications, which are exceedingly frequent. They consist of inflammations of the ears; inflammation or even breaking down of the lymph-glands; bronchitis; pneumonia; renal irritation going on to hemorrhagic nephritis; erythematous, impetiginous, and papular cutaneous eruptions; and true cutaneous diphtheria.

The **prognosis** is doubtful; spontaneous recovery may ensue after an attack so slight as almost to escape notice, or the disease may run a protracted course, marked by relapses, especially in the nose, or, finally, the disease may take the form of a profound infection, with rapid cardiac collapse or extensive and destructive local phenomena.

Treatment.—As cases that are quite mild at the outset may, in their subsequent course, become very malignant as the result of mixed infection, we should, if possible, abort the attack. Antitoxin must, therefore, be administered: in the first days a single dose; if the case

is seen later, two or three doses of Behring's serum. The local treatment of the larynx is discussed in another place. Warm aromatic gargles or nasal irrigations with a tepid 1 per cent. solution of lime-water are indicated to hasten the detachment of the membranes; a protective ointment should be applied to the skin of the nose and lips. These measures may be supplemented by a wet throat compress and the administration of cathartics. The action of the heart must be carefully watched, and, if necessary, injections of camphor administered without delay. The patients must avoid overexertion, and not be allowed to get up too soon or to interfere with the action of the kidneys by indulging in alcohol or irritating food.

The process does not always end with the subsidence of the fever and of the membrane formation; in fact, it is just during the period of convalescence that severe palsies occur. These consist in paralyses of the soft palate, causing regurgitation of food through the nose; paralysis of the vocal cords, and sometimes complete aphagia from paralysis of the esophagus; paralysis of accommodation, shown by a sudden inability to recognize near objects, and paralysis of the abducens, indicated by the development of strabismus. Even the diaphragm and the extremities may be involved, and, what is more alarming than anything else, the cardiac fibers of the pneumogastric are not infrequently attacked. The sensory nerves also are involved, particularly the superior laryngeal, paralysis of which leads to anesthesia of the entrance to the larynx and subjects the patient to the danger of aspirating portions of food, with secondary inspiratory pneumonia. In some cases the patient may have to be fed for weeks with a stomach-tube, and during all this time he must remain in the dorsal position so as to avoid the slightest exertion. Injections of nitrate of strychnin, 0.005 gm. (gr. $\frac{1}{12}$) two or three times a day, are said to hasten the disappearance of the paralysis. Atrophy from disuse may at least be guarded against by means of systematic faradization.

INTERSTITIAL INFLAMMATION.

This can readily be subdivided, both on clinical and on anatomic grounds, into two varieties, although from an etiologic standpoint they are caused by the same bacteria—usually the streptococcus pyogenes.

Erysipelas affects the mucosa and upper layers of the submucosa. It is characterized by extensive but sharply defined redness and intense elastic swelling. If the infection has been very severe, blebs may be formed on the mucosa, but suppuration never takes place, as the extravasation consists entirely of serum and contains very few cells. The fever is quite characteristic; it is of an intermittent type, corresponding to the way in which the inflammation spreads, which is paroxysmal rather than progressive. Recurrences are common in the same individual, and as long as the conditions are favorable for an invasion, persist. The disease preferably begins in some insignificant abrasion of the surface, and is probably propagated more by fission fungi already residing in the body than by freshly imported germs. Accordingly, we observe that erysipelas preferably begins at the vestibule of the nose, where fissures, abrasions, and especially acne pustules, which commonly accompany chronic inflammation of the interior of the nose, afford ready entrance to the bacteria contained in the secretion. In like manner, although much more rarely, erysipelas may develop in the tonsils or at the pillars of the fauces, in the lacunæ, and supratonsillar recess, which often contain infectious material, and where abrasions of the mucous membrane are not uncommon. It is extremely rare for erysipelas to begin on the lips or the mucous membrane of the mouth, in spite of the frequent presence of fissures at the angle of the mouth, particularly in children. If these structures are attacked, it is practically always owing to extension of the infectious process.

Erysipelas, as a rule, prefers the skin to mucous membrane, and nasal erysipelas extends ten or even a hundred

times as frequently over the external nose, the lips, and the face, as into the interior of the nose, whence the disease has been named facial erysipelas, without any regard to its origin. In the nose the process fails to find a favorable field for the development of its activity; the mucous membrane is everywhere intimately adherent to the periosteum or to the submucosa, and this explains why pharyngeal erysipelas sometimes appears to follow directly upon erysipelas of the face, because the nasal affection which has intervened has run its course without leaving a trace.

In fact, the appearances in the nose are anything but striking; the swelling of the mucous membrane covering the turbinates closely resembles that of an ordinary catarrh. It is only at the septum that we see the tense, glistening, broad, red swelling which may even go on to vesicle formation.

The nasopharyngeal space may apparently become the primary seat of erysipelas, although it is more likely that the disease was present in a latent form in the nose and that infection originally took place through the nostrils. Primary nasopharyngeal erysipelas is, however, not impossible.

The mucous membrane in erysipelas is of a dark-red color, and, owing to its extreme tension, presents a dim luster. The boundary-line between diseased and healthy portions is sharply defined (Plate 9, Fig. 2), the less adherent portions (uvula) become greatly deformed by reason of the edema, so that intense dysphagia and dyspnea may develop even without laryngeal involvement. In the nasopharynx erysipelas hardly ever occurs independently without participation on the part of the soft palate, and is, therefore, difficult to detect by inspection. It may occasionally attack the accessory sinuses of the nose, and autopsies have shown that here the mucous membrane also becomes covered with large blebs, which may rupture and discharge a serous effusion.

The constitutional symptoms usually set in suddenly

and are violent from the outset. Fever, delirium, and great prostration are not uncommonly observed. They disappear and reappear with the variations in the temperature, and, if the progress of the disease is arrested, may subside and the patient may feel relatively comfortable before the local process is terminated. The heart may show the effects of the intoxication and occasionally of metastasis in the form of endo- and pericarditis.

The inflammation, which, on the whole, is benign, may become serious when it extends to the larynx and gives rise to symptoms of suffocation, or, as occasionally happens, when it reaches the meninges by way of the lymph-channels. In this way a "latent meningitis," which is rarely diagnosticated, develops. Sequelæ are rare. Permanent injuries may occasionally remain behind in the pneumatic cavities, owing to some peculiar anatomic conditions.

Expectant treatment is all that is required, due attention being given to supportive measures and abundant feeding. The strict supervision of the heart, which sometimes shows sudden depression and requires stimulation, is not to be neglected. The treatment should not end with the subsidence of the acute attack. The return of the infection must be guarded against after complete convalescence by instituting a diligent search for the causal factors which have been described.

When the deep layers of the submucosa and of the intermuscular connective tissue are attacked by inflammation, the process takes on the character of **phlegmon,** with abundant cellular infiltration, which terminates in suppuration. The surrounding tissues may present circumscribed areas of edema due to compression of the veins, but the characteristic features of the process consist in relatively slight alteration of the surface, with diffuse swelling of stony hardness in the deeper tissues. Very slowly the infiltration may make its way to the mucous or cutaneous surface, a discolored spot is formed, the abscess points, and eventually ruptures. The tempera-

ture presents the type of purulent fever with slight remissions, and does not subside until the pus has been evacuated, either spontaneously or by operative means. The constitutional symptoms, which are those of a general intoxication with cardiac weakness, generally make their appearance gradually and may assume alarming proportions until the abscess ruptures, while the local symptoms, consisting in throbbing pain and a feeling of tension, are specially noticed during the early stages. In milder cases they may be exceedingly severe; in severer cases, on the other hand, they may be entirely masked by the general hebetude. When the infection is unusually virulent and is combined with a deep infiltration, exerting pressure on the nerves and vessels of the neck, the absorption of toxins, owing to the continuous high pressure, may go on rapidly and uninterruptedly and bring on the severe general disease which, under the very appropriate name "acute infectious phlegmon," has usurped a special place in the literature and which sometimes terminates fatally in a most unexpected manner.

The clinical appearances in phlegmon vary greatly according to the localization. The process is always strictly confined to the affected point, from which the inflammation spreads by continuity, and through which the pus can always be reached.

From the **entrance to the nose** the inflammatory process may extend either to the upper portion of the upper lip or to the external nose. In both these places the infection may begin, although rarely, from the sebaceous glands of the vibrissæ. Inflammations in the **floor of the nose** and on the **septum** are derived from the roots of the incisors; they develop rather slowly, and are apt in this area to be mistaken for specific inflammations. The liability to error is even greater in the rare purulent infiltrations that occur in the hard palate and in the form of tongue abscesses. Minute inquiry into the history and an examination of the entire body should in most cases guard against this error. **Tongue abscesses,**

especially when deeply situated, develop very slowly and may give rise to alarming symptoms, owing to edema in the adjacent structures of the pharynx and larynx.

The most dangerous form of phlegmon is that which occurs on the **floor of the mouth,** in the angle of the lower jaw, between the genioglossus and mylohyoid muscles. It is generally known under the name of **Ludwig's angina,** a term that is often indiscriminately applied to a great variety of suppurative processes in the neck. In this condition the pus is confined in the depths of the tissue. There is an enormous, board-like swelling of the structures of the neck, forcing the head upward and forward like a stiff cravat, and very often leading to sudden asphyxia. In extreme cases the patient's life can be saved only by early and deep incision in the median line between the fibers of the cervical fascia and the genioglossus muscle, and penetrating still more deeply into the lateral tissues of the neck with a blunt instrument until the pus is liberated. In addition there may be a more circumscribed and less dangerous infiltration around the sublingual gland, which, after it has been freely exposed, may apparently subside without suppuration, but in any case, no matter how slight the symptoms may be, an infiltration in this region calls for the greatest care and watchfulness, for in this form, as well as in the deep cervical phlegmon, which is quite similar to it, death from edema of the larynx or sudden heart failure may occur unexpectedly.

Fortunately, these deep-seated suppurative processes are quite rare, and in this respect differ widely from **pharyngeal abscesses.** The commonest form is the **typical supratonsillar phlegmon** or abscess. It originates in the supratonsillar fossa, which is situated between the arches of the palate, and, on account of its depth, presents great facilities to the entrance of infection. The connective tissue between the tops of the arches, as well as the intramural connective tissue of the soft palate, becomes densely infiltrated. Accordingly, the swelling

causes the anterior pillar of the fauces to bulge forward and completely conceal the tonsil itself, which is only slightly inflamed. The abscess gradually points outward and upward (Plate 9, Fig. 1). Owing to the extreme tension of the fascia of the internal pterygoid muscle, it forms the outer boundary of the abscess; there is great interference with the movement of the jaws, so that it is often impossible to insert even a spatula between the teeth. The inflammation rarely spreads to adjacent regions, but the rapid absorption of toxins due to the great tension of the tissues, the severe pain, and total dysphagia rapidly undermine the individual's strength. For this reason the pus should be liberated as soon as the condition is recognized. If incision is delayed until fluctuation and pointing beneath the mucous membrane of the palate make their appearance, spontaneous rupture will be very little, if at all, anticipated. The pus can be reached by following its own path with a bent probe introduced through the supratonsillar fossa outward and upward. If a good deal of pus has already been formed, it will at once follow the withdrawal of the instrument; but if pus-formation has only begun, the pus may be obscured by the slight hemorrhage which follows the introduction of the probe, although the morbid process is at once arrested, as the subsequent course will show. Sometimes the pus discharges in the course of an hour or two, having overcome the slight remaining obstruction. In any case the insignificant operation is productive of the greatest benefit, as it at once arrests the inflammatory process. Its great usefulness and the complete absence of danger, as compared with incision, should win for this procedure a place in the routine practice of every physician.

Abscesses of the adenoid tissue will be discussed in another place (see p. 141).

Peritonsillar suppurations are due to tonsillar abscesses, infection by foreign bodies, and especially to carious teeth. The "intermaxillary fold" connecting the upper and lower maxillæ in the posterior portion of the

mouth is occasionally the seat of a characteristic infiltration; sometimes deep cavities are formed in this region and extend toward the lower jaw, or the swelling is not observed until it reaches the lower jaw, no swelling being visible at the original site, because it has already subsided. A lymphadenitic abscess may, of course, also develop in this region, and may even appear to be primary, hence a diagnosis of this condition in the neck should always be made with great caution.

In addition to the forms of phlegmon described, innumerable variations are possible and could not be exhausted by the most far-reaching description.

It is well known that the **nasopharynx** also may become involved. Clinically it is impossible to distinguish between a simple phlegmon in Rosenmüller's fossa and the interstitial inflammations of the pharyngeal tonsil discussed elsewhere (see p. 142). All that can be said is that the dreaded retropharyngeal abscesses preferably begin in this region.

The **treatment**, as has already been indicated, consists in evacuating the pus by surgical means as early as possible. In addition, the benefit to be derived from wet compresses and gargles used as hot as possible need hardly be mentioned. Absolute rest in bed, even during the first days of convalescence, should be enjoined, and the intoxication combated by giving the patient plenty of alcohol, as this has been found by experience to be the best means of counteracting the infection.

In this condition also recurrence must be guarded against later on by removing any possible cause for another attack, such as carious teeth, a suppurative rhinitis, necrotic plugs in the tonsils, and other like conditions.

GANGRENE.

The only form of inflammation that extends even more deeply than those that have been described is *gangrene*, which in the region of the mucous membranes with which

we are now occupied occurs under the name of noma or "water-cancer." It is a peculiar disease, which, fortunately, rarely occurs at the present time. It affects principally children between eight and twelve, and undoubtedly depends on a severe specific infection. In typical cases it begins in front of the caruncle of the duct of Steno as a bluish-red discoloration, and spreads rapidly to the mucous membrane, the muscles, and periosteum, and even downward to the bone and upward to the skin. In a few days the necrotic tissue separates and a broad and deep defect results. Coma and delirium make their appearance early, and death usually terminates the horrible drama in a short time. Occasionally, however, the absence of subjective symptoms is in marked contrast to the frightful local disease. In very rare cases the ulcerated surface clears up, the remaining tissue then skins over quite rapidly, although the cheek remains fenestrated, leaving the interior of the mouth completely exposed. An extensive plastic operation becomes necessary, and the patient has to be fed artificially for a long time until the wound closes.

The **treatment** is confined to keeping up the patient's strength. The frightful odor from the decomposing masses of tissue may be mitigated by dusting the parts with freshly roasted and ground coffee.

The necrosis of soft parts and of bones that occasionally occurs after severe suppurations in the accessory sinuses is discussed on page 98.

SYMPTOMATIC COMBINED FORMS.

THE ACUTE EXANTHEMATA.

The acute exanthemata never run their course without some effect on the mucous membranes. The coryza that occurs during the incubation period of measles is well known. If this occurs in connection with conjunctivitis in children who have never had the disease, the "spots" may be confidently expected. The eruption declares itself

in the pharynx on the very first day of the fever, in the form of erythematous macules at the junction between the hard and soft palates. The center of the macules is occupied by minute whitish, slightly prominent vesicles. [In 1896 Koplik, of New York, called attention to the early appearance on the buccal mucosa, in measles, of what are known as "Koplik's spots." They appear from one to five days before the rash typical of the disease. They are to be looked for by everting the lips and cheeks *under direct daylight.* They consist of small, irregular spots, bright red, with a minute, bluish-white speck in the center. They are not removed by any smooth instrument, but may be picked up with forceps. They are made up of diplococci and epithelia, and measure from 0.2 to 1 mm. in diameter. At first discrete, they may later coalesce.—Ed.] Coincidentally with the appearance of the cutaneous eruption on the third day of the disease the efflorescence rapidly spreads to the entire oral mucous membrane, except the tonsils and pillars of the fauces, which continue to present diffuse reddening, as at the beginning of the attack. Occasionally small hemorrhages take place into the mucous membrane. This diffuse secondary extension, however, presents a distinctly more inflammatory character. In rare cases the epithelium desquamates, and erosions result.

In the nose and nasopharynx the eruption can also be recognized on the greatly swollen mucous membrane during the first day of the attack if solar illumination is employed. The nasal obstruction usually persists during the fever, and adds to the unpleasant dryness of the oral mucous membrane, which may be so extreme as to lead to the formation of crusts and fissures on the tongue and lips. There is a profuse mucopurulent secretion both from the nose and from the accessory cavities; in rare cases the secretion may even take on the characteristics of a fibrinous exudate.

Scarlet fever is ushered in by severe angina, which in the subsequent course of the disease, probably owing

to mixed infection, may go on to diphtheria. Not infrequently abscesses of various kinds are formed, or a severe lymphadenitis develops. The suppurative process, as usual, preferably attacks the adenoid layer, sometimes also the follicles in the pillars of the fauces and in the soft palate, so that permanent perforations may remain. These perforations may be distinguished from syphilitic defects by the absence of scars in their immediate neighborhood. They are apt to be diagnosed erroneously in later life as "congenital" conditions. [Some of these openings are congenital, doubtless due to incomplete closure of branchial clefts. Moreover, syphilitic perforations are not always accompanied by scars in the surrounding tissue.—Ed.] We also speak of a "scarlet-fever tongue." The tongue is swollen in a characteristic manner, exceedingly dry and intensely red, presenting great prominence of the papillæ, so that the surface resembles that of a strawberry. Dryness of the mouth is also a prominent feature, as the nasal mucous membrane becomes greatly swollen, thereby occluding the nares, and secretes freely; in fact, it very frequently becomes diphtheritic. When the head is extensively involved, the punctiform eruption may spread to the mucous membrane of the nose and nasopharynx. The accessory cavities are also quite frequently attacked. Protracted catarrh of the accessory cavities and of the nasal mucous membrane, which eventually becomes atrophic (see Ozena, p. 90), is frequently a sequel of scarlet fever.

The eruption of **rötheln** or **German measles** is seen only in the mouth; the nose escapes altogether. The secondary stomatopharyngitis characteristic of measles is absent. The lesions of **varicella** preferably become localized on the hard palate, very rarely in the nose. After the vesicles rupture, a shallow erosion remains, which rapidly heals.

In **small-pox** the oropharynx is involved as regularly and in the same manner as the skin; the lesions here also end in pustulation and scar-formation. Typical

pustules are also formed in the nose, especially about the vestibule. Diphtheric necrobiosis occurs both here and in the pharynx.

All these diseases have one sequel in common—namely, a **permanent hyperplasia,** involving especially the pharyngeal portion of the lymphatic ring, which always shares, as a whole, in the inflammation of the mucous membrane. When the causes of adenoid vegetations are inquired for, the acute exanthemata and especially measles will almost always be given in the history. The symptoms usually develop soon after the end of convalescence.

Local **treatment,** especially of the nose, is particularly desirable in the acute eruptive fevers. Secondary aural inflammations, septic processes, or at least permanent inflammations of the mucous membranes affected, would be much more frequently prevented if the infectious material that accumulates in such large quantities in the nose were removed, and nasal respiration, which exerts so beneficial an influence, restored. Some form of spray or irrigation and a gargle should be used whenever at all possible. In very small children and in stuporous patients much good may be done by cleansing the floor of the nose at frequent intervals, using a probe wound with a thin layer of cotton and dipped in liquid vaselin (see p. 46). Astringent and antiseptic remedies are not necessary, and are, in fact, of no use.

STOMATITIS.

The disease recently identified as *human mouth disease* (since it is hardly permissible to speak of "claw disease"—foot and mouth disease) presents some similarity to the acute exanthemata. The affection has been aptly termed **epidemic stomatitis.** After severe prodromal symptoms lasting three days, and consisting in chills and fever, with headache, abdominal pain, diarrhea, and sometimes vomiting, the temperature falls, the bowels become obstinately constipated, and an eruption suggesting measles

appears on the arms and thighs, and, rarely, on the trunk. Sometimes there is a characteristic eruption of vesicles filled with a turbid fluid about the nails of the fingers and toes and around the mouth and nose, suggesting the foot and mouth disease of cattle. In addition, there is great swelling, with livid discoloration of the entire oropharyngeal mucous membrane and profuse salivation. Vesicles similar to those described and attaining sometimes the size of a pea, on a somewhat swollen and injected base, appear scattered over the mucous membrane. They soon rupture and leave a shallow ulcer, the floor of which is covered with a fibrinous exudate. The remaining objective symptoms include marked swelling of the cervical glands and of the liver. The spleen is not enlarged.

The **outcome** is not always favorable, and relapses are not uncommon. Sometimes the inflammation involves the muscles of the tongue and the submucosa, and is followed by secondary cicatricial contraction.

The **treatment** should be directed chiefly to disinfection of the bowels, as the infection is evidently imported through the intestinal tract by drinking the milk of diseased cows. For the rest, the symptoms must be met as they arise.

INFLUENZA.

Although in the first large epidemics of *influenza* in our generation involvement of the higher mucous membranes was the rule, the more recent epidemics of this peculiar disease have often run their course unaccompanied by any kind of "catarrh," and we must, therefore, conclude that the catarrh is not characteristic and is merely a localization of the infection. If the nose is attacked, epistaxis is frequent, and profuse catarrh always results; and it may be said of the latter that it is never unaccompanied by disease of the accessory sinuses. Already existing catarrh in these cavities suffers intense exacerbation, while recent catarrhs may become chronic. The extraordinary

frequency of severe disease of the accessory sinuses, with suppuration and even necrosis, that follows an epidemic of "nasal" influenza may be the cause of serious mistakes in regard to the frequency of disease of the accessory sinuses in general.

The subjective symptoms, vertigo, stupor, and headache, are particularly frequent and remarkably severe in nasal influenza, although these symptoms may occur in the form of neuralgia of the nasal and facial branches of the trigeminal nerve without any catarrhal rhinitis.

Peculiar features of influenza sometimes observed without catarrh are cacosmia and parosmia, conditions that may persist for some time after recovery.

If the pharynx is involved, either catarrhal angina combined with edema, or infiltration of the deep muscular layers with dysphagia and severe pain, may develop. Suppuration of the follicles about the pillars and in the tonsils, as well as the formation of phlegmons, has been reported.

TYPHOID FEVER.

In *typhoid fever* epistaxis occurs so frequently in one-half the cases toward the end of the first week in patients under forty years of age that the symptom is regarded as of diagnostic value. The hemorrhage is not, as was formerly believed, due to diffuse hyperemia of the mucous membrane, which in typhoid fever is usually very dry, both in the mouth and in the nose. The discharge, which in the nose is often purulent, especially if it originates in the sphenoid sinus or in one of the other accessory sinuses that are frequently involved, tends to dry up and form crusts which adhere to the lips and to the nasal septum. These crusts are removed by scratching—many patients are always seen with their hands to their noses; the mucous membrane, the nutrition of which is already impaired by the infective process, gives way, and a hemorrhage from the "*locus Kiesselbachii*" results.

In the oropharynx diffuse catarrh with tenacious, dry,

mucous secretion is at first a prominent feature. Sometimes the epithelium becomes completely desiccated and desquamates in fine saccules — the *angine pultacée* of French writers. Not so very rarely abrasions and flat ulcers covered with a fibrinous exudate of an aphthous nature are formed, especially on the pillars of the fauces and on the soft palate (Plate 13, Fig. 1), or ulcerations extending down to the muscular layer may develop. These lesions, as a rule, heal readily by rapid removal of the epithelium and leave no scars.

The peculiar "fuliginous" appearance of the *tongue* is familiar; it consists of a heavy coating, with dark-red discoloration of the margin. Care of the mouth and pharynx are doubly important in typhoid fever on account of the great tendency to the formation of decubital sores in the mucous membranes. An alkaline mouth-wash should be used at short intervals, and the patient made to gargle if possible. The nose should be painted with liquid vaselin to prevent inspissation of the secretions and thus guard against complications.

HERPES.

The peculiar general infection which manifests itself in *herpes* sometimes attacks the mucous membrane of the mouth and pharynx. It is rarely possible to observe the first stage—that of vesicle formation—because the vesicles, owing to the delicate nature of their epithelial covering, rapidly rupture and are replaced by ulcers. These ulcers in a very short time become covered with a delicate fibrinous exudate and closely simulate aphthous ulcers. It is very probable that the diagnosis of this comparatively common affection is often erroneously made in cases of herpes. The sudden onset of the disease with chills and abrupt rise of temperature, the general feeling of malaise, the acute *burning* local pain, and, above all, the characteristic grouping of the lesions, assure the diagnosis (Plate 13, Fig. 2). The severity of the pain may be

alleviated by giving antipyrin or phenacetin internally; locally a *single* application of the solid stick to the freshly formed ulcers has a very good effect.

SYPHILIS.

The acute inflammations that develop in the wake of *syphilis* have more than a symptomatic significance. They usually appear in the secondary stage, either shortly before or coincident with the eruption, and are rarely absent. One of the earliest, and a rather ambiguous sign, is a diffuse **erythema**. Acute coryza in infants, even without any signs of syphilis on the body, is undoubtedly to be regarded as syphilitic, and a violent catarrhal reddening at the entrance to the pharynx, lasting over eight days, especially when it occurs in young adults and is accompanied by extreme pain without any apparent reason, should always excite a suspicion of lues.

Before long the pathologic appearances become unmistakable, the epithelium appears cloudy and macerated, the mucous membrane becomes slightly raised in more or less extensive areas, and the characteristic **papule**, which at first is distinguished from the surrounding tissue by its glistening surface and later becomes converted into a thick, white or yellowish-gray wheal, makes its appearance (Plate 10, Fig. 2). The favorite seat of the papule is the entrance to the pharynx; it is also observed quite frequently on the tongue, where it must be carefully looked for, and on the **inner surface** of the mucous membrane of the lips and cheeks. This secondary lesion, which is also known as a **mucous patch**, may in rare cases occur on the nasal mucous membrane, either on the septum or on the anterior portion of the floor of the nose; while a **broad condyloma** which represents an extreme hypertrophy of the papillary bodies sometimes occurs on the mucous membrane of the turbinates or in the nasopharynx in the form of a moderately raised growth resembling a cock's-comb, or at the entrance to the nose in the

form of a diffuse, dry, brownish-red, somewhat elevated infiltration surrounded by rhagades.

In the mouth and pharynx condylomata present themselves in the form of broad, more or less elevated, brownish-red or bluish elevations, with a shallow central depression and superficial ulceration (Plate 2, Fig. 1; Plate 17, Fig. 2).

The **course** of all these lesions is quite protracted. Several weeks at least are required for the occurrence of spontaneous involution, but a well-trained physician will hardly be inclined to wait for this to take place. The lesions may ulcerate and break down or even become gangrenous, owing, probably, to mixed infection, especially in anemic individuals.

The **diagnosis** in a well-marked case presents no difficulties; but in the early stage, when the disease is, as we know, extremely infectious, it is more difficult and all the more important. Attention has already been called to the disproportionate severity of the pain. In addition, all the lymph-glands in the corresponding region early become enlarged. The patient suffers from marked general malaise and may have slight fever; in women there is often a good deal of *falling out of the hair*. The diagnosis is established beyond a doubt by the presence or speedy development of the characteristic eruption or by the discovery of a freshly healed primary lesion. The patient's statements are of value only when they are positive—*quivis syphiliticus mendax*.

Treatment.—Local measures are required in addition to energetic mercurialization. Cauterization with chromic acid applied at the end of a probe and repeated at intervals of two to three days has been found extremely useful, both to allay the pain and to hasten involution. Condylomata in the nose may be treated with powdered calomel or with white precipitate ointment.

The tendency of the mucous patches to recur deserves special mention. This tendency is due to artificial irritation of the diseased mucous membrane, which for some

time continues to be extremely sensitive, by food, tobacco, or other irritating substances. It is not an indication to renew mercurial treatment, especially as mercurial stomatitis itself may produce circumscribed cloudy swelling of the epithelium. Under these circumstances an expectant policy and careful supervision are called for, and it is to be remembered also that any phenomena of this kind that are unduly prolonged must not at once be pronounced syphilitic. Superficial maceration of the mucous membrane from general pharyngostomatitis, especially when it is of the secondary character described, may occur whether the individual is clearly syphilitic or entirely innocent of luetic taint (see Plate 10, Fig. 1). The condition may be recognized by the entire absence of any tendency to undergo progressive alteration.

In contradistinction to the comparative frequency of these secondary phenomena, a **primary lesion** of the mucous membrane is extremely rare, as the infection, of course, usually gains entrance by way of the sexual organs. Nevertheless, chancres have been observed in every portion of the oropharynx and of the interior of the nose, and even in the inaccessible nasopharynx. The tonsils are most frequently attacked, as the open crypts are very accessible to infective material, transmitted by kissing, aspirated, or otherwise introduced into the mouth, such as by glassblowers' pipes, needles, and the like.

The **diagnosis** is very often delayed until the appearance of secondary symptoms direct the physician's attention to the original morbid process, which for weeks had escaped his notice. In some cases, however, when, as is the case in certain constitutions, the pain is marked, the physician's attention or even his suspicions may be awakened and led on the right track. The chancre is differentiated from secondary lesions by the distribution, which is generally **unilateral**, by the circumscribed, deep, and indurated (cartilaginous) infiltration and the thickened and elevated edges. No one can be blamed, however, for failing to

make the diagnosis before the outbreak of generalized syphilis.

The **treatment** of the lesion is purely symptomatic.

In the foregoing description only the diffuse, acute inflammations have been included. The special localizations of acute inflammation, especially in the accessory sinuses of the nose, are either so recondite or else their diagnosis and treatment are so nearly the same as those of chronic inflammations in the same regions, that for the sake of simplicity they will be discussed at the same time with the permanent affections of these regions.

CHRONIC INFLAMMATIONS.

Chronic inflammations of the upper mucous membranes either result from repeated acute attacks, or follow a single severe acute inflammation of excessively great virulence, which does not produce self-limited sequelæ, or, finally, they may result from the localization of the process in some region structurally unfavorable for recovery. Constantly acting injuries, such as decayed teeth, alcohol, tobacco, especially when chewed or taken in the form of snuff, occupational injuries, and irritation from flour, street-dust, cement, chromic acid, arsenic vapors, and the like, are all apt to produce chronic catarrh. The injurious effect of abnormal secretions from the nose and nasopharynx acting on the intermediate and deeper mucous membranes of the mouth and throat is also to be considered. This mode of origin is quite frequently overlooked, and accordingly all manner of treatment, including balneotherapy, is applied in vain. The anatomic basis of chronic inflammations is naturally as manifold as the complicated system of cavities and recesses itself.

In the **mouth** the tongue is found to be slightly coated and reddened at the margins. Owing to the swelling of the member, it shows numerous tooth-marks and small wounds inflicted during hasty mastication on account of

its thickened condition, which somewhat interferes with free movement. The gums frequently show alterations; there is a clouding of the epithelium, which later becomes swollen and livid from passive hyperemia. They push themselves into the interstices between the teeth, or, on the other hand, become retracted on the anterior surfaces so as partly to expose the roots (Plate 4, Fig. 2). Sometimes the mucous membrane becomes loosened, and **pyorrhœa alveolaris**, or suppuration from the covering of the roots of the teeth, results, with loosening and falling out of the teeth. These pathologic processes, however, always rest on some constitutional basis; they are observed in individuals weakened by protracted disease, overexertion, or privation, or suffering from some dyscrasic condition, such as diabetes, chronic nephritis, tabes, or grave gastric catarrh. It need hardly be mentioned that general stomatitis and pharyngitis are aggravated by extensive caries affecting the crowns and roots of teeth, nor can we sufficiently condemn the abominable practice followed by so many dentists of utilizing carious stumps for the foundation of a set of artificial teeth, which necessarily results in purulent and hypertrophic gingivitis and horrible fetor of the breath.

The mucous membrane of the cheeks also becomes involved; there is swelling, with whitish discoloration; opposite the molar teeth depressions are often observed, caused by the thickened mucosa forcing itself into the interstices of the teeth. The irritation produced in the various salivary glands manifests itself in ptyalism. When the ducts of the salivary glands are much involved, the secretion becomes more tenacious and is more slowly secreted; lime-salts are often produced, and are deposited in the gland-ducts in the form of **salivary calculi.**

The **pharynx** very frequently presents chronic hyperemia. The effect of hot and highly seasoned dishes, tobacco, and alcohol, which the more robust mucous membrane of the mouth is better able to resist, is greater in the pharynx, because these substances, in their passage to

the stomach or to the lung, are momentarily delayed. In addition, the injurious material from the nose tends to increase both the frequency and the severity of inflammatory processes in the pharynx, which become still further aggravated by the constant muscular strain incident to retching and clearing the throat after aspirating the contents of the nose and pharynx. It is, therefore, unusual to see an adult with a really normal pharynx. Slight swelling of the pillars of the fauces, with localized areas of intense redness on the posterior wall of the pharynx, are exceedingly common and do not necessarily produce any unpleasant symptoms. Dilatation of the veins is another condition that is commonly observed, especially when, as is usually the case in civilized human beings, there is more or less abdominal stasis due to delayed digestion, and when the individual is suffering from circulatory disease of the heart, cirrhosis of the liver, tumors, or any other condition that interferes with the circulation.

The lymph-follicles are involved in almost every case of chronic catarrh. There may be diffuse swelling, causing a velvety, mammillated appearance of the surface or a circumscribed hypertrophy on the posterior wall of the pharynx and on the pillars of the fauces (Plate 13, Fig. 1). The latter condition is known as **pharyngitis granulosa** or **lateralis hypertrophica.** These nodules, it is true, not infrequently represent the remains of lymphatic hyperplasia without any inflammatory basis, and may even be imbedded in an anemic mucous membrane.

Syphilis appears to have a special tendency to leave behind a chronic inflammation, which is preferably epithelial in character. It may take the place of the eruptions on the mucous membrane just referred to, or may present a more diffuse character, and is usually associated with atrophic processes in the connective tissue. Thus, opaque white patches often persist for years after secondary manifestations of the disease, and are not infrequently mistaken for mucous patches. In recently infected cases one sees the peculiar picture of **leukoplakia**

oris, which, however, is in part produced, or at least aggravated, by gastric catarrh, excessive smoking, and especially by secondary catarrh derived from the nose, to which is superadded the deleterious influence of the nasal secretion in purulent nasal affections. The last-mentioned causative factor acquires peculiar importance from the fact that it often suffices to produce and keep alive the somewhat rare affection under discussion, even when there has been no syphilitic infection. The disease chiefly attacks the anterior portions of the mouth. The margin and anterior half of the tongue and the mucous membrane of the lips and cheeks are covered with a coating of variable thickness and of a color that may be bluish-white, pure white, or somewhat yellowish, from the presence of food or hemorrhages. The coating consists in the main of hyperplasia and hyperkeratosis of the epithelium (Plate 6, Fig. 1). There are marked passive hyperemia and round-celled infiltration of the mucosa, indicating the presence of inflammatory irritation. Except for the production of painful fissures by the separation of the cornified layers, there are practically no subjective symptoms. The affection may assume a serious character, either in a psychic sense by producing a condition of syphilophobia, or, in a more practical sense, as the epithelial proliferation has a tendency to become atypical and degenerate into carcinoma.

A similar desquamation of the swollen epithelial covering is occasionally observed in the anterior portion of the septum in association with crust-formation within the nose. As this position favors drying out of the crusts, the latter become densely adherent, and by their pressure on the epithelium produce a superficial necrosis. The epithelium becomes loosened and forms a thin white membrane, which, after a time, can be removed with the forceps without producing a hemorrhage, leaving the mucosa exposed (Plate 27, Fig. 3).

This process would be observed more frequently, but the crusts are usually separated prematurely by scratching

and squeezing the nose, and the repeated traumatism and resulting suggillations eventually lead to ulceration and necrosis, even of the underlying cartilage, so that perforation ultimately remains. In itself this process is quite harmless, but it is annoying to the patient on account of the vicious circle established by the alternate removal and formation of the crusts. It is generally associated with obstruction of the nose and a feeling of tension, and, in addition, is not without significance on account of the danger of erysipelas and other infections. It may be mistaken for syphilis. The differential diagnosis must be based on the duration of the process, the typical position of the lesions within reach of the scratching finger, and the normal condition of the immediate surroundings. A failure to appreciate the purely traumatic origin of the process has led to the description of individual stages of it as "xanthosis"—that is, hemorrhagic infiltration or deposition of hemoglobin fragments, and as "perforating ulcer of the septum."

In the **nasopharynx** chronic catarrh is met as a constant concomitant of adenoid vegetations (see p. 149), even when the latter are of only moderate extent. The localization of these growths in the recesses of the nasopharynx is discussed on page 141. In most cases the diagnosis of nasal catarrh is quite proper, as in 90 out of 100 cases the accumulation of secretion or crusts in the nasopharynx is due to some nasal process (see Plate 22, Fig. 2; Plate 24, Fig. 2).

Chronic nasal catarrh always involves the erectile tissues, which readily respond to any form of irritation on account of their great reflex liability to dilatation. The hyperemia, especially when it affects the inferior turbinates, may at first escape the subject's notice for some time, because in mild cases the swelling, as a rule, alternates from one side to the other, permitting sufficient air to enter through the opposite side. During sleep, however, the amount of air usually proves insufficient, and mouth-breathing occurs, so that, on being questioned,

or sometimes of his own accord, the patient admits that he has a feeling of dryness in the throat in the morning. If the hyperemia persists, it soon degenerates into diffuse hyperplasia of all the various constituents of the mucous membrane or at least into hypertrophy of some of these constituents. The inferior turbinates, which are more frequently involved in the former case, present the same thickening as in simple hyperemia, with the difference that they do not shrink after the vascular engorgement has subsided. Hence cocain is used for purposes of differentiation. A 1 per cent. solution suffices to cause a simple hyperemia to disappear, and if, after its application, any thickening remains, especially if it is confined to circumscribed portions, such as the anterior or posterior extremity or the upper margin of the inferior turbinate, it is a sign of true hyperplasia.

The hyperplasia most frequently takes the form of smooth, round, club-shaped thickening of the extremities of the inferior turbinate, in which all the elements of the tissues except the epithelium participate (Plate 27, Fig. 1). Beginning proliferation of the latter manifests itself at first in the formation of wrinkles on the surface (Plate 28, Fig. 2), then in lobulation and papillary new growths (Plate 26, Fig. 1). The latter occupy preferably the posterior extremities of the inferior turbinates, where they often present a mulberry-like appearance, or they may be found on the anterior extremities, or on the middle turbinates (Plate 28, Fig. 2), and very rarely on the septum (Plate 27, Fig. 4) or on the floor of the nose.

The histologic classification of these growths depends on the preponderance of the individual tissue elements; thus, we speak of adenoma (Plate 35, Fig. 1); adenofibroma and angiofibroma (Plate 33, Fig. 1); papillary fibroma and fibro-epithelioma (Plate 39; Plate 40, Fig. 1); or, finally, cystadenoma when a gland has become occluded and converted into a cyst. It is an indication of the inflammatory origin of the process that it is invariably found attended with round-cell infiltration

about the glands and particularly about the vessels. The walls of the latter sometimes undergo eccentric proliferation and sometimes proliferate concentrically to such an extent as to produce local interference with the circulation and stagnation of the plasma and lymph (Plate 33, Fig. 2). It is the latter process that is especially concerned in the production of edematous fibromata, the so-called **mucous polypi** (Plate 26, Fig. 2; Plate 28, Fig. 1). These peculiar structures consist mainly of loose connective tissue infiltrated with serous fluid or distended to actual cyst-formation, containing both straight and elastic fibers and numerous inflammatory, hypertrophied, and even obliterated blood-vessels (Plate 33, Fig. 2). Clinically, they appear as smooth tumors ranging in color from grayish-yellow to pale pink. The tumors are usually discrete and very small, and are situated somewhere in the region of the middle nasal meatus. Not uncommonly, however, they appear in considerable and often incredible numbers, and attain a stupendous size, growing by a long pedicle from the middle and superior turbinates, or even from the interior of an accessory cavity, and projecting into the interior of the nose. The author has counted as many as 120 in a single nose, the largest of them weighing 28 grams. In exceptional cases they appear to develop spontaneously, and after their removal leave no alteration of the nasal cavity except a more or less extensive pressure atrophy of the internal nasal skeleton. In these cases, which almost always occur in persons of advanced age, there are, as a rule, large masses of polypi. On the other hand, in about 85 per cent. of all the cases, polypi are **symptomatic** in character and represent the product of some deeper inflammatory condition, which should, therefore, always be searched for in every case of polyp-formation. The persistence of the basal condition often explains the well-known tendency of these tumors to recur even after apparently radical extirpation—so much so that they are often regarded as incurable not only by the laity, but also by practitioners. It cannot

be said, however, that a basal inflammation is the sole cause. It often happens in chronic cases that polypi continue to make their appearance even after a thorough correction of, let us say, purulent catarrh of an accessory sinus, and it is not to be denied that there are many cases of recurring polypi without any focal suppuration. In both conditions the proliferation has extended to the periosteum and to the bone, or it began originally in these structures; and, in order to arrest the progress of the abnormal growth, it becomes necessary to remove these structures, although the original cause in both cases may already have been removed. Even in cases unassociated with focal suppuration the whole structure of the tumors indicates an inflammatory process; on the other hand, one should not go to the other extreme of making the general statement that all polypi grow from periosteum or take their origin in an inflammatory osteomyelitis. The latter condition is only occasionally found. It cannot in any sense be said to be the rule, and is more apt to be a sequel than the causal condition, a fact which is shown both by the negative histologic findings and by the circumstance that a number of cases of polypi associated with focal suppuration either disappear spontaneously or fail to return after the first removal, providing only the focal suppuration has been cured.

Another cause of recurrence is found in the circumstances already referred to, that the polypi that are visible in the nose have their roots in the mucous membrane or periosteum of the accessory sinuses. This is especially true in the case of the ethmoid cells, which are, relatively speaking, accessible, but it is also true to some extent of the other pneumatic spaces. The tumors growing in them are usually small and do not exceed in size the cavities themselves, especially the larger ones. These tumors are never seen except during an operation or at the autopsy.

A special feature of the mucous membrane lining the accessory cavities is the presence of cysts consisting

usually of serous effusions into the lymph-spaces, or, rarely, of a dilated gland-duct that has been constricted. The walls of these cysts are formed of an extremely thin layer of connective tissue covered with flat epithelial cells, and corresponding in every respect to the extremely delicate lining membrane of the cavities, which it is practically impossible to separate from the periosteum. Owing to the protected position of these cavities and the impossibility of their being affected by any external injuries, such as would utterly preclude the formation of similar structures within the nose, they occasionally attain a considerable size. In the antrum of Highmore the cystic change may lead to pressure-atrophy of the bone and bulging of the walls, a condition which has been described under the name of **hydrops of the antrum of Highmore.** The only mucous cysts found in the interior of the nose are included within tumors and are produced by dilatation of a gland (Plate 34) or by softening of edematous polypoid tissue. The contents of such cysts are of an amber color, and so tenacious that the distinction from polypi is extremely difficult, and in frozen sections quite impossible.

In marked contrast to these swellings and true tumor-formations produced by chronic inflammation are the **atrophic processes,** or, more correctly, *conditions* which rest on the same etiologic basis. These atrophic conditions are also met in the mouth. Abnormal dryness of the oral mucous membrane occurs not only from oral respiration, but also as the result of persistent, especially secondary, catarrh, and is then due to atrophy of the mucous and salivary glands, although the development of the condition, as in the case of dryness of the nasal and pharyngeal mucous membrane, presupposes an individual predisposition which rests on malnutrition of the mucous membrane, either congenital or acquired during childhood. The contraction of interstitial tissue observed in the catarrh of scarlet fever, and more especially in syphilis, including the hereditary forms, which so often

remain masked, and syphilis acquired in childhood, with its accompaniment of extensive vascular alterations, probably represent the chief structural foundation, while, on the other hand, the very common occurrence of "atrophies" in districts showing high percentage of rachitic individuals would tend to indicate that general nutritive disturbances also play an important part in the etiology. It follows that atrophic processes, which, in their early stages, manifest themselves by dryness of the mucous membrane, call for careful examination of the general condition. Latent **diabetes,** for instance, is very apt to give the first signs of its presence in this way.

Appearances indicative of atrophy in the mouth are not very conspicuous. In the pharynx, however, they are quite marked. The mucous membrane of the posterior wall of the pharynx presents pale, glistening, linear markings that reflect the light and are due to wrinkling of the attenuated mucosa. In the higher grades of atrophy the soft palate and uvula are greatly shrunken. But it is in the nose that the alterations due to atrophy are most conspicuous. In advanced cases the mucous membrane barely suffices to veil the skeleton. The outlines of the turbinates, which, under normal conditions, owing to the robust covering of erectile tissue, appear like thick, club-shaped bodies, contract to such an extent as to leave an unobstructed view from the inferior meatus as far as the nasopharynx; and, by looking along the middle turbinate, the otherwise invisible superior turbinate, and even the roof of the nose, is distinctly seen. The epithelium is also attacked by the atrophic process; the walls of the nose dry out, the juicy, cylindric cells become converted into flat, horny elements which slowly exfoliate and accumulate in several layers. In exposed areas, such as the angle of the mouth, the entrance to the nose, and the front of the septum, the brittle surface is frequently broken, fissures are produced, and become covered with tenacious, adherent crusts.

It follows, as a matter of course, that a mucous mem-

brane which has been altered pathologically will present **secretory anomalies.** Accordingly, chronic catarrh in the great majority of cases is characterized by quantitative and qualitative changes in the secretion. All gradations occur, ranging from fluid, almost watery, secretion or glairy and whitish-gray mucus that can be drawn into threads, to thick gray, grayish-yellow, greenish, and yellow lumps and purulent masses, both solid and liquid, either yellow or greenish-yellow in color. In addition, crusts of varying thickness and a great variety of discolorations from the admixture of blood are observed. When the secretion stagnates in the cavities of the nose, as happens in greatly dilated nasal chambers, horribly offensive crusts are produced, which have given the generic name of "**ozena**" to a great variety of clinical pictures.

Even in the earliest times, when only the most conspicuous nasal diseases were studied, the occurrence of excessive secretion in extreme cases, drenching the pillow night after night, and the phenomenon of a periodic cessation of secretion, followed by sudden renewed copious discharge, led investigators to examine into the *origin of the secretion*, and recently thinking physicians have settled this question for all time. It has been found that under all circumstances a rigid *distinction must be drawn between diffuse and nasal catarrh*, and on this distinction a rational therapeusis will depend. If abnormal secretion is to be combated, it is absolutely essential in the first place to know where it comes from, and it must be remembered that while the nose contains a large area of secreting mucous membrane, it also forms the drainage canal of a number of possible sources of secretion behind and around it. It is evident that an examination of these sources in every individual instance is impossible, and the physician will, therefore, ask himself whether he has to do with a diffuse or with a localized (focal) process.

A theoretic discussion of this question does not come within the scope of this volume, and the author will con-

fine himself to the enumeration of facts that rest on the basis of experience.

DIFFUSE FORMS.

Diffuse chronic secretions of the nose are extremely rare. Secretions containing cellular elements, or, in other words, consisting of any kind of pus, practically always emanate from certain definite regions, even when the discharge is small in amount, for the nasal mucous membrane in general possesses such perfect mechanical drainage, and is so freely exposed to desiccation by the air, that a generalized hypersecretion soon ceases of its own accord, except for residual processes in areas which are not accessible to the favorable healing factors referred to, where, accordingly, a focal inflammation remains as a residuum. Even an unmixed mucous secretion can become inspissated for any length of time only under certain conditions interfering with free escape of the fluid, as in hyperemia and hyperplasia of the turbinates and other similar conditions. There is only one form of hypersecretion—the unmixed watery variety, especially when it occurs paroxysmally—that is more often diffuse than localized, and even then diffuse only in the sense that it emanates from a large smooth surface, the superior nasal meatus, and that it does not become stagnant. In every case, therefore, it will be well to bear in mind the possibility of a focal origin.

FOCAL DISEASES.

NASOPHARYNX.

The *nasopharynx* is an exceedingly common source of secretion, or, to speak more precisely, hypersecretion is apt to develop in hypertrophy of the turbinates secondary to disease of the lymphatic ring. The secretion usually becomes visible on the floor of the nose in the form of thick clumps of mucus. Whenever these are found in a

nose otherwise free from secretion, posterior rhinoscopy should be at once performed, a step which, in fact, should never be neglected under any circumstances. If nothing is found on rhinoscopic examination, or if, after the naso-pharynx is cleared, the secretion continues, a fresh source must be looked for. Frequently the mucus, which is usually very tough and yellowish in color, drips down over the posterior wall of the pharynx, and in adults not rarely leads to secondary laryngeal affections. At the **entrance to the nose** secretion usually takes the form of crusts. It is only in exceptional cases that these crusts are due to inflammation localized at the site of their appearance. As a rule, the secretion has come from some point in the interior, and has been deposited in this situation, which is most favorable to desiccation, or else the inflammation of the follicles of the vibrissæ which has produced the crusts is kept alive by some more deeply seated suppurative process. Under any circumstances local treatment is necessary. The crusts are closely adherent and must be softened up by the introduction of a cotton-wound applicator saturated with liquid vaselin (see p. 46). Follicles that are infiltrated with pus, acne pustules, and furuncles, or deeper and more wide-spreading infiltrations, such as phlegmons, must be laid open. Eczema of the skin surrounding the vestibule must be, at least temporarily, cured by means of ointments which at the same time prevent reinfection from within. In children particularly, and usually also in adults, the most frequent cause is the presence of "adenoids" (see p. 147). As long as the causal maceration by the internal secretion continues, a return of the folliculitis must be prevented by the constant application of an ointment. A fresh attack may be aborted by the introduction of cotton pledgets saturated in a 2 per cent. solution of aluminium acetate; after that the deep source of the secretion, which is usually one of the smaller accessory sinuses, must be diligently looked for.

A rare cause of phlegmonous inflammation of the

anterior portion of the nose is disease of the roots of the incisors. The absence of folliculitis, which is the usual port of entry, and the fact that the inflammation is restricted to the mucous membrane at the entrance to the nose, should direct the attention to the possibility of this pathogenesis.

NASAL PASSAGES.

While the *nasal passages* very frequently serve merely as the receptacles for secretion which has its origin elsewhere, they may also be the primary seat of disease.

The **inferior meatus** collects the secretions of the **lacrimonasal duct** and of the **conjunctiva.** As, however, the latter organs are quite apt to become involved secondarily through the accumulation of a secretion in the inferior meatus and the propagation of an inflammation primary in that region, one is not justified in assuming the ocular condition to be primary unless distinct ocular disease can be demonstrated, and the boundaries of the inferior nasal meatus are not materially altered. The latter is almost always the case when large masses of mucopus, such as frequently accompany hyperplasia of the pharyngeal tonsils, are present. It is to be remembered that frequent as hyperplasia of the tonsils may be, consecutive swelling of the inferior turbinate is equally frequent; it may be so great as completely to obstruct the inferior meatus and thus lead to the production of copious secretion. The question whether this accumulation belongs to the meatus itself or has made its way forward from the nasopharynx is best decided by removing the tonsil and observing whether the process continues or becomes arrested. It is true that in the former event the secretion may come from one of the accessory sinuses, especially the antrum; while this is rare in children, it has been repeatedly observed. If the discharge is confined to one side, its origin from the antrum is practically certain, and even when it is bilateral, that possibility is not to be excluded *à priori.* But in the great majority of cases of this kind one has to

deal with a simple catarrh of the nasal meatus, which soon disappears if the secretion is systematically removed by spraying and proper cleansing of the nose, or at least after the swollen and hypertrophied portions have been made to shrink.

In adults not affected with nasopharyngeal disease the conditions are directly opposite. It is quite common to find secretion only in the inferior meatus, but in such a case one should carefully avoid making a hasty diagnosis of inflammation of the nasal meatus. Secretions derived from the antrum and sphenoid sinus are very apt to appear on the floor of the nose, that from the antrum being usually more purulent, more profuse, and in large coherent masses; while that from the sphenoid sinus is more scanty and evinces a greater tendency to dry out. The former extends in a broad, invisible layer over the upper and median surface of the inferior turbinate; the latter flows along the septum to the floor of the nose. The differential diagnosis will be materially facilitated by obstructing the suspected source of the discharge (see p. 38). A secretion coming from one of the accessory sinuses, as long as it remains fluid, is usually much more copious than that which is formed in the nasal meatus and the hypertrophies which accompany or cause the latter, unless there is a diffuse hyperemia of the erectile tissue, are found only at the anterior extremity of the inferior turbinate. That portion of the turbinate may be enlarged to such an extent as to lead to the formation of a deep recess behind it, which can be exposed only by removing the extremity of the bone after the method used in amputating the middle turbinate (see p. 50). This condition, it is true, is quite rare, and it may be incidentally remarked that the practice which has recently become popular of amputating half or all of the inferior turbinate rests on a purely esthetic foundation.

Caries of neighboring teeth, even without retention, sometimes leads to chronic irritation and hypersecretion of the mucous membrane. Easy as it is to remove the

cause when it is found, it is equally easy to overlook it in the first place.

Subjective **symptoms** are rarely marked in diseases of the inferior meatus, although drawing pains in the jaw and frontal headache sometimes occur.

They are, on the other hand, quite marked in the rather rare chronic inflammations of the **middle** and **superior meati.** In these conditions the discharge flows down the median surface of the middle turbinate. Inflammation of the middle and inferior meatus is usually due to an acute catarrh becoming chronic on account of permanent hypertrophy producing retention. Like inflammation of the accessory sinuses, it is characterized by the occurrence of dryness, alternating with the sudden discharge of relatively large quantities of secretion—relatively, we say, for here also the secretion is always much less in quantity than one emanating from accessory sinuses. In making the diagnosis the pneumatic spaces must first be excluded, since the middle and inferior meati communicate with all of them. In some cases a positive diagnosis can be made later on only by observing that the discharge, which in these cases is always purulent, not mucous, heals without local treatment directed to the accessory sinuses. Stagnation of the secretion in the comparatively small spaces always produces a severe irritation of the mucous membrane, with intense migration of leukocytes. Erosions and ulcers from the pressure of neighboring structures may even invade the bone.

In the middle and superior meatus, the favorite seats are the small depressions in front, between the outer wall of the nose (lamina papyracea or os planum) and septum, and a little further back, below the bend of the middle turbinate or between the latter and the upper turbinate, especially when the extremities of the turbinates are thickened (Plate 29, Fig. 2). These recesses between the middle and upper turbinates may also be produced secondarily, and then become an even more violent source of irritation. As the suppurative processes in the meatus

are kept up solely by the retention of the secretions, the parts must be laid wide open to bring about a cure. Owing to the small dimensions of the spaces, the removal of hypertrophies rarely suffices, and in most cases amputation of the anterior extremity of the middle turbinate (see p. 50) is indicated.

DISEASES OF THE ANTRUM OF HIGHMORE.

Of the accessory cavities, the antrum of Highmore is more frequently involved than any other. The current conception of "empyema of the antrum of Highmore" as a rare and severe disease is altogether erroneous; as a matter of fact, it is highly probable that the antrum becomes involved in any violent acute catarrh. It is not to be supposed that every pain radiating to the teeth or to the forehead is to be referred to these cavities, but the presence of swelling of the infra-orbital soft parts, coupled with periodic profuse discharge of pus, should never fail to direct the diagnostician's attention to them. The diagnosis can, however, be positively established only by exploratory puncture, owing to the swelling and consequent difficulty of obtaining a view of the interior of the cavity. Unless the pus comes from a dental ulcer, simple irrigation, which may be performed immediately after the exploratory puncture, will be all the treatment required. If this fails to bring about a cure, all the measures indicated in chronic inflammations must be tried. In this connection we must once more emphasize what has already been said, namely, that the antrum of Highmore is in all probability the seat of a chronic pathologic process more often than any other part of the body, and this statement is borne out by the great number of autopsies in which the antrum is found to be involved. It also proves that antrum disease, in the great majority of cases, is a benign process, and that, as a matter of fact, it is present in all the cases that are currently diagnosed as chronic nasal catarrh.

As has been remarked on p. 91, persistent hypersecretion practically always has its origin in circumscribed spaces, and it may here be added that such spaces are principally found in the antrum of Highmore, especially when the suspicious material consists mainly of mucus. It is not improbable that the tenacious masses of mucopus, which many persons laboriously expel on rising in the morning by aspirating them through the nose and finally forcing them through under the soft palate, are derived from the antrum of Highmore.

Approximately the same is true of hypertrophic conditions in the turbinates. Both chronic hyperemia and true hyperplasia of the inferior turbinates are very often due to catarrh of the antrum of Highmore; recurring conditions of this kind are practically always due to this cause. A permanent thickening of the median border of the upper surface of the lower turbinate, which is much more common than the hyperplasia of the lower lip of the hiatus maxillaris, also known as the lateral fold, and which occurs only in suppurative processes, is absolutely pathognomonic (Plate 27, Fig. 5).

Cases characterized by the discharge of yellowish-green masses of mucus, gradually changing to a copious watery, fetid pus, are rare compared with cases of more distinctly mucous catarrh, but the natural conclusion that these severer forms of inflammation must necessarily produce more intense symptoms is quite erroneous. Profuse fetid discharge may exist without pain or other subjective symptoms, while, on the other hand, the entire congeries of nasal symptoms described on p. 24 may be complained of in cases in which the catarrh is so inconspicuous that the patients themselves often deny its existence. Without pretending to draw a hard-and-fast line between the various forms and degrees of hypersecretion, it is advisable to distinguish between catarrhs characterized by the discharge of pure mucus, mucopus, an admixture in which pus predominates over the mucus, and pure pus. The second and third forms are the most frequent. The term

empyema should be reserved for a collection of pus within a closed cavity, a pathologic condition that is extremely rare. The secondary phenomena observed in the nose, especially in the inferior turbinate, have already been mentioned. In addition the middle turbinate, which forms the upper boundary of the hiatus, is frequently involved. Hyperplasia of the mucous membrane and even true polypus formation are observed quite frequently. Occasionally ulceration of the inferior lip or of the lateral wall of the middle turbinate, extending as far as the bone, occurs as a result of erosion or infection of the tissues.

The lining mucous membrane of the antrum invariably undergoes certain alterations. At first it becomes inflamed and thickened to a greater or less degree; subsequently the membrane becomes edematous, and small polypi are formed which occasionally attain such a size or become so numerous as completely to fill the cavity. Cysts are also quite frequently produced. Before the days of rational nasal therapeutics these cysts would assume such dimensions that they finally caused the anterior or inferior wall to soften and bulge, and this condition was known as "**hydrops of the antrum of Highmore.**" The bulging wall of bone, under certain circumstances, becomes greatly attenuated and transmits to the palpating finger a feeling like the crackling of parchment. This condition may be confounded with true maxillary cysts, usually of dental origin, and the error cannot always be avoided before operation, when the true condition of affairs will be revealed.

Destructive changes are also observed in the inner membrane as the result of protracted suppuration. Ulcers of the mucous membrane and of the bone, and even complete necrosis of portions of the wall, are sometimes found when the cavity is opened.

The **diagnosis** of catarrh of the antrum of Highmore rests, in the first place, on the presence of abnormal secretion. Its possibility must be borne in mind whenever mucus or other similar material is found on the floor of

the nose. The presence of such matters in the middle meatus, especially if they are purulent, is extremely suspicious. If pus continues to be poured out after the spot has been carefully cleansed, suspicion is practically converted into a certainty. The only other cavities that empty in this region are the frontal sinus and a few of the median ethmoid cells. The mouth of the former lies more anteriorly ; that of the latter, nearer the median line. Absolute certainty is secured by performing an exploratory puncture, followed by insufflation or irrigation (see p. 37). If the secretion is scanty, a preliminary packing for the purpose of allowing the secretion to accumulate is indicated (p. 38). A pledget of cotton of suitable size is thrust as far back as possible into the middle meatus, and, if the frontal sinus as a possible source of the secretion is to be excluded, a second pledget is applied in front of the hiatus semilunaris. The distribution of the accumulated secretion on the tampon sometimes suffices to indicate its origin, but in any case exploratory puncture may be expected to yield positive information. In suspicious cases a negative result from exploratory puncture is not sufficient, for the cavity may continue to secrete, and yet, owing to the presence of free drainage, it may contain little or no secretion. In two or three cases the author has been obliged to repeat exploratory puncture after a somewhat doubtful result, in order to obtain a clear conception of the state of affairs.

It is exceptional that the cavity is so full that the withdrawal of the stilet from the trocar is immediately followed by a flow of pus. On the other hand, it sometimes happens that a light or amber-colored serous exudate escapes in this way, drop by drop, or in somewhat larger quantities, especially after insufflation through the trocar. Such an event points positively to the existence of cysts in the cavity, and accordingly adds to the gravity of the prognosis as regards recovery.

It is, however, to be remarked that this drastic procedure is necessary only when the subjective symptoms

are intense. In a great number of doubtful cases the procedure may be quite safely neglected, even if the diagnosis is not absolutely assured, because both the amount of trouble on the part of the physician and the discomfort to the patient are out of all proportion to the gravity of the disease, nor, as a matter of course, will the question of operative interference have to be considered in such cases. It may, however, be remarked that the great frequency of inflammation of the antrum of Highmore, which naturally follows from the anatomic position of the cavities, rendering them liable to infection by the extension of a process from the inferior turbinate and favoring the isolation of the morbid process within them by the swelling of the surrounding tissues and by the high position of the orifice above the floor of the cavity, is enhanced by the proximity of organs like the teeth that are so exceedingly prone to become diseased. The openings of the other accessory sinuses lie approximately at the lowest point of the cavity. Accordingly, infection of the antrum of Highmore, derived from the diseased pulp by way of the lymph-channels, and catarrhal conditions due to the irritation accompanying coronal caries, are quite common, and, inversely, catarrh of the antrum may give rise to periodontitis at the root of a tooth, and thus establishes a vicious circle, so that the antrum disease persists even after other causes have been removed.

In all such cases the first thing to be done is to extract the suspicious tooth or teeth, nor should it be delayed until the diagnosis has been confirmed by an exploratory puncture. In this way the author has seen many an obstinate catarrh of the cavity subside in a short time without direct treatment. The conditions are different, however, in all purulent forms of antrum disease, and, in fact, in all conditions accompanied by marked subjective symptoms.

The alveoli of the second bicuspid and first molar teeth are immediately contiguous to the floor of the antrum (see Fig. 3), while the cavity cannot be reached at all or

only with great difficulty by way of the first bicuspid or the second molar. If one of these teeth is diseased or lost, the cavity can be entered through its alveolus. By

FIG. 14.

means of the instrument here depicted (Fig. 14), which has an oblique cutting-edge, the intervening layer of bone can be perforated with great ease. The opening should

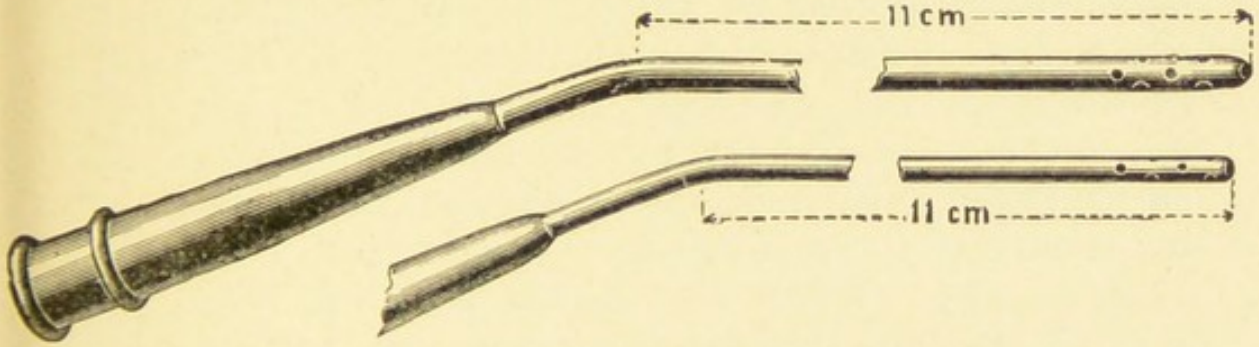

FIG. 15.—Irrigating cannula for the sphenoid sinus.

be packed with iodoform gauze for a day or two, and after that requires no further treatment. Through the opening a cannula (Fig. 16) is introduced, which is attached by

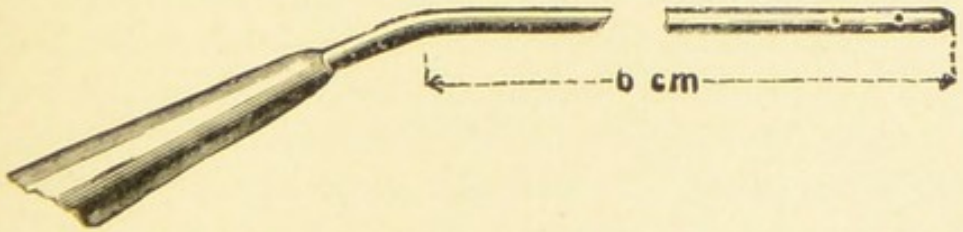

FIG. 16.—Irrigating cannula for the antrum of Highmore.

its anterior extremity to a rubber tube communicating with a bulb. With this instrument the patient is directed to inject a lukewarm aseptic alcoholic solution two or three times a day.

This mild procedure will be successful only when the normal cavity has not undergone extensive alterations. If there is reason to believe that such alterations have taken place, as in the case of purulent catarrh without disease of the teeth, polypus formation in the nose or after a long-continued mucopurulent secretion, or if cysts or the presence of polypi are directly discovered, or if, finally, irrigation through the alveolus produces no improvement after two or three weeks, the cavity must be *laid open*. This operation requires a general anesthetic.

FIG. 18.

The trunk should be slightly elevated. After the gums have been painted with a 10 per cent. solution of cocain a large plug is pushed between the teeth and the cheeks, behind the field of operation, which is finally cleared for action by means of the mouth-gag (Fig. 4, p. 32).

FIG. 17.

When the patient is completely anesthetized, the fold of mucous membrane produced above the second bicuspid by drawing the upper lip upward is divided with the scissors along with the periosteum, and the latter is pushed backward and upward with an elevator, after which a double retractor with very long hooks (Fig. 17) is inserted. The unusual length of the hooks is necessary to include the thick upper lip. The anterior wall of the cavity is now laid bare by means of a chisel with an oblique cutting-edge (Fig. 18), which readily penetrates the bone. A quadrangular piece is chiseled out of the wall, the chisel being successively removed and reapplied, and the excised section of bone is then removed with a sharp forceps. No great harm is done if, as often hap-

pens, the section of bone falls into the cavity, as it will be brought out later with the packing, or, if necessary, can be extracted under direct illumination. After packing the cavity for a short time to control hemorrhage, an attempt is made to obtain a view of the interior, or, if that is impossible, to determine the nature of its contents by means of a probe. Polypi or granulations are removed with a snare, a forceps, or a sharp spoon. Disintegrated mucous membrane and exposed carious portions of bone, which are frequently found at the inner lower wall, are then curetted away. The entire cavity is then rapidly packed with narrow strips of iodoform gauze from 1 to 1.5 meters in length, filling the entire space as far as the opening in the bone.

The flap of periosteum and mucous membrane is then released from the retractor and freed by means of two vertical incisions running upward from each angle of the wound, rendering the flap freely movable from side to side. It is then fixed to the upper margin of the bone by means of another tampon consisting of a short strip of nosophen gauze, and a third thin strip of gauze is lightly packed into the pocket formed by the mucous membrane in the posterior angle of the wound. After two or three days the first packing, that which was introduced into the cavity, is removed altogether. The external strips of gauze may, if necessary, be changed earlier, at which time the interior of the cavity is inspected with a head-mirror so as to remove any foreign material remaining, such as polypi, splinters of bones, and the like. After the flap of mucous membrane has become adherent at the upper edge of the opening the subsequent treatment, consisting in irrigation performed two or three times a day, as described above, may be intrusted to the patient. In the author's experience the duration is not in the least affected by any internal medication, even in the most protracted cases. In the severest cases, with complete degeneration of the mucous membrane, full recovery cannot, as a rule, be expected until the volume of the cavity has been re-

duced to its minimum; while in milder cases, especially when the discharge consists simply of fetid pus, the suppuration ceases sometimes in one or two weeks, or at least in from one to three months.

Radical operation is indicated only when the orifice is situated so high that the irrigating fluid cannot return, or when extensive destruction of the bone has taken place. In this operation a wide opening is made in the anterior wall of the cavity, and, in addition, the inner wall, which communicates with the nose, is chiseled away. The nasal mucous membrane is then reflected into this opening so that a permanent broad communication is established between the antrum and the inferior meatus of the nose. The packing is then introduced through the nose and allowed to remain in place until the mucous membrane flap has become adherent.

DISEASES OF THE ETHMOID CELLS.

Disease of the *ethmoid cells* occurs usually in the course of some general infection, most frequently influenza. The secretion is practically always purulent, because it requires a high degree of inflammation to overcome the natural tendency to recovery which is afforded by the favorable anatomic conditions, the orifices of the cells being wide and situated at the lowest point of the cavities. For pus to accumulate, the tissues about the orifice must become swollen or the mucous membrane must undergo proliferation. In the **acute stage** normal drainage may be anticipated by cautious probing of the middle or superior nasal meatus, but it is not justifiable to attempt to effect an entrance into the cells themselves.

Chronic suppuration is usually accompanied by violent subjective symptoms which become aggravated when the secretion is dammed up, so that painless intervals generally coincide with profuse discharge. The secretion may be quite copious, but, as a rule, it is moderate only in quantity. In many cases the lacrimal

bone is sensitive to pressure. Not so very rarely the relatively small and hidden openings become closed, the secretion accumulates, and a true (closed) empyema develops. The delicate walls of bone suffer distention and soon break down, forming a large cavity. If this cavity extends toward the exterior, a bulging is produced at the inner canthus of the eye, and the globe is displaced outward; occasionally an **orbital abscess** develops.

Small circumscribed collections of mucus are known as **bone cysts;** they are cyst-like dilatations with thin bony walls in the middle turbinate, and contain either pus or a thick, tenacious mucus suggesting polypous material. In the latter case it is justifiable to assume that a mucous cyst has gradually enlarged to the point of completely filling the cavity and distending the bones, for in these sinuses also cysts and small polypi of the mucous membrane are quite common. Indeed, the extraordinary high percentage of ethmoid suppurations accompanied by intranasal polypi makes it probable that the great number of small intracellular tumors of this kind escape observation. Suppuration of the ethmoid cells as an isolated affection is not very common; it is much more often a concomitant of inflammations in the antrum or frontal sinus; hence the differential diagnosis is apt to be difficult.

The **nasal picture** in severe cases is fairly characteristic, consisting chiefly of alteration in the outline of the middle turbinate, which in a sense is a mere appendix of the labyrinth. The anterior extremity is converted into an irregular mass by the thickening of the mucous membrane and the enlargement of the bone;, later it may present fragmentation, or the extremity may be brittle and in places deficient if the bone becomes softened or carious. Occasionally the bone presents a hideous aspect from the presence of large and small polypi, a quantity of oozing pus, and extensive areas of granular mucous membrane. Cleavage of the turbinate, producing a bifid effect in the anterior extremity, has also been observed.

The **diagnosis** is made partly by the characteristic

appearance of the general picture and partly by the results of probing, by which it is determined whether the pus emanates from bone cavities at the upper portion of the middle turbinate, and, if so, from which of these cavities. The anterior and median cells empty into the middle meatus, and are, therefore, explored through this structure; the posterior cells are reached through the upper meatus—that is to say, by introducing the probe to the median side of the middle turbinate. Abnormal communications may, however, be established by perforation of the thin bony walls.

As the antrum and the frontal sinus also empty in the middle meatus, the presence of suppuration from one of these cavities must first be excluded, or, if such a condition is present, the cavities must first be evacuated to guard against error in diagnosis—that is to say, in the case of the antrum exploratory puncture followed by irrigation, and in the case of the frontal sinus irrigation through the frontal orifice, must be performed. It is true that this is easier in theory than in practice, particularly in the case of the frontal sinus, which it is often impossible to keep free from secretion without an operation, and, on the other hand, the most anterior of the ethmoid cells, owing to its high position and great size, is very apt to be mistaken for the frontal sinus. But as in such a case both cavities are practically always involved, the failure to establish an accurate diagnosis does no practical harm. On the contrary, one is more apt to err in the direction of too accurate localization, since enlargement of the middle turbinate stands in the way of recovery in the case of any disease of an accessory cavity, whether it be contiguous to the middle turbinate or not.

Suppuration in the posterior cells may easily be mistaken for inflammation of the sphenoid sinus. Although the latter cavity can be identified by means of the probe without any special difficulty, the middle turbinate may be in such close contact with the septum as to make it absolutely impossible to determine by inspection from

which of these two cavities the pus is coming. In such a case, and in fact in all doubtful cases, *amputation of the anterior extremity* or *of the entire middle turbinate* should be performed (see p. 51), the more unhesitatingly as the operation is equally necessary from a therapeutic point

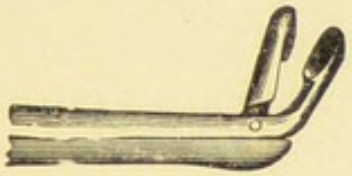

FIG. 19.

of view. Both the ethmoid cells and the orifice of the sphenoid sinus are then freely exposed to view (Plate 28, Fig. 4).

In addition to the exposure of these structures, removal of the anterior and inferior walls of the diseased cells is required so as to preclude the possibility of pus-retention. The best instruments for this purpose are bone-forceps that cut from before backward like the instrument illustrated in Fig. 19, and the sharp spoon. In almost every case this intranasal operation will be found sufficient; if the conditions are unusually difficult, the following *external operation* will become necessary.

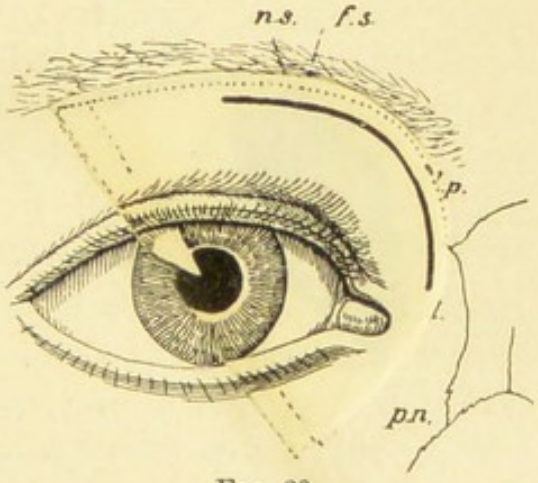

FIG. 20.

A curved incision is carried immediately below and parallel with the eyebrow, beginning about the middle of its course and extending to the root of the nose. From this point the incision is continued downward to the distance of half the length of the nasal bone, and terminated at the inner canthus of the eye (Fig. 20). The vertical

portion of the incision, which should divide both skin and periosteum, corresponds exactly with the nasal boundary of the orbit. In dividing the periosteum the supra-orbital nerve (*n. s.*), which runs underneath the periosteum within the orbit, should be avoided. After it has been exposed it may be necessary to thrust it aside so as to guard against its being injured later on in the operation. To do this the bridge of bone forming the upper boundary of the supra-orbital foramen (*f. s.*), is carefully chiseled through, or, if the supra-orbital notch is not bridged over, the covering strand of connective tissue is divided, whereupon the nerve can readily be pushed aside after the periosteum has been stripped back. The entire flap, including the periosteum, is then reflected downward with an elevator. As the only vessels divided by the incision are the cutaneous vessels, the operation is practically bloodless, and a large portion of the inner wall of the orbit will be exposed (*lp.*, lamina papyracea ; *L*, reflected flap). The most accessible structure is the lacrimal bone (*l*). This is chiseled through in a direction inward and downward or backward, and the labyrinth of the ethmoid is thus reached. The illustration shows portions of the bone that are not exposed by the incision. These are the ascending nasal process of the superior maxilla (*p. n.*), the suture between this and the nasal bone, and the suture between these two bones and the nasal process of the frontal bone. They have been dissected out partly to make the anatomic relations clearer and partly to show that the frontal sinus can also be reached by means of this incision.

There is no danger whatever of injuring the lacrimal organs in this operation.

If the frontal sinus is also involved, the operation may be performed immediately after the frontal sinus has been opened.

It may be worth mentioning that suppurations of the ethmoid cells occur symptomatically after diseases affecting neighboring structures. Thus the ethmoid cells may represent the outlet of an orbital abscess, or of suppuration

of the frontal sinus, of empyema of the sphenoid sinus, or of abscesses in the frontal or even in the temporal lobe, the latter of otitic origin. It follows, therefore, that any disease occurring in this region requires careful supervision and accurate weighing of the symptoms.

DISEASES OF THE SPHENOID SINUS.

In the *sphenoid sinus* the conditions are much more simple. Normally, this cavity possesses a single opening, situated between the middle or superior turbinate and the septum. Large as this cavity appears in the skeleton, it may be very small in the living subject, because the delicate lining membrane covers in the greater portion of the anterior boundary where the bone is deficient and, unfortunately, the lower part more than the upper. Accordingly, inflammatory swelling of the mucous membrane facilitates retention of the secretions.

Acute inflammation of the sphenoid sinus is probably more frequent than is generally supposed, being masked by the picture of violent coryza with severe headache, or perhaps delirium and vertigo. The condition tends to spontaneous recovery, and requires surgical intervention by probing the orifice only in extreme cases.

If, however, a **chronic catarrh** or **suppuration** develops, the prognosis is more grave, chiefly on account of the greater anatomic alterations. The usual hypertrophic and atrophic changes that affect the lining membranes are observed also in this sinus, while caries and perforations are not so very rare. As the pus is apt to be scanty, it tends to become inspissated, and is, therefore, frequently seen in the form of crusts, especially at the posterior border of the vomer, the posterior surface of the soft palate, and the posterior regions of the floor of the nose (Plate 22, Fig. 2). It may, however, flow down along the median surface of the middle turbinate and make its appearance at the septum. Since suppuration in the sphenoid sinus in the majority of instances is asso-

ciated with a similar process in other accessory cavities, especially the ethmoid cells, the secretion alone cannot be utilized in the diagnosis. Pus must be demonstrated within the cavity itself, because a secretion appearing at the same point may be derived from the posterior ethmoid cells, or the spheno-ethmoid recess (see Fig. 2, p. 10).

The **symptoms** of suppuration of the sphenoid sinus do not, on the whole, differ greatly from those observed in similar disease of other cavities. Severe headache may or may not be present; vertex headache and vertigo are more or less suspicious. In the severest cases irritative symptoms in the domain of the sphenopalatine ganglion and in the distribution of the optic nerve, including optic neuritis and atrophy, have occurred. A thickening of the upper portion of the septum should direct the attention to the sphenoid sinus. This is practically the only intranasal secondary phenomenon that is observed. It follows that the **diagnosis** must be based chiefly on direct examination of the sinus.

The cavity may be identified with the aid of a sound introduced along the septum opposite the middle turbinate. In this direction the posterior wall of the cavity lies at an average distance of 8.2 cm. in men, and 7.6 cm. in women, from the line of junction between the septum and the upper lip. As the entrance to the cavity is usually placed a little to one side of the median line, the probe should be bent slightly outward at a short distance from its upper extremity. The fact that the probe has entered the cavity is definitely determined by the instrument catching when it is depressed. If it had entered the recess, it would glide downward in an oblique direction. So far all that has been learned is that the probe is within the cavity, and unless the instrument at once comes upon rough or exposed bone, determined by the ringing sound which is produced, or a distinct thickening of the mucous membrane can be made out, it will be necessary to demonstrate the presence of secretion within the cavity. Sometimes the secretion flows along the probe so as to be

directly seen; if not, a cannula (Fig. 15, p. 101) must be introduced and the cavity irrigated while the patient bends the head well over. If secretion is present, it will be directly evacuated by this procedure.

The **treatment** of chronic inflammation of the sphenoid sinus should include more radical measures than mere irrigation. The only hope of success lies in thoroughly exposing the cavity by removing the anterior wall, and, if possible, the floor of the cavity. In attacking the floor there is no danger of doing any injury, and the bone may be confidently scraped away with a small, sharp spoon (Fig. 13, *b*, p. 52) or clipped away with bone-forceps (Fig. 21). It goes without saying that if the middle

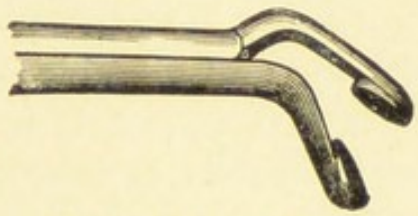

FIG. 21.—Bone-forceps.

meatus is much in the way, it must first be removed; but in a good many cases this preliminary operation is unnecessary. To expose the cavity from without through the labyrinth of the ethmoid is absolutely unnecessary, since it can be made sufficiently accessible through the nose without inflicting the same amount of damage (Plate 28, Fig. 4).

DISEASES OF THE FRONTAL SINUS.

Although the practising physician frequently thinks of **suppuration from the frontal sinus,** the condition, as a matter of fact, is extremely rare, and frontal headache is as common as it is diagnostically unimportant in suppurations from the nose. The cavity has a broad and deep outlet, and is, therefore, little prone to become diseased, but, on the other hand, spontaneous recovery is little likely to take place, as the sinus frequently has a

number of deep recesses which extend below the level of the internal orifice, and when the outlet has once become obstructed, the obstruction is with difficulty removed. Besides, the frontal sinus, even more than the sphenoid sinus and the antrum of Highmore, represents the prototype of a "rigid cavity," the great resistance of which to mild therapeutic measures every surgeon knows to his cost. It is significant of the resistance ("Beharrungsvermögen") of these cavities that free communications have been found between a suppurating cavity and an adjacent healthy cavity in the form of congenital defects in the separating wall, and that in most cases only one cavity is found diseased.

Usually, not to say invariably, suppuration of the frontal sinus is complicated by suppuration of other cavities in the ethmoid bone and in the upper maxilla. The anterior portion of the labyrinth may, indeed, be said to constitute a kind of vestibule for these cavities, and the infundibulum frequently opens freely in the direction of the maxillary orifice, so that the pus in such cases directly enters the antrum. But the principal reason probably is that an infection severe enough to overcome the resistance of the frontal sinus finds no difficulty in attacking the remaining sinuses, which are much less resistant to disease.

It is easier to exclude the existence of suppuration in this region than to establish its presence. The former can be done with certainty if the anterior cleft of the nose —that is, the space between the septum, the anterior extremity of the middle turbinate, and the outer wall of the nose, represented by the nasal process of the upper maxilla—immediately comes into view posteriorly when the middle meatus has been dammed up. It becomes positively easy if the orifice of the frontal meatus can be directly seen. Unfortunately, the discovery of pus deposited at or flowing down toward this point may be derived from the anterior ethmoid cells or even from regions situated still further back, such as the antrum of

Highmore, if the middle turbinate is in close apposition to the septum in such a way as to form a capillary space through which the pus rises to the surface.

Absolutely characteristic **symptoms** are rarely present. Personally, the author has often observed occipital headache in this very condition. Sensitiveness to pressure about the supra-orbital foramen may be present also in antrum disease, and pain elicited by pressure or percussion of the anterior wall of the cavity occurs only in extreme cases. Owing to the extraordinary diversity of the anatomic relations, the variations in the thickness of the boundary walls, which range from the thickness of paper to nearly 1 cm., and the variations in the size of the cavities from that of a walnut down to complete obliteration, transillumination is absolutely useless. Hence the **diagnosis**, when the suspicion has once been aroused by the constant collection of pus in the most anterior portions of the nose, must be determined ultimately by the direct demonstration of secretion within the cavity. As has been said, the cavity is identified with the aid of the probe. At a point 3 to 4 cm. from its anterior extremity the probe is bent over to form a quadrant of a circle, and introduced into the previously cocainized infundibulum or through the frontal orifice, if it is visible, and gently pushed upward and forward. By this method the cavity may possibly be reached in about one-third of the cases, depending on the length of the portion introduced in relation to the external measurements. It is not, by any means, impossible for the probe to deviate into the ethmoid bulla (largest ethmoid cell). In doubtful cases the position of the probe may be accurately determined by means of Röntgen-ray illumination. If, after the probe has been introduced, pus is seen to flow down along its side, the diagnosis is assured. If it is impossible to effect an entrance, a frontal sinus cannula (Fig. 22) is introduced into the infundibulum or into the ostium, and air insufflated under illumination. If any secretion is present, it will be brought to light by this procedure.

To make sure that the secretion comes from the sinus, a cold 1 per cent. solution of carbolic acid may be injected. If the patient is positive that he feels this solution above the eyebrows, the operator may be sure that he has reached the cavity.

Another diagnostic aid, especially useful in excluding an accompanying suppuration from the antrum, is found in observing that after the middle meatus has been carefully cleansed mucus instead of the pus that has been removed flows down from above. This mucus represents a recent secretion, since the purulent character develops only after the secretion has remained within the cavity for some time. Hence if the ethmoid bone has been excluded, such secretion can come only from the frontal sinus.

If the entrance to the sinus is greatly contracted, or if the clinical picture is complicated by suppurations in other accessory sinuses, a positive diagnosis *per vias naturales* may be absolutely impossible. If the suspicion based on the symptoms is sufficiently strong and the patient's condition becomes alarming enough to demand a decision, the question of exploratory opening of the cavity by means of an external incision may be considered. The attempt to break through the floor from the nose and enter the cavity in this way cannot be too severely condemned. An additional advantage of the external incision is that, if the results are positive, it may be followed immediately by operation. The operation is performed as follows:

A vertical incision is made coinciding exactly with the fold in the skin formed by the corrugator supercilii, which is very near the median line. The incision need not be longer than this fold, or, in other words, about $1\frac{1}{2}$ cm. in length. If the skin is free from wrinkles, the incision may be carried along the upper border of the eyebrow and parallel with it. After the periosteum has been stripped back, the bone is cautiously chiseled away in the median line until the operator is certain that he has reached the cavity. The investing mucous membrane is more

delicate than the dura mater, and can be more readily pushed back, although it also manifests pulsation. With the aid of the probe the operator then determines surrounding anatomic relations, and assures himself that the sinus of the other side has not been opened, an accident that is quite possible on account of the variable position of the dividing wall between the two cavities. If the probe passes freely into the nose or meets only with the resistance of alterations in the soft parts, it will suffice to enlarge the opening enough to permit palpation of all the pockets of the cavity. Hypertrophied tissue and diseased portions of bone are then removed with a sharp spoon or with a

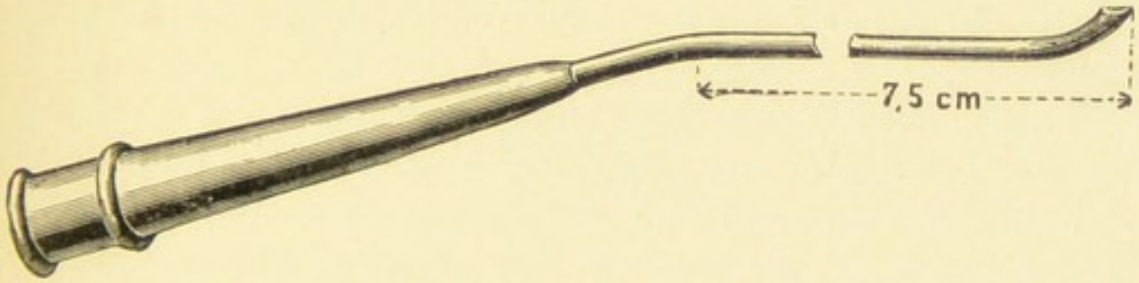

FIG. 22.—Frontal sinus cannula.

bone-forceps. If the hemorrhage is marked, the outlet of the cavity must be temporarily packed to prevent entrance of blood into the air-passages. This procedure will also do away with the necessity of performing the operation with the patient's head hanging over backward. The entire cavity is then packed, and the tissues are sutured together, leaving only space enough for subsequent therapeutic measures. The after-treatment consists in removing the packing after three days and irrigating the cavity with a cannula (Fig. 16, p. 101) which is introduced into the cavity, but not into the outlet.

At the end of ten days the irrigations may be performed by the patient, as by that time a fistula will have been formed.

A boiled alkaline solution is used for the irrigation, and during the procedure the small opening of the fistula is covered with cotton and a small compress of silk.

If the outlet is too much contracted, either primarily or as a result of pathologic changes, or if the condition of the interior of the cavity is such as to make regeneration improbable, other procedures are indicated. The outlet toward the nose must be artificially enlarged, or else the power of the cavity to produce secretion must be permanently abolished. The first object is attained by means of Killian's method of temporary resection of the nasal bone and exposure of the outlet from in front, after removal of the intervening infundibular cells. Personally, I doubt that this procedure is adequate in all cases, and believe that sometimes resection of the uppermost portion of the septum will be required to obtain enough room. This can, of course, be performed through the same incision.

Other operative measures may be considered according to the conditions in any individual case. Thus Luc, utilizing the fact that the cavity can be drained at a distant point by going through the labyrinth of the ethmoid bone, closes it at once and permanently from above.

If the inner wall is extensively involved or deep recesses are present, permanent **obliteration** of the cavity after Kuhnt offers the only prospect of success. After the eyebrows have been shaved, an incision is made running from the supra-orbital arch inward along the line of the eyebrows; the entire anterior wall of the cavity is then removed with the periosteum in such a way as to leave nothing but soft parts in front. The mucous membrane, including the lining of the outlet, is completely removed to the last shred, so that granulations that spring up from the exposed bone and the periosteum of the flap left by the anterior wall gradually fill the entire cavity. By judicious use of packing the flap may be thrust upward far enough to prevent the formation of any disfiguring contraction.

Mention has repeatedly been made of the simultaneous occurrence of inflammation in several cavities. In these

combined suppurations it is obviously difficult to differentiate the individual foci. The means employed to distinguish between the individual diseases have already been discussed. The existence of suppuration from several cavities is not without its influence on the treatment, because there is no doubt that higher cavities affect those on a lower plane, both by discharging their secretions into them and by keeping up the swelling around their orifices, so that the morbid process in the former must be arrested before a cure can be brought about in the latter. Besides, the early recognition of disease in one cavity, by enabling the surgeon to operate on both at once, materially tends to shorten the period of treatment. Thus, if the labyrinth of the ethmoid is involved in suppuration of the frontal sinus, the operation performed on the latter should be followed immediately by a temporary resection of the nasal process after Killian, so as to expose the cells and clear out their contents. In the same way, if they are involved in suppurations of the antrum, a broad opening must be made from within the nose before any effective treatment can be applied to the larger cavity. If the frontal sinus and the antrum are affected together, it is necessary to evacuate the frontal sinus first to achieve a cure in the antrum of Highmore. Owing to the great variety of possible combinations and the complexity of the anatomic relations, the individual therapeutic measures must be determined by careful consideration of each case.

In case the principles discussed in connection with treatment of the various focal diseases should not suffice to determine the **treatment of chronic inflammations**, the following points may be emphasized :

In the treatment of any chronic catarrh the occurrence of renewed injuries must be avoided from the outset. Hence the patient's mode of life should be regulated properly. The mere removal of chronic injuries, such as congestion, thermic influences, or dust, often has a magic effect. Removal to a moist atmosphere free from dust, such as may be found in mountainous regions or in a mild

sea-climate, especially Venice, in the springtime, should be advised. Inhalations of brine, in themselves very beneficial, require great caution in their application to avoid the risk of unilateral cooling.

In regard to the local treatment, the cavities must be kept free from secretions by means of mouth-washes, alkaline sprays, irrigations, and the like; the condition of the teeth must be strictly looked after, and if stumps are present, they must be extracted. The passages of the nose in all nasal diseases must be rendered permeable to the air, both to relieve the symptoms and to combat the cause of the disease.

Simple hyperemia of the turbinates can usually be effectively controlled by cauterizing them with trichloracetic acid. The superficial destruction brought about in this way, while it includes the superficial nerve-endings which are diseased and keep up a constant reflex irritation, avoids any injury to the functionating portions of the mucous membrane, which are always impaired when more energetic caustics, and especially cauterization with the actual cautery, are employed. It is for this reason that submucous cauterization was recommended instead of superficial cauterization, in the general portion of this work, for the purpose of destroying true hyperplastic erectile tissue (see p. 47).

The question of instrumental ablation of hyperplastic or other neoplastic tissue was also discussed at that place (p. 48). The technic of these things can be learned only by practice. One more observation may here be added. The cold snare, which is completely withdrawn into the cannula, is sometimes recommended for the removal of the hyperplastic extremity of the inferior turbinate. I am led by a number of experiences to advise strongly against this proceeding. In many cases the structure is so tenacious that the cold snare fails to cut through it, and if traction is applied, the entire investment of the inferior turbinate is torn away, which is certainly an unjustifiable mutilation, not to mention the unpleasant

hemorrhage that accompanies it. If the hot snare is used and carefully drawn through the bone, only the portion caught within the loop is removed, and the hemorrhage is quite insignificant.

SYMPTOMATIC PERSISTENT INFLAMMATIONS.

While in the above-described chronic inflammations the anatomic foundation of the process presents many variations in the different stages, the histologic basis is practically always the same. The symptomatic forms very frequently present a great variety of anatomic changes in combination.

SYPHILIS.

Although *syphilis* may show a tendency to chronicity in the secondary stage, the alterations must be regarded as transitional forms approaching those of the tertiary period, the usual foundation of which is represented in the diffuse or circumscribed infiltration known as a gumma. It is very rarely that the affection is observed at this stage of tumor formation before destructive alterations have set in. Now and again it may be seen in the tongue, where gummous infiltrates may in rare cases persist for weeks without materially increasing in size or changing their form, until finally ulceration sets in (Plate 7, Fig. 1). Hence the condition is very apt to be confounded with true neoplasms. Small gummatous neoplasms are seen even more rarely, as the picture soon becomes obscured by confluence or disintegration of the infiltrate (Plate 16, Fig. 1). The delimitation in such cases is probably explained by the fact that the process is confined to individual follicles; for, as a rule, the individual nodules are masked not only clinically, but also histologically (Plate 36, Fig. 1), by the presence of a diffuse infiltrate (Plate 23, Fig. 2), which presents nothing characteristic until ulceration begins. On mucous mem-

branes, as on the skin, we may observe the punched-out ulcer with a characteristic lardaceous exudate on its floor (Plate 7, Fig. 1; Plate 10, Fig. 3; Plate 15, Fig. 1; Plate 19, Figs. 1, 2; Plate 25, Fig. 1; Plate 30, Fig. 2), which, after it clears up, leaves sharply defined tissue defects or stellate scars (Plate 15, Fig. 2; Plate 19, Fig. 3). The seats of election of tertiary ulcers are, in general, those portions which are exposed to frequent irritation and other injuries, and may, therefore, be regarded as loci minoris resistentiæ. They include the soft parts of the palate and the anterior portions of the nose. The hard palate becomes involved chiefly from the propagation of an intranasal infiltrate in the floor of the nose. However, all the various parts may be attacked, as we see by the localization of the disease in the nasopharynx. On the lower jaw and on the mucous membrane of the tongue tertiary affections are practically never seen.

The ulcer is not the only manifestation. A condition that has received too little attention and is probably, on that account, so refractory to treatment, consists in diffuse and extremely chronic infiltrates, depending chiefly on alterations in the blood-vessels. These do not, by any means, always end in superficial ulceration. They may imperceptibly and very gradually bring about atrophic or hypertrophic changes in the connective tissue (Plate 25, Fig. 2). In the nose especially atrophic changes occur under the form of "atrophic rhinitis." In addition, tumors resembling polypi, except that they are hard and brittle, are formed either as the result of destructive processes or without this antecedent cause. These tumors are characterized by the predominance of periarteritic changes. The **symptoms** of infiltrations that ultimately end in disintegration may at first be very deceptive, as the development is extremely slow. Intense pain, out of all proportion to the visible alterations, a subacute course in spite of violent inflammatory reddening, and a tendency to unilateral distribution or isolation, the latter when the lesions are situated near the median line, are characteristic

features of these fetid oropharyngeal foci. In the nose the characteristic signs are great obstruction, with radiating pains; the presence of a stale odor or even intense fetor; the presence of hemorrhagic crusts, which, unless they are situated exactly in that area of the septum which is usually injured by the scratching finger, are absolutely pathognomonic; and, finally, the seat of the infiltration, which rarely spares the floor of the nose or the middle portions of the septum. In the latter location the linear extension of the tissues from in front and below backward and upward is especially characteristic. The presence of a diffuse macular redness, resembling that of measles, on any portion of the mucous membranes; and a coppery discoloration of the skin covering periosteal and perichondrial foci, combined with a sense of resistance and elasticity to the finger, should always excite suspicion. Glandular enlargement is rarely absent.

The course is determined by the breaking-down of the infiltrate, which almost always takes place. As it is usually quite extensive, a perforation is produced in those regions that are exposed on either side, while free portions of tissue are often completely destroyed. All degrees of obstruction are observed, from fenestration in the faucial arches to the formation of a wide communication between the oropharynx and the nose. These changes produce very troublesome interference with swallowing and speaking. When a gumma in the cartilage or on the bone breaks down primarily or as the result of nutritive disturbances in the domain of the supplying blood-vessels, extensive necrosis with the formation of sequestra results. In this way the entire alveolar process, including a number of teeth, may be lost. By the destruction of the plates of bone that form the boundaries of the accessory sinuses large abnormal communications with neighboring cavities, or, as in the case of the frontal sinus, with the skin, are produced, as well as fistulæ which lead down to unexpectedly large deposits of dead bone. In the nose, where the septum is most commonly attacked, the quadrangular

septal cartilage is destroyed, and in its place there appears a large oval perforation (Plate 30, Fig. 3), the edges of which, after recovery has taken place, are bounded by cicatricial contractions of the mucous membrane. Such a formation of radiating scars is always characteristic of a former syphilitic process (Plate 19, Fig. 3). It is also responsible for the depression (retraction) of the bridge of the nose that occurs at this point, and that is described as the *lorgnette nose*. This deformity is rarely produced by the mere loss of the quadrangular cartilage, although the latter forms the chief support of the lower skeleton of the nose. *Saddle-nose*, which consists in depression of the upper half of the member, is also to be attributed to cicatricial contraction following ulceration of the perpendicular plate of the ethmoid bone and of the nasal bones.

Even worse than these ulcerations are the **adhesions** that so frequently form in the throat, either by the ulceration of adjacent soft parts or as the result of the cicatricial contraction already referred to. Partial or total occlusion of the mesopharynx and nasopharynx, rhinolalia clausa, and closure of one or both nares, with distressing occlusion of the Eustachian tubes, are among the conditions that are observed. Sometimes occlusion of the orifice of an accessory cavity is followed by dilatation of the affected structure.

Some of the most troublesome symptoms of ulcerative processes are due to **mixed infection,** which delays recovery after the specific infiltrate has become absorbed, and to the metasyphilitic alterations that are chiefly due to nutritive disturbances of the blood-vessels. These consist in atrophy of the mucous membrane and of the muscles, torpid ulcers, and infiltrations that are not affected by antisyphilitic remedies, and granulation tumors with a marked tendency to recurrence. The same refractory processes are sometimes met in the skin of the nose and of the upper lip, where they assume the form of superficial nodules which extend laterally and slowly undergo

ulceration. They are very apt to be confounded with lupus vulgaris.

That the sequestra of cartilage and bone may keep an ulcerative process alive and lead to the constant production of fistulæ, the cause of which may be difficult to determine, is readily comprehensible.

During the initial stages, while infiltration is going on, the **diagnosis** is much more difficult than later on, when the characteristic ulcers have already developed. Unfortunately, the condition is much more frequently seen during this period of well-developed necrosis, when medical aid is too late; hence the great importance of recognizing the disease in its early stage. In addition to the peculiarities detailed above—namely, unilateral distribution; subacute, very severe inflammation; intense pain; hemorrhage; infiltration of the glands; macular redness; the predilection evinced for certain situations; and the odor—careful inquiry into the history and an examination of the entire body must be depended on to establish the diagnosis. In women the occurrence of marked **falling of the hair** is particularly suspicious, as well as the history of premature births, still-births, or early death of the children. In both sexes a general feeling of illness, a cachectic appearance, and violent headache occurring chiefly at night, are significant symptoms. With the greatest care, however, the diagnosis may remain in doubt and have to be determined by the therapeutic test.

Treatment.—The sovereign remedy is potassium iodid. It should be exhibited at once in large doses:

℞ Sol. kal. iod., (10.0–15.0) 150.0
Sod. carb., 0.5
Syr. aurantii cort., 25.0
M. Sig.—One tablespoonful three times a day.

The addition of the alkali guards against iodism or holds it in check after it has developed.

Superficial ulcers may be cauterized *once* with a crystal

of chromic acid to alleviate the pain and to combat mixed infection. The crystal is carefully fused on the end of a heated probe. In pharyngeal disease gargles should be used with great caution. The patient may gently rinse his mouth with a lukewarm alkaline solution. In the nose the crusts must be softened with liquid vaselin, after which a cleansing solution should be drawn up into the nostrils. Necrosis is searched for with a probe. During the early stages decay of the bone may be checked by opening up the diseased areas as freely as possible, and packing with iodoform gauze so as to guard against mixed infection. Sequestra must be removed as soon as possible. The torpid ulcers of the later stage may be treated advantageously with the sharp spoon. During this stage, when the specific poison has ceased to act, little is to be hoped from internal medication except in the form of mercury to prevent occurrence of fresh lesions, while, on the other hand, energetic surgical cleansing is of the greatest value. Broad surfaces covered with torpid granulations and dense bands of connective tissue interspersed with islands of badly nourished tissue keep up the inflammatory condition for years; they may be freshened up advantageously with the actual cautery. Syphilitic lupus at the entrance of the nose and in the skin ought to be treated in exactly the same way as the tuberculous form of the disease.

The final results of syphilitic disease often require surgical aid. Perforations and tissue losses in the soft or hard palate should be covered in, if possible, by means of staphylorrhaphy, or a staphyloplastic operation, or, if these measures fail, plugged with an obturator. The cicatricial contraction of the alæ nasi and the deformities of the bridge of the nose can also be corrected, or at least mitigated by surgical means. Adhesions between the soft palate and the posterior wall of the pharynx are very difficult to treat. After the adhesions have been divided and the contiguous surfaces freshened up, a new epithelial covering to guard against the formation of fresh adhesions

may be secured by making a perforation on each side and keeping these packed with gauze until epithelium is formed, when the tissues between the two are divided so as to form a broad separation. Epithelialization of this surface is then secured by means of constant packing, since the outer angles, where new adhesions are most likely to form, are already covered with epithelium. Permanent or periodic dilatation of the artificial openings by means of tampons or a dilator may be necessary both here and in other regions. Before any plastic operation is attempted, the original disease must, of course, be cured beyond the possibility of a recurrence. [One of the most efficacious operations for the relief of this condition, especially in the permanency of its results, is that devised by the late J. E. H. Nichols, of New York. The procedure consists in inserting a thread loop through the base of the adhesion, leaving it there until cicatrization has taken place around it, and then cutting through the adhesion and leaving the edges to heal, reunion always being prevented by the presence of the narrow strip of cicatricial tissue at the base of the cut. In other words, the adhesion is treated as are webbed-fingers. The operation is fully described in the *Transactions of the American Laryngological Association for 1896*, p. 166.—Ed.]

GLANDERS.

It seems advisable at this place to introduce the subject of *glanders*, as this disease, fortunately, manifests itself usually in a chronic form in man, acute malignant cases being quite rare.

Infection is usually derived directly from the horse, rarely from another diseased human being. While in the horse the mucous membranes of the upper air-passages are always involved, they may escape in the human subject, in whom cutaneous ulcers, gastro-intestinal catarrh, bronchial disease, and symptoms of pyemia dominate the clinical picture. The disease does not acquire its peculiar

character unless the characteristic eruption appears in the nose, mouth, and pharynx. The eruption consists of pustules which become converted into punched-out ulcers, and are followed by phlegmons and, later, by extensive destruction of the bony framework. Before long the outer skin of the nose becomes involved and presents an erysipelatous inflammation terminating in ulceration.

In acute cases the result is very often fatal. In chronic cases the course is very protracted, as the ulcers are refractory to treatment, and the cicatricial contraction that follows leaves great deformities. Perfect recovery occurs only in about 10 to 12 per cent. of the cases.

The **diagnosis** is based on the demonstration of the typical bacilli, which must be identified by means of animal inoculation, and, above all, on a careful history of the case. Care is requisite to guard against confusion with syphilis, which this disease often greatly resembles.

The **treatment** consists in early and radical extirpation of the diseased foci with the actual cautery. Potassium iodid in large doses is said to exert a distinctly favorable influence.

TUBERCULOSIS.

Tuberculosis of the mucous membranes of the mouth, nose, and throat occurs either in the course of an extensive pulmonary phthisis, usually as a terminal manifestation, or primarily as the result of infection introduced from without. In the first form symptomatic treatment only is applicable; the second, on the other hand, calls for active therapeutic measures, especially as it has been found that while the symptomatic lesions evince a marked tendency to ulceration, primary tubercular disease presents the true type of an inoculation tuberculosis, and is characterized by a torpid course, with distinct tendency to cicatrization. In a general way it may be said that "endogenous" forms are more frequent in the oropharynx, while "ectogenous" forms are most frequently observed in the nose. The oropharynx usually becomes infected

through the sputum, the infectious material effecting entrance through fissures or defects in the tissues. At the entrance to the nose, where the localization is chiefly in the anterior portion of the floor and on the cartilaginous septum, the infectious material is introduced by the scratching finger, so that the infiltration at first is strictly confined to the area accessible to the finger. The case illustrated on Plate 2, Fig. 2, is a good example of sputum infection. Rhagades are particularly common at the angles of the mouth; carious teeth and fissures of the gums have also with good reason been regarded as frequent ports of entry. The disease in that case usually spreads to the respective regions, and in both forms its progress is very slow.

Other ports of entry that should be especially borne in mind are the crypts in the pharyngeal lymphatic ring, where the carriers of infection are deposited either by inhalation or during the ingestion of food. It is true that in this region the bacilli are more apt to pass through the lymphatic region and exert their influence on the nearest glands, than they are to produce alterations in the lymphatic ring itself. The changes are usually confined to the deeper portions of the follicles, and can be discovered only by microscopic examination. Their clinical significance is, therefore, to say the least, dubious, and has never been fully explained.

Tuberculosis manifests itself in the following forms: **Superficial aphthous ulcer** (Plate 2, Fig. 2); an **infiltration** presenting the character of **granulation tissue** (Plate 17, Fig. 3; Plate 30, Fig. 1); the **polypoid tumor,** which may attain the size of a walnut (Plate 36, Fig. 2); the **deep ulcer** (Plate 4, Fig. 1); and the small nodular **lupous infiltrate** (Plate 16, Fig. 2).

All these affections have, in common, a bossellated appearance of the lesion itself or of the surrounding tissues, due to its origin in the tubercle. The infiltrations are moderately firm; the tumors are softer, more brittle, bleed readily when irritated; the floor of the ulcers is

rather shallow, the edges are irregular and granular, never punched out, like those of syphilis. From the latter affection tuberculosis is also distinguished by the pallor of the surrounding tissue, the absence of scars, extremely slow development, which may extend over months or even years, and, subjectively, by the insignificance or entire absence of pain, coupled with a marked sensation of dryness and tension. All these factors must be duly taken into consideration in making up the **diagnosis**, which in a doubtful case may be confirmed, in a negative sense, by the administration of potassium iodid, and, in a positive sense, by the injection of tuberculin. The tubercle bacilli are very difficult to find, as they are not present on the surface, and must, therefore, be looked for in the deeper tissues.

The **course** is slow, but almost never benign; the infiltrate either undergoes superficial ulceration or it gradually extends deeper and consumes the adjoining tissues like a malignant tumor, so that in exploring with a probe the instrument suddenly slips into large homogeneous masses of disintegrated tissue. The bone itself is gradually eaten away and replaced by granulomatous tissue, the process in this respect presenting a marked difference to syphilitic decay, since sequestrum-formation is extremely rare. Extending in this way, the infection ultimately invades contiguous spaces: from the nose it passes into the mouth (Plate 17, Fig. 3), or into any one of the accessory sinuses, or even into the skull; or from the mouth into the antrum. It is probable that the skull is also reached by way of the lymph-channels, and it is not unlikely that tubercular meningitis occurs chiefly at the base of the skull, because of the extraordinary frequency of tubercle bacilli in the adenoid tissue of the nasopharynx and of the readiness with which they enter the subdural lymph-spaces.

The **prognosis** is most favorable in the lupoid forms and those characterized by the presence of tumors, as the diseased tissue can then be readily extirpated.

The indications for **treatment** are found, first of all, in the general condition. The presence of advanced phthisis renders success extremely improbable, and even if the local treatment proves successful, the relief will in all probability be too late. However, if the respiration is affected or any other distressing symptom justifies the procedure, a surgical intervention may be indicated. Obstructing tumors and swellings should be removed or reduced to a minimum. Ulcers may be touched with a 50 per cent. solution of lactic acid or cleansed with the curet or the actual cautery, but these procedures merely satisfy symptomatic indications.

The case is different in local tuberculosis occurring in otherwise healthy or practically healthy individuals. Complete extirpation of the focus or foci is then possible, and is, therefore, indicated. As it is most important to prevent the spread of the disease, operative measures must include the healthy tissue surrounding the lesions, it being borne in mind that the infiltration always extends beyond the area that is visibly diseased. Caustics should, therefore, be freely used, as they destroy any germs that may remain on the wound surfaces. In tubercular disease at the entrance to the nose, no matter how small the diseased focus, I am distinctly opposed to any operation *per vias naturales*. The affected side of the nose should be at once laid open as described on p. 51, and the lesion excised with a zone of healthy tissue by means of the cutting cautery. During the after-treatment iodoform should be used whenever possible. The patient must, of course, be kept under observation for some time, so that any recurrences may at once be recognized.

LEPROSY.

Leprosy has recently gained a peculiar interest for the rhinologist from the fact that in a great number of cases it appears to be extremely probable, if not actually proved, that the primary lesion is seated in the nose on the ante-

rior portion of the septum; in other words, the infection effects an entrance at the same point as that of tuberculosis. This fact also explains the mystery that leprosy is transmitted from one individual to another, but is not contagious in the ordinary sense of the word, as this mode of infection is to be explained only on the supposition that the infectious material is conveyed by the scratching finger.

The first signs of the disease then usually appear in the interior of the nose and rarely on the exterior, while pharyngeal lesions make their appearance later along with the cutaneous eruptions.

At first there is a diffuse infiltration (Plate 16, Fig. 3, lip), within which sharply defined, large and small nodules of moderately firm, and sometimes elastic consistence and of pale or waxy color develop (Plate 16, Fig. 3, pharynx). The individual stages, which are readily observed in the pharynx, cannot be distinguished in the nose, because the swelling of the interior tissues and the obstruction from the external nodules soon combine to make inspection impossible. The nodules speedily ulcerate and break down, leaving large defects surrounded by scars. Meanwhile other portions are attacked by other stages of the process, producing a polymorphous clinical picture. Even the underlying bone is destroyed; extensive portions of the palate, the skeleton of the nose and its soft parts, or even the entire member is sacrificed, but without the separation of true sequestra, as the bone undergoes carious disintegration. Owing to the great tendency to cicatrization, stenoses and adhesions are, of course, quite commonly seen.

The **symptoms** consist at first of violent and protracted coryza, with watery, sanguineous secretion; the presence of great swelling and anesthesia, which may even affect apparently normal parts; and angina, which may be so severe that the patient refuses to take food; and, finally, salivation.

The **diagnosis** is made by the characteristic anesthesia

and the peculiar appearance and seat of the nodes, which in the oropharynx preferably attack the symphysis of the palate and the posterior arches. In addition, the complicating cutaneous and nervous phenomena and, in doubtful cases, the demonstration of the lepra bacillus in the secretions are valuable diagnostic aids. Although there is a superficial resemblance to tuberculosis and syphilis, the distinction is readily made by observing the course of the disease. The diagnosis may possibly become obscured if a complication with one or the other of these infections exists.

The **treatment** consists solely in relief of the symptoms.

SCLEROMA.

Scleroma constitutes a specific disease of the upper air-passages—so much so that until quite recently it was known under the name of rhinoscleroma. It is characterized by an exceedingly slow course, measured not by years, but by decades; and usually begins in the posterior portion of the nose, so that the first, and for a long time the only, symptom consists in chronic nasal catarrh, the production of tenacious crusts, and slight obstruction. The disease does not become characteristic until it extends downward or forward and produces material alterations in the pharynx or at the entrance to the nose. The pathologic basis consists in pale, cartilaginous, nodular or rarely diffuse infiltration of the mucosa itself, much more rarely affecting also the deeper layers, and followed secondarily by great shrinking of the tissues, which may also involve contiguous regions. The surface may become slightly eroded in places, but true ulcers are never formed. On the other hand, the uvula is quite apt to contract and disappear as if it had been removed with a razor; the cartilages of the nose in some instances are completely destroyed by the pressure of the growing tumors. If contraction has begun, it reveals itself by the presence of white, radiating scars. During the stage pre-

ceding the cicatricial process small, flat, hard nodes or larger masses of granuloma, which, for example, may occlude the nasopharynx, and finally wide-spread stenoses due to the retraction of the tissues, make up the picture of the disease. The posterior arches and the soft palate are retracted and completely shut off the nasopharynx. The salpingopharyngeal folds are so stretched as to evert the margins of the tubal orifices, and the entrance to the nose is greatly narrowed by retraction of the septum and of the alæ.

During the initial stage, as long as the superficial layer only is attacked and undergoes contraction, the mucous membrane of the nose itself may merely present the appearance of atrophy, an appearance that is accentuated by the presence of inspissated masses of pus.

The disease is common in eastern Europe, but occurs only sporadically in other portions of the globe.

The **diagnosis** is based on the extremely slow course, the cartilaginous hardness of the infiltrations and of the scars, and on the finding of Mikulicz's cells in the tissues. These cells and the hyaline corpuscles contain the specific bacillus of scleroma, which may also be found in the secretion.

No trustworthy causal **treatment** has as yet been discovered; excision of individual portions of tissues that are particularly troublesome and the production of artificial openings when required by the presence of adhesions are the only therapeutic measures at our disposal.

ACTINOMYCOSIS.

Actinomycosis represents the rarest form of chronic infectious inflammation. The ray-fungus gains entrance to the organism through the instrumentality of objects that have come in contact with diseased cattle, or enters directly with vegetable particles, such as kernels of corn and the like, in which the fungus grows. This explains the frequent localization of the disease in the mouth. Carious

teeth and wounds of the gums are the favorite ports of entry, but the tongue may also be attacked independently. In the former case chronic periosteal abscess usually forms on the lower jaw; more rarely a central osteitis is produced. When the infection is conveyed directly through the mouth, a slowly growing, hard, sharply outlined tumor appears at the tip of the tongue, more rarely at the margin or in the middle, and sometimes undergoes softening. The lingual tumor may be mistaken for a gumma or carcinoma, and it is to be remembered that potassium iodid appears to have some influence on the disease under discussion, so that it cannot be employed as a therapeutic test to exclude syphilis.

A positive **diagnosis** can be made only by finding the characteristic ray-fungi in the secretion or in the tissues.

The **treatment** is chiefly surgical, and consists in free excision of the foci. It may be efficiently supported by the administration of large doses of potassium iodid.

APPENDIX.

INFLAMMATORY DISEASES AND HYPERPLASIAS OF THE LYMPHATIC RING.

THE various portions of the lymphatic ring being similar in structure and embryologic origin, and the pathologic conditions, therefore, approximately the same, the diseases of the individual parts may be discussed together.

Acute inflammations presenting the familiar picture of **lacunar tonsillitis** occur chiefly in the palatal tonsils. The inflammatory process becomes localized in the deeper lacunæ or crypts, which present a good opportunity for the inflammatory secretions to stagnate. The constitutional **symptoms** are often marked; the temperature rises to 29.5° C. (103.2° F.), and in children even higher. Headache and pain in the limbs are present; the patient is much depressed; and a feeling of dryness and choking in the throat points to the chief focus of the infection. At first no more than a reddening of the central portions of the pharynx is observable. On the following day, however, the tonsils appear greatly swollen and covered with a yellowish-white exudate, corresponding in distribution to the crypts and extending into these structures (Plate 8, Fig. 1). In the course of a few days the exudate, which in the main consists of recent and necrotic pus-corpuscles, some epithelium, and a good many microbes, breaks down and the entire symptom-complex begins to subside.

The localization and the great tendency to recurrence observed in this peculiar disease, which, however, is not at all rare, throw some light on the **pathogenesis**. Thus

these peculiarities explain the fact that an ordinary cold very frequently appears to be the only exciting cause. Lacunar angina is, so to speak, a preformed disease—that is, it attacks individuals in whom the lacunæ are either abnormally deep or somewhat branching, permitting the pathogenic fission-fungi which are present in the mouth of every healthy person to develop into large colonies. The crypts, which are constantly irritated by the action of metabolic products, appear to present a *locus minoris resistentiæ* to the secondary determination of blood to the inner organs whenever the individual catches cold. In addition to the ubiquitous fungi, a sudden immigration of streptococci and staphylococci, which are either facultatively pathogenic or at once exert their deleterious influence, appears probable from the fact that cases are not infrequently observed in which infection is directly carried to a healthy person by one affected with angina. The attacks occurring after operations on the nose and on the teeth are in part due to direct infection ; but in the majority of instances they probably resemble the inflammations due to cold in that they depend on certain insufficiently explained processes that follow in the wake of a determination of blood to the part.

The characteristic picture of lacunar inflammation in the subsequent course of the disease becomes obscured by the prominence of the products of desquamation. The latter may extend over the surface of the tonsils ; the epithelium covering the intervals between the lacunæ undergoes coagulation necrosis, and thus, by the production of fibrin, benign fibrinous angina is produced (Plate 8, Fig. 2). This somewhat rare event may give rise to confusion with diphtheria. The error may be guarded against, however, by bacteriologic examination and by remembering that the membranes, since they consist solely of epithelium, readily come away without producing hemorrhage—that is to say, without any destruction of tissue.

As a result of the inflammation the lacunæ become dilated, since they are bounded only by the lymph-fol-

licles, and the material from the latter structures itself contributes to the inflammatory leukocytosis. The follicles break down and give up the material they contained, as shown on Plate 31, Fig. 3 (in a pharyngeal tonsil). Small cavities are formed, and later, owing to destruction of the dividing septa, coalesce with the adjoining spaces.

It is this dilatation of the lacunæ, coupled with the accumulation of secretion in the form of inspissated or even calcified concretions within the lacunæ, that is responsible for the tendency to recurrence, and persists in many individuals until the cavities have been entirely obliterated, either artificially or through the action of the morbid process.

The concretions referred to frequently give rise to a number of symptoms without producing an actual recurrence of the inflammation, and as they are hidden away in the depths of the lacunæ, they not infrequently escape observation for some time. The feeling of a foreign body; the constant desire to swallow and choke; expectoration of mucus in the morning, occasionally mixed with small quantities of blood; and, finally, the subjective sense of a bad odor—these are the ambiguous symptoms complained of. If in such a case the more common sources of these symptoms—catarrh of the nose and of the accessory sinuses, hypersecretion of the nasopharynx, and similar conditions—are not found, the tonsils should be examined carefully even if their external appearance presents nothing suspicious. If the tonsils are manifestly altered, fissured, or partially destroyed; if small yellowish points are seen on the individual lacunæ, the condition, of course, will not be overlooked. In all such cases the pockets from which concretions protrude must be explored with the probe, or, if no such pockets are seen, the probe should be passed from below upward over the surface of the tonsil for the purpose of bringing any hidden plugs that there may be into view. To return to the angina: the above-described symptoms sometimes manifest them-

selves without the appearance of the ominous secretions at the openings of the lacunæ; in some cases there may be more marked dysphagia; in others a variable degree of nasal obstruction, for it is to be remembered that lacunar inflammation of the lingual and of the pharyngeal tonsils while much more rare than in the palatal tonsil, is not impossible and may be inferred if the above-described phenomena are present. A positive diagnosis can, of course, be made only when the characteristic formation of purulent plugs is actually seen in the lingual and pharyngeal tonsils (Plate 21, Fig. 1). Their occurrence in the lingual tonsil in association with ordinary inflammation of the palatal tonsil is not so very rare. That the lingual and pharyngeal tonsils are less subject to disease than the palatal tonsils is due partly to their protected position and the fact that the surface is more frequently cleansed mechanically, and partly to the fact that the openings of the crypts of the pharyngeal tonsil are hidden and directed downward, thus facilitating the escape of the secretions.

Nevertheless, the secondary changes described may also appear in these portions of the pharyngeal ring.

A description of lacunar inflammation of the pharyngeal ring would be anything but complete, in fact, would be lacking in an important essential, if it failed to include the **complications**, which are often much more important than the local condition. In the majority of cases the invading army of cocci encounter the resistance of the inflamed follicles; these immediately pour out numbers of leukocytes into the intervening spaces, and the advance guard is checked by the lymph-glands of the affected region, so that, without exception, glandular enlargement accompanies every attack of angina. But as soon as the normal outpouring of leukocytes begins to be insufficient, there is not in the whole body a better port of entry for the invasion of fungi that have not been damaged by secretions than is found in the lacunæ of the tonsils. Accordingly it is common to see, after tonsillitis, irritations or

even grave inflammations of the **serous membranes.** Indeed, clinical experience makes it probable that the source of various inflammations of serous membranes in which no other definite cause can be discovered is to be sought in the pharyngeal ring, whether the latter has been acutely diseased or only predisposed to the reception of pathogenic germs on account of former attacks or of some structural abnormality. The whole army of these acute febrile and sometimes very harmful inflammations of serous membranes has not inaptly been attributed to cryptogenetic septicopyemia, and this is true, but in a special sense of the term, since they arise from the crypts of the tonsils. These affections, including pleuritis, endo- and pericarditis, and polyarthritis and the cutaneous manifestations by which they are accompanied (purpura, erythema nodosum, and the like), have long been recognized as possessing a certain causal connection, and this is now explained by the discovery of their common origin. Slight irritations, especially of the joints, are unquestionably much more common than is generally supposed, because no mention is made of them and they sink into insignificance beside the febrile pain. On the other hand, the more severe affections of the serous membranes so dominate the picture that the original angina is quite overlooked, or at least forgotten, and, as the pathogenesis is not determined, the proper measures to prevent recurrence of the attacks are neglected.

Among the rare diseases of serous membranes is inflammation of the tunica vaginalis of the testicle. A number of cases of this form of **orchitis** and one case of **peritonitis** have, however, been observed. That disseminated metastases of true pyemic character—septicophlebitis—occasionally occur is readily understood from what has been said.

Even **pneumonia** has been observed to follow lacunar angina in a number of instances, although the bacteriologic connection was not very clear, while, on the other hand, in the inflammations of serous membranes the same

streptococci and staphylococci were found as in the original angina.

The occurrence of a febrile albuminuria or true **nephritis** after tonsillitis presents nothing characteristic, as it is a phenomenon common to all acute infectious diseases.

In connection with the pathogenesis of general septicopyemia the fact is worth mentioning that **osteomyelitis** has been observed as a sequel of angina, identical fungi being demonstrated in the tonsils and the pus contained in the bone-marrow. The most typical case of the kind was one of simple fracture of the humerus, which developed symptoms of osteomyelitis immediately after an intercurrent attack of angina.

Some of these complications, including the milder ones, especially simple irritation of serous membranes, are probably due more to resorption of toxins than to a true metastatic process. The same pathogenesis applies to the neuritis which sometimes follows simple angina, as well as pharyngeal diphtheria, and has been more fully described elsewhere (see p. 60).

Catarrh and suppuration of the middle ear frequently complicate inflammations of the pharynx, and have already been described (see p. 28).

After a number of attacks of lacunar inflammation a condition of atrophy is sometimes produced by the proliferation and secondary contraction of the interstitial tissue; or, more frequently, hyperplasia results from the reactive swelling of the follicles. This subject will be discussed more in detail in a subsequent section.

The **treatment** of an acute attack of angina is to be based on the principle that the disease is a general infection. The local measures include only such as have been found by experience to possess the power of allaying the pain. The idea that the process can be aborted or even mitigated by means of local antisepsis is wrong, both in theory and in practice; antiseptic applications fail to reach the true seat of the inflammation. They cannot be

used in sufficient strength to be effective, and are not without danger on account of the unavoidable risk of swallowing. There is no internal antiseptic capable of cutting short the attack, although several such substances are brought forward every year. My treatment is, therefore, as follows :

If there is constipation, I immediately order a laxative, consisting, for children, in a small dose of compound licorice powder, for adults either in some remedy that they have already found to act successfully or an infusion of senna. The patient must go to bed. If the inflammation is still in its initial stage, he is given several cups of chamomile tea, put into a dry pack until profuse sweating is induced, and receives 1 gm. (15 grains) of salipyrin twice a day until the headache and pain in the limbs have disappeared. This requires two, or at most three, days. The local measures are simply a warm

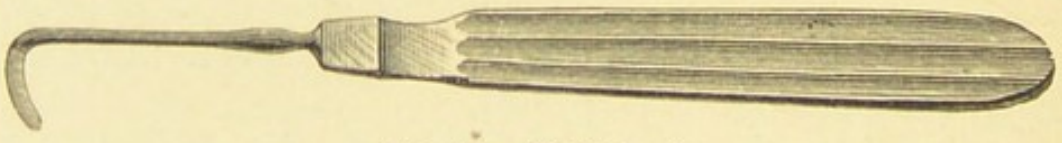

FIG. 23.—(Half-size.)

gargle (30° C.—86° F.) consisting of sage tea and a wet throat compress (Fig. 8, p. 41).

Complications are to be treated according to general therapeutic principles. The urine is to be examined at frequent intervals, and the diet restricted to semifluid, non-irritating articles.

The only effective means of guarding against recurrence consists in removal of the infectious material deposited in the dilated crypts, followed by free incision. Unless the measures indicated in hyperplasia of the tonsils and described on p. 154 are to be employed, the lacunar cavities are laid open by dividing their walls. To prevent them from growing together it has been recommended to tear the walls with a blunt instrument like a strabismus hook. It is better, however, to use a smooth, sharp instrument

like that illustrated in Fig. 23, both because it inflicts less pain and because the bands of cicatricial tissue which are often found in the interior of the crypts are more certain to be divided. The parts are first anesthetized; the position of the various ducts determined by exploration with a strabismus hook; the knife is then introduced and withdrawn from behind forward. Hemorrhage is controlled by means of a cold gargle.

Similar dilatations in the adenoid tissue of the naso-pharynx, the median and lateral pharyngeal recesses, or so-called bursa pharyngea, may be cauterized with a crystal of silver nitrate or chromic acid fused on the end of a probe. The field of operation should be well illuminated by means of the head-mirror, and the cavities obliterated as described, or curetted out. Kafemann's curet may be recommended for this purpose. In the lingual tonsil the condition is extremely rare; if necessary, the same operation is applicable, or the scissors or cold snare may be used.

Interstitial disease, ending in **abscess,** is much less common than lacunar inflammation of the essential tissue. The condition is usually confounded with phlegmon of the pharynx, a much more common affection (see p. 65). Indeed, tonsillar abscess may lead to phlegmon of the pharynx, but in most cases it is strictly limited to the original adenoid region.

The course of **abscess of the palatal tonsil** is marked by similar general and subjective local phenomena as that of an ordinary angina. The dysphagia, however, is complicated by a certain limitation of the movements of the jaws, due to the tension of the tonsillar capsule. There is little redness, and what there is, is sometimes confined to the affected tonsil. The latter is very much swollen, however, and extremely sensitive to the touch, the surface is smooth or slightly irregular, and occasionally covered with a little purulent or fibrinous exudate. Rupture of the abscess is followed by disappearance of the symptoms

and the liberation of pus mixed with blood or necrotic fragments of tonsillar tissue which give it a grayish and creamy appearance. Sometimes the abscess is evacuated only through one of the crypts near its upper pole. The improvement in the symptoms is only temporary, and is followed by renewed accumulation of pus. In such a case the surgeon should not wait for spontaneous rupture, but should take his probe and look for the crypt through which the abscess can be most readily reached, because it is also the one through which infection has taken place. The wall of this crypt is then divided with a knife, exactly as described above. If spontaneous rupture fails to take place and the abscess finds it impossible to form a sufficiently large opening either below or above to evacuate its contents, **a chronic tonsillar abscess** is produced. The pus accumulates again and again, giving rise to a feeling of tension and a nauseating taste in the mouth; the tonsil remains swollen, and pus is discharged from time to time—in some cases several times a day. At any time the pus may be expressed by compressing the tonsil or exerting pressure on the retromaxillary region. If the abscess has not extended beyond its capsule, simple division of the walls will suffice even in this case. If, however, fistulous tracts have already been formed in the surrounding tissue, it may be necessary to divide both the peritonsillar tissue and the soft palate. This must be done with a galvanocautery, as otherwise a furious hemorrhage results. [The author makes a distinction, and a correct one, from an anatomic standpoint, between supratonsillar phlegmon and abscess of the palatal tonsil. In the former the pus is really outside the tonsil proper and rather in the circumtonsillar connective tissue; in the latter it is within the tonsillar substance. The symptoms of the two are practically the same, though there is less bulging of the faucial pillars in the latter.—Ed.]

The **pharyngeal tonsil** in exceptional cases may be the seat of pathologic processes which cannot be distinguished, especially from lacunar inflammation, without rhinoscopy.

These conditions occur both independently and as the result of inflammation of the palatal tonsil. They are always complicated by intense nasal obstruction, and terminate by **evacuation of the pus through the nose.** Owing to the anatomic relations making it possible for the pus to be discharged in a downward direction, the abscess always heals spontaneously.

Abscess of the lingual tonsil, in spite of the exposed position of that structure, is even more difficult to discover than abscess of the pharyngeal tonsil, to which the surgeon's attention may at least be called by the presence of nasal obstruction. From the small number of cases that have been observed it would appear that the tonsil becomes greatly swollen and reddened; the surface may be covered with lacunar deposits; the base of the tongue shares in the inflammatory process; and attention is usually called to the affected region by the unusual severity of the dysphagia and the absence of anything abnormal in the pharynx.

These interstitial inflammations of the pharyngeal ring acquire a peculiar significance through their *complications*, which are comparatively frequent. While in lacunar inflammation metastasis is the rule, in the interstitial form of the disease pyemic symptoms, making up the picture of cryptogenetic septicopyemia or metastatic disease of the heart, are occasionally observed, yet polyarthritis and inflammations of serous membranes are practically unknown. Deep abscesses are comparatively common. They may occur in the intermaxillary fold; or along the lower jaw in the form of a parulis or gumboil, when the teeth are sound; in the retromaxillary, nuchal, and retropharyngeal regions; and even in the mediastinum or along the vertebral column as far down as the lower extremities. The ultimate fate of the abscess is variable. A cure cannot, of course, be effected without first removing the original focus.

The phlegmonous affections in the floor of the mouth and in the deep layers of the connective tissue of the

neck that develop secondarily to tonsillar abscesses have received special names, and are described at length in another portion of this work (see p. 66).

To prevent recurrence, the infective focus should be removed by laying open or extirpating the hyperplastic portions of the tissue.

Hyperplasias of the lymphatic ring, especially of the palatal portion, have always been a fruitful field for the physician, although his interference has not always been indicated. The condition is most frequent in childhood. The pharyngeal tonsil is by far the most frequently affected; next in order is the palatal tonsil, which is affected two-thirds as often; while the lingual follicles are least frequently affected, and practically only in advanced age. [In our experience this condition is very frequent in women from thirty-five to fifty years of age. —Ed.]

When "adenoid vegetations" and hypertrophy of the tonsil are associated, as commonly happens, the recent occurrence of some disease of childhood will almost always be given in the history. The children, who before their attack presented nothing abnormal, present the characteristic symptoms after scarlet fever, measles, diphtheria, or sometimes whooping-cough. The topical leukocytosis that always occurs in these diseases leads to permanent hyperplasia in the *plastic* tissues of childhood. Much less commonly the cause of the hyperplasia is found in repeated attacks of inflammation of the pharyngeal tonsil. In the former mode of origin the surface of the hypertrophied portions presents only a certain wavy irregularity without other change; in the latter variety the remains of the inflammatory process are always found in the form of deep lacunæ, inspissated or coalescent masses of secretion, and in the presence of small cysts (Plate 31, Fig. 3; Plate 32, Fig. 2) on the surface, produced by adhesions or by the growing together of the epithelium over the clefts remaining in the gland after the inflammatory

processes. In the pharyngeal tonsil the most characteristic and most troublesome conditions of this kind are found in the median and lateral recesses (Plate 22, Fig. 1). The inflammatory origin of these structures is proved beyond a doubt by the fact that they occur only in later years.

A general hyperplasia is occasionally accompanied by the presence of small, sessile, or pedunculated neoplasms, consisting either of connective tissue or of epithelium.

Hyperplasia of the lingual tonsil is observed only in adults, and may present all the symptoms that have just been described.

Anatomically, the various enlargements of the tonsils are found to consist, in the main, of proliferation and multiplication of the lymph-follicles. During childhood, and in conditions unattended with inflammation, there is very little interstitial tissue and only a small amount of vascular new formation observed, while in persons of more advanced age, or after some inflammatory process, the follicles, owing to obliteration of connective tissue, become thick, and trabeculæ with numerous new blood-vessels are formed (Plate 31, Fig. 2). Owing to the irritation of the inflammatory material at the bottom of the lacunar clefts, the epithelium at that point proliferates and forms large masses; sometimes the epithelium on the surface also becomes thickened and converted into horny strata.

A special feature of enlargement of the pharyngeal tonsil is the presence of the histologic structures characteristic of tuberculosis, without the exterior of the tumor being in any way distinguished from other forms of enlargement, there being, especially, an entire absence of ulceration. Since the lymphatics of the adenoid ring represent the channels by which tubercle bacilli reach the maxillary and cervical glands, the fact that the latter present a scrofulous appearance cannot be utilized to determine whether the bacilli are the cause of the hyperplasia, or whether they have invaded the hyperplastic tissue secondarily. It may be that it is this infection

that is responsible, in certain cases, for the recurrence of the tumor after operation; at all events it cannot be distinguished from other tumors except by histologic examination.

The **symptoms of hyperplasia of the palatal tonsils** are often quite insignificant unless the inflammatory recurrences that have been mentioned make their appearance. During the intervals between the inflammatory attacks little is to be seen, as the enlargement is only moderate; but in severer grades, when the tonsils are in contact and even when the tissues are at rest, or at least during the act of deglutition, speech becomes nasal, owing to the insufficient action of the soft palate, and the voice, owing to the interference with the movements of the tongue, sounds as though the individual were speaking with his mouth full. The swallowing of large morsels of food gives considerable pain, and the mechanical interference with the act of deglutition often causes the ingesta to regurgitate into the larynx or through the nose.

Enlargement of the lingual tonsil produces symptoms of a more "nervous" character. It is not uncommon that a diagnosis of hysteria or neurasthenia is made when an irritative cough has existed for years without any laryngeal or pharyngeal conditions being found, although, as a matter of fact, the epiglottis is constantly being irritated by the enlarged lingual tonsils, which cannot be seen in an ordinary examination of the throat. On the other hand, the epiglottis may be wedged underneath the adenoid tissue and produce a reflex irritation in that way. In addition, the patients often complain that they feel as if there were a foreign body in the throat; as if they had swallowed a fish-bone; or they describe the well-known "globus hystericus," which has always been regarded as characteristic of hysteria. These abnormal sensations, as is always the case in diseases of the throat, are often referred to situations far removed from the point of irritation. From what has been said in the section on General Symptomatology,

it follows that the sensory irritation and motor reflexes may exert their influence in regions far remote from the seat of the disease.

It is thus seen that the symptoms of hyperplasia, both of the palatal and of the lingual tonsil, present nothing that is characteristic, and the diagnosis practically has to be made by direct visual examination.

The case is different with the **pharyngeal tonsil.** One who has had any experience at all can draw his deductions from the history alone and from the general symptoms. A child of six to twelve years is brought for examination. The parents think there must be something in the child's nose because it often keeps its mouth open, is unable to blow its nose, and "is always full of mucus." On examination, it is found that the mouth as a matter of fact stands open, the chin hangs down, the nasolabial folds are obliterated, and the whole appearance of the face is dull, and often absolutely idiotic (see Fig. 24). The upper lip may be somewhat swollen, the retromaxillary and inframaxillary glands are often enlarged, and the picture of "scrofulosis" is completed by the pale and somewhat bloated appearance. The nose is examined because the patient complains of obstruction, and nothing is found to explain the interference with respiration. The inferior and middle meatus are quite free; it is even possible to see the posterior wall of the pharynx. The only inference is that there must be some other obstruction. Another careful examination is made, and the patient is asked to swallow. It is found that the parts about the pharynx remain quite immovable. In another case the choanæ appear unusually wide, and from the upper margin a smooth, somewhat wavy structure is seen protruding into the lumen (Plate 20, Fig. 2). In both of these cases, which it must be admitted are not so very common, the cause of the stenosis may be directly seen. In the first case it is the pharyngeal tonsil hanging down behind the choanæ like a curtain, and obscuring the movements of Passavant's fold and of the tubes

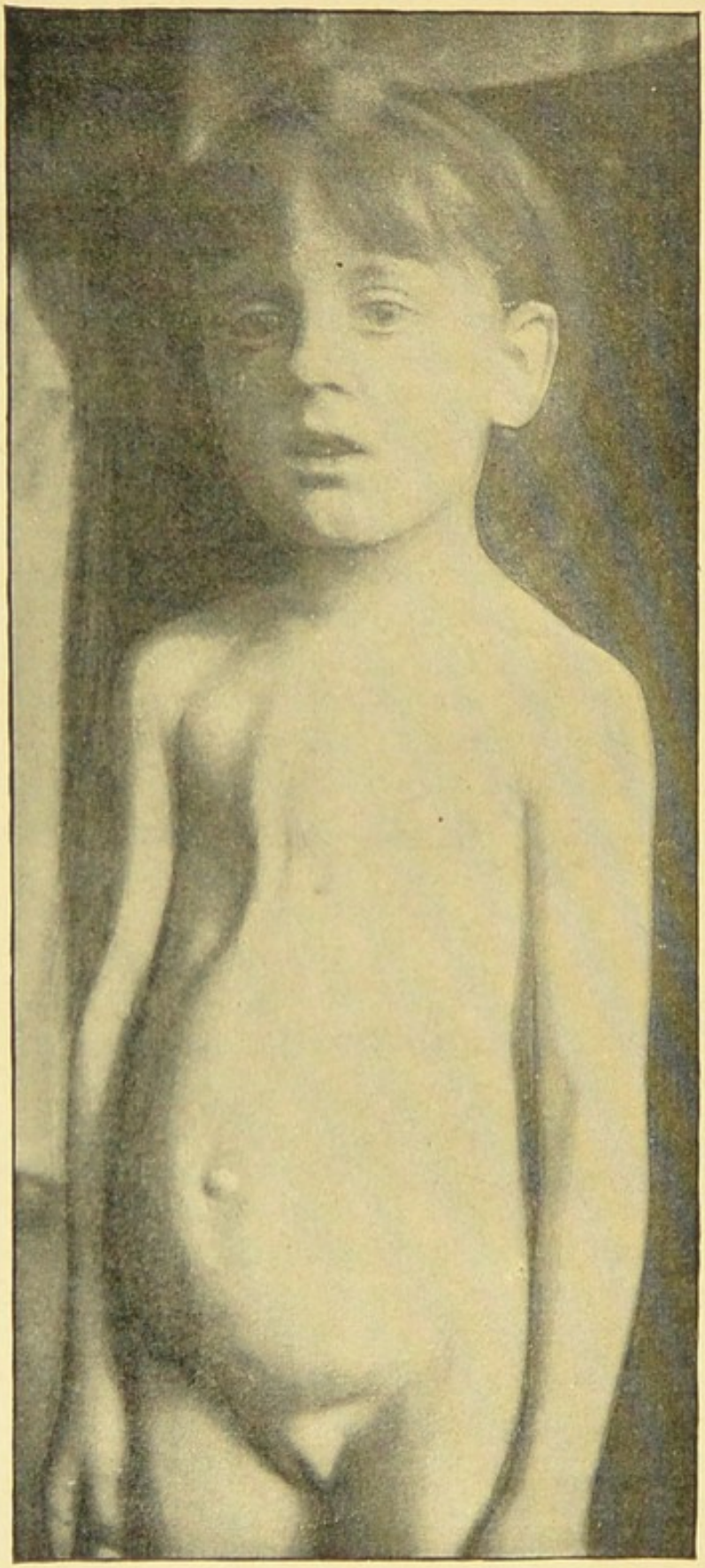

FIG. 24.—Characteristic appearance in pharyngeal tonsil.

during deglutition; in the second it is an adenoid vegetation of moderate size, the lower margin of which is visible.

Slight enlargements of the pharyngeal tonsil, which may not be visible although it is quite possible to see through the nasal meatus, may produce a good deal of nasal obstruction if they are situated in the fornix, so as completely to arrest the physiologic air-current at the point where it comes in contact with the upper wall of the pharynx and is deflected downward (see p. 16)..

In most cases, however, the conditions are somewhat different: the lower turbinates are pale and greatly thickened, especially in front; the inferior nasal meatus, particularly in the median enlargement of the floor of the nose, contains numerous gray and yellow masses of mucus, or possibly a few drops of pus—very rarely dry crusts. The breath has a peculiar, musty odor, due to the decomposition of secretions in the mouth.

The oblique or transverse position of the incisors and canines is often quite noticeable. Sometimes individual teeth are found directly behind their neighbors, for they have no other room to grow, as the lower, and particularly the upper, jaw, is compressed laterally; the palate is high, and suggests the shape of a church roof. When the tongue is depressed and the soft palate contracted by the reflex choking which ensues, a thick mass of mucus is seen to glide down the posterior wall of the pharynx. This sign is practically pathognomonic of adenoid vegetations in children. Owing to the inadequate ventilation or complete absence of ventilation, the masses of tenacious mucus produced by constantly secreting follicular and glandular tissues are unable to escape, and accumulate in the pharynx. They are identical with the mucus that we have already seen deposited in the anterior of the nose. In exceptional cases the lower extremity of the tumors attached to the posterior wall is seen to project beneath the soft palate.

In the cases described so far the symptoms which called

the parents' attention to the seat of the trouble, and naturally directed the physician's examination to the proper point, were all referred to the nose. This is not always the case; sometimes the physician is consulted on account of deafness said to have developed within a week. The ear is examined, although the little patient's face may already have given us an inkling of the state of affairs, because it is better to secure the parents' coöperation, and there we see a pale, somewhat retracted, or possibly opaque drum-head without the slightest sign of irritation. We find the hearing reduced, often to an alarming extent, so that the whispered voice can be heard only at a distance of 10 cm., or there may be an obstinate, possibly a fetid, suppuration, without any signs of bone-disease, or perhaps associated with bone-disease. In the first case that we have supposed, adenoid vegetations are present almost beyond a doubt, for only "congenital" or syphilitic stenosis of the tubes—both extremely rare conditions—can produce such symptoms in children. In the second case it is absolutely necessary to look for the adenoid vegetations, for the otitis has either been produced by the introduction of some of the infectious material that fills the nasopharynx or it is kept up by the passage of such material and by the insufficient tubal ventilation.

Let us take another example. A clinical history reads somewhat as follows: The mother has often told the family physician that her nine-year-old boy is constantly troubled with headaches. During the summertime the headache was attributed to the heat; during the fall, to the extra tax on his brain incident to the beginning school-work; and during the winter it was supposed that the headache was probably due to the long confinement indoors, which isn't good for anybody. However, the warm days of spring arrive, and although the family goes away for a week's change of air at Easter, and some improvement is noted, there is no radical change in the child's condition. The boy looks tired and pale—perhaps he has grown somewhat rapidly, so we will give him iron.

But his condition does not improve. In spite of careful examination no good reason can be found for this nervous headache. There is no tape-worm, no well-founded suspicion of masturbation, nor any other reasonable cause. What is to be done? Don't send your patient to a spa; don't keep him out of school for six months; don't keep on doctoring; especially, don't brand the poor little chap as a malingerer. The only proper thing to do is to examine him. Examine him, and examine him for adenoids. Not only nine out of ten times, but forty-nine out of fifty times, adenoids will be found. It not only means a freedom from present troubles to the little patient, but in many cases the saving of his health and career for life. The true cause of these juvenile headaches is often overlooked, because the general appearance does not at all correspond to the type that has been described, the hyperplasia having developed during the later years of childhood on a congenital foundation and after some intervening disease—too late, therefore, to impress upon the patient's features the characteristic appearance.

On the other hand, the cause is more readily found in another group of cases in which the anxious father, after punishment and extra work at home have equally failed to keep the boy up in his school-work, is told by the teacher that he has noticed the *want of concentration* in the boy, who at other times may be quite attentive and is generally well behaved. When he is called up he starts as if he were frightened out of sleep, can't collect his thoughts, forgets everything in a very short time, and is absolutely unable to concentrate his attention on one subject for any length of time. The latter symptom, known under the name of "aprosexia," has been found to be particularly characteristic of enlargement of the pharyngeal tonsil. [This term has been overworked. There is, indeed, a true aprosexia, but many cases reported under this category have shown by their subsequent course that the lack of mental attention has been due solely to deafness.—Ed.] It occurs chiefly when the tumor is large and develops

early, and is, therefore, usually combined with the typical facial expression. This, with its vacant stare, corresponds perfectly with the psychic abnormality and is due in the main to stagnation of the lymph at the base of the skull, which always accompanies the presence of large adenoids (see p. 18). This aprosexia, from the frequency of its occurrence, always calls for an examination, even in the absence of other less important psychic symptoms.

Examination is always necessary to justify an operation, even when, as has been described above, the hypertrophied tissues are plainly visible through the nose. It not only enables one to plan the operation accurately, but is, in addition, indispensable for purposes of diagnosis, for it occasionally happens that a part at least of the above-described symptoms are produced by some other cause, such as tumors of a different character, disease of accessory sinuses, congenital abnormality, rachitis, imbecility, and the like.

In the case of adults even greater caution is necessary. In them headache is much more often due to other causes, acting either within or without the nose, pharyngeal secretion depending not only on pharyngeal, but more commonly on nasal, or rather perinasal, disease.

These are the most conspicuous and most important conditions; they do not, however, exhaust the list of possible sequelæ. Fig. 24 shows a **deformity of the thorax** which is not infrequent in the disease under discussion, and consists in retraction of the lower true ribs opposite the line of attachment of the diaphragm. The deformity is, therefore, aptly termed "**diaphragmatic furrow.**" Its production is due to the fact that the inspiratory tension of the diaphragm is not compensated for want of the amount of air necessary to distend the inferior portions of the lungs, the pull of the muscle causing retraction of the ribs, which, in children, are soft and yielding and sometimes rachitic. The deficient ventilation can also be determined by percussion at the apices, and is an important factor in producing or keeping up the ominous

apical catarrh—in other words, tuberculosis. When, on the other hand, there is a tendency to emphysema or mild grades of emphysema exist, the evil is aggravated by mouth-breathing, which affects expiration quite as much as inspiration, and by the stasis that is always present to a greater or less degree in the pulmonary tissue.

Even in cases in which these grave symptoms are not observed the insufficient oxygenation is indicated by the anemic and bloated appearance of the children; and the evil influence on the general health is increased by the decomposition of the secretions which are constantly swallowed.

It should be especially emphasized that the phenomena of **nasal enuresis** and **nasal epilepsy** referred to in the general portion of this work (see p. 27) are chiefly due to adenoid vegetations.

During the *examination* the patient should be placed on a chair in such a way that his mouth is at the same level as the examiner's eye. Little children should be held by the mother or other attendant, who holds the child's legs between her knees, but only lightly, so as to avoid provoking resistance at the very beginning of the examination. The child's cheeks should be touched with the tongue depressor and with the mirrors to show that they do not cut, and he may even be allowed to use the mirror himself. Children that are at all tractable will usually allow themselves to be examined at once.

Unless there is a good deal of mucus, the nasopharynx can be readily seen. Several sizes of tumor may be distinguished for the sake of simplicity as follows—First grade: The tumor does not extend down to the upper border of the choanæ. Second grade: The tumor blocks the nasopharynx down to the choanæ. Third grade: The tumor encroaches on the opening of the choanæ. If it is found impossible to see, palpation must be resorted to, as described on page 35. It is a characteristic sign that

the finger is always stained with blood when it is withdrawn, as the pharyngeal tonsil is very easily torn. During palpation the presence of hyperplasia on the posterior wall must incidentally be noted, because the latter cannot be felt with the instrument.

The **treatment** of hyperplasia of the tonsils must always be surgical. Local applications, cauterization, and similar measures are absolutely useless. Operation on the palatal tonsil is indicated in the presence of recurring attacks of angina and their complications or sequelæ, revealing a constant focus of infection which is found by inspection in the lacerated tonsil, and when the enlargement is so great as to interfere with swallowing. Ablation of the lingual tonsil is indicated when the above-described symptoms are present. In children adenoid vegetations of any size must always be removed, because the consequences, especially the deafness, while they may not be marked at the time, rarely fail to make their appearance later, when it may be too late to correct them.

At a more advanced age thorough clearing out of the nasopharynx is usually done as a preliminary measure for the relief of pharyngeal symptoms, particularly insufficient ventilation, as well as in the treatment of sequelæ within the nose or independent nasal affections, such as hyperplasia of the turbinates and inflammations of accessory sinuses. Even in older children the extirpation of adenoid vegetations is indicated only in the presence of sequelæ, since, if the latter are absent, there is some reason to expect involution of the tumor, which usually takes place after adolescence.

A small tumor in an adult need not be extirpated unless its evil influence on some other condition is clearly established. Patients in the initial stage of phthisis, who suffer from insufficient nasal ventilation, may, therefore, be treated in this way.

Small palatal tumors that are badly ulcerated and cannot be readily seized with the instrument can be treated only by opening up the crypts, as described on page 140.

Lingual tonsils in the same condition must be cauterized with trichloracetic acid or the galvanocautery if they give trouble; but larger tumors of this kind and all pharyngeal adenoid tumors must be *extirpated*. To remove the lingual tonsil either the cold or the galvanocaustic snare may be used. For ordinary tonsillotomy the old Mathieu's tonsillotome is still the best. It enables the operator to avoid the dangerous accident of dividing the capsule at the point where it is pierced by the tonsillar artery, since the section represents the cord of the arc formed by the capsule. If the knife is used and the tonsil is drawn inward with Muzeux's hooks, there is much more danger of striking the capsule; while with tonsillotomes that act by compression and not by traction, like Mackenzie's and similar instruments, there is also a risk of dragging the tonsil too far forward. It follows, therefore, that the tonsil is not to be removed altogether, since we anxiously avoid dragging out the external middle pole. [A less conservative view is taken in this country regarding the removal of the entire tonsil. Strenuous objection has been made by more than one American authority against defining a tonsillotome as "an instrument for removing part of the tonsil." Most operators endeavor to remove as much of the organ as possible. The more complete the removal is, the less, naturally, is the probability of reënlargement. In proportion to the whole number of operations, alarming hemorrhage is extremely rare. Great care should be taken to see that the faucial pillars are not adherent to the organ. With this precaution there is very little danger of wounding the anterior pillars, an accident largely responsible for excessive bleeding.—Ed.] Hence there is a possibility that the portion left behind may enlarge, in rare cases even to its original size, a point to which the patient's attention should be called at the beginning. It is a good rule to observe caution in the matter of prognosis in anything connected with the pharyngeal ring. The symptoms attributed to the lingual tonsil often depend not only on the local irritation, but

also on a general neurasthenic basis, and the alterations accompanying "adenoid tumors," such as intranasal swellings and excessive nasal secretion, may be due to other causes. Besides, although the operation may have been quite thorough, the tissue left behind is capable of growing, and in very rare cases does actually undergo proliferation, so that while there is every reason to advise the operation, as soon as its necessity has been recognized, the patient should be distinctly informed of these facts.

Tonsillotomy can almost always be performed without anesthesia, even without cocainization, which should be avoided because the reactive engorgement of the blood-vessels that follows cocainization is very apt to produce a marked secondary hemorrhage. The usual hemorrhage, amounting to from 50 to 100 c.c. (say 1.5 to 3 ounces), ceases entirely after a few minutes, or at most requires a little mild gargling with cold water. The extremely rare accident of hemorrhage from the tonsillar artery can be controlled by direct compression with a finger or with a cotton pledget held in a dressing forceps, or by compression of the external carotid. Mikulicz has devised a special forceps by means of which permanent internal and external compression can be applied.

To diminish the pain after the operation, the wound may be dusted with orthoform after the hemorrhage has ceased. The only after-treatment required is regulation of the diet, which should be tepid, soft, and bland, and regular gargling after each meal. As the wound, like any other wound in the mouth, soon becomes covered with a yellowish crust of fibrin, the patient should be informed at once that it is not diphtheria.

Extirpation of the pharyngeal tonsil differs from an ordinary tonsillotomy in that it includes complete removal of the foreign tissue. The structure, which under normal conditions undergoes complete involution, is of no physiologic importance whatever; its radical extirpation is unattended by danger and is all the more necessary as portions that are left behind in a superficial operation

very frequently undergo proliferation, and as the symptoms which may be produced by a comparatively small tumor in the fornix or at the tubal fold continue just as bad as before.

Owing to the comparatively wide distribution of the various portions of the tumor on the upper and posterior lateral walls of the nasopharynx and on the arch of the fornix, complete removal at one stroke is absolutely impossible. Although with a suitable instrument a tumor the size of that represented in the accompanying illustration (Fig. 25) may be removed at one sweep, there will usually

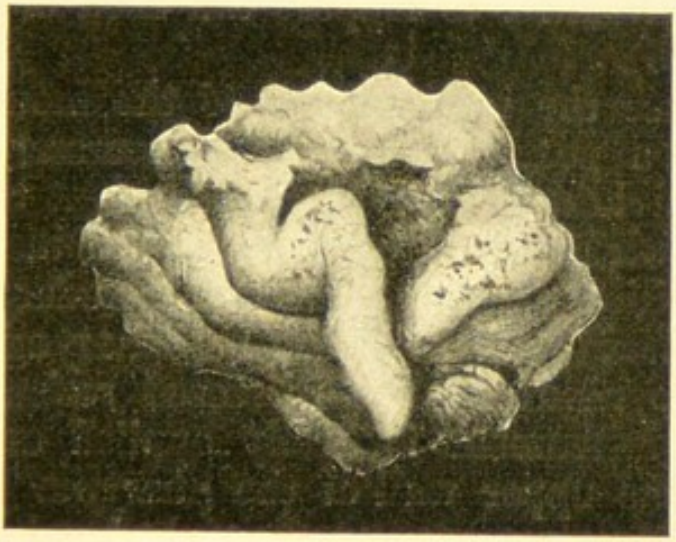

FIG. 25.—Hyperplastic pharyngeal tonsil (natural size).

be enough tissue left behind to require a second interference. For this reason, while adults may be operated on without anesthesia, children practically always, with the exception of the very rarest cases, require a general anesthetic.

The author long ago gave up the practice of having the children held by force and attempting to perform the operation under these unpleasant circumstances, as the results are, as a rule, anything but satisfactory. After anesthesia has been induced, the child's trunk is raised and the head placed on a roller pillow. No mouth-gag need be used, a depressor sufficing to keep the mouth open.

The instrument recommended for the operation is Gottstein's knife. The degree of curvature in the original instrument is insufficient to enable the operator to reach the upper wall of the pharynx, because the necessary depression of the handle is prevented by the teeth of the lower jaw, and the straight surface of the latter also interferes with the introduction of the instrument into the concave fornix. The author is therefore in the habit of using a knife with a double curve, one in the blade and one in the handle. In addition it has the lateral bend recommended by Schrötter for laryngeal instruments (not visible in this illustration), which leaves the view unobstructed, and finally a shoulder to support the back of the index-finger (Fig. 26).

To introduce the instrument into the mouth it must be held like a pen. Great care is necessary to avoid injuring or dividing the uvula, an accident that, to the author's knowledge, has occurred. The instrument is then seized with the entire hand and introduced, first on the left-hand side in front of the nasopharyngeal cavity, which is recognized by the increased resistance. The edge of the instrument is firmly applied and brought down along the upper wall of the pharynx. The same movement is then repeated on the right-hand side. The instrument is at once withdrawn, and at the same instant the attendant turns the child on its right side, face down. The surgeon during the operation stands at the child's right side. As the anesthesia by this time has partially subsided, the child at once begins to cough and cry, and this, with the position, suffices to prevent aspiration of blood into the air-passages, and the ablated fragment of tissue, if it is not brought out with the instrument, is at once ejected. Sometimes it is swallowed or it gets into the nose and must be extracted, or the child must be made to blow it out. Occasionally it remains adherent to the posterior wall by a shred of mucous membrane. In such a case it is to be at once removed with forceps or scissors.

More of the anesthetic is then given, and the posterior wall of the pharynx curetted with an ordinary Gottstein knife, after which the surface is carefully palpated while the child is still under the anesthetic. In almost every instance a shred of tissue will be found that needs removal; if necessary, a tonsillotomy may be performed at the same time. [The combined use of nitrous oxid gas and a little ether renders it unnecessary to give an additional dose of the anesthetic. A skilful administrator can determine at will the length of the period of unconsciousness after the withdrawal of the anesthetic, and can with perfect safety make this period amply long enough for all the manipulations described.—Ed.] The after-treatment consists solely in seeing that the child blows its nose properly (see p. 22). *Irrigations* and measures of that kind are to be avoided, and, in fact, *explicitly forbidden.*

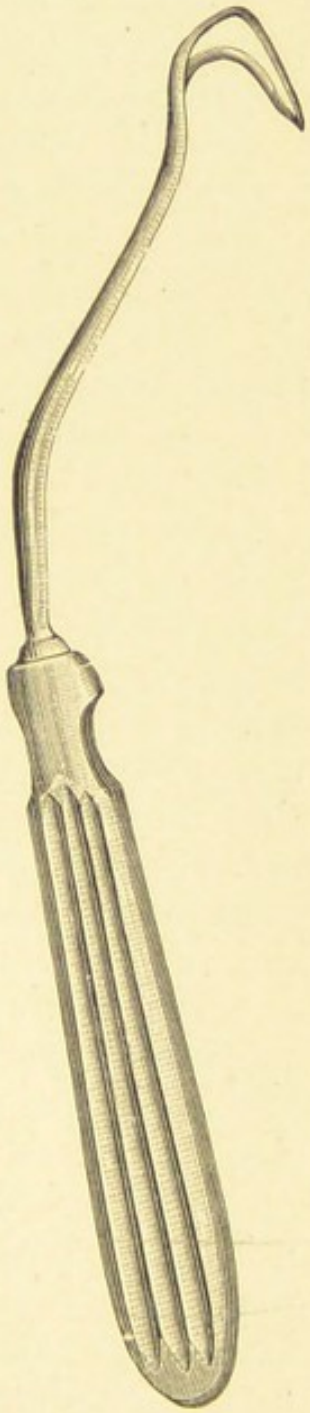

Fig. 26.—Gottstein's knife (half size).

Secondary hemorrhage is always due to improper technic. [We cannot agree with this strong statement. Hemorrhage has happened in the experience of the most skilful operators, and is by no means uncommon, as the perusal of the literature of the last five years will amply show. Incomplete removal, however, is doubtless one of its most frequent causes.—Ed.] Either one of the tubal folds has been injured, especially when one of the instruments invented for lateral curetment has been used, or the ablation has not been thorough, the tumor having merely been lacerated instead of completely removed. In such a case

the operation must be completed at another sitting. The rare condition of hemophilia, which can be determined before operation is decided upon, need not be discussed in this connection. (For general directions in regard to arresting hemorrhage consult p. 42.) If the operation is performed without anesthesia, all the steps just described will, of course, not be necessary. In such a case, if final palpation has not been performed, the patient must be examined after ten or fourteen days, which is the time required for the clot and reactive swelling to disappear. In almost every instance considerable remains of tissue will be found that need removal, and the surgeon will convince himself that without this careful examination the operation must always be incomplete.

More or less related to the pharyngeal tonsil is the peculiar form of tumor described as fibroma of the nasopharynx, fibroid of the base of the skull, or retromaxillary polypus, and for which the author has suggested the term **juvenile sarcoma of the nasopharynx.** The tumor occupies the upper wall of the pharynx—the basilar fibrocartilage; it occurs chiefly before and during puberty, and in boys. Histologically, and so far as absence of glandular infection or metastasis is concerned, the tumors are benign. Clinically, however, they may, as appears from a few cases, become malignant by their continuous growth, which produces fatal destruction in the important organs situated in this region. The peculiar feature of these tumors is that in a large proportion of the cases they undergo spontaneous involution after puberty. This peculiarity strongly suggests the hyperplasia of the pharyngeal tonsil, which also undergoes involution after puberty, develops at the same site, and resembles them in structure. It is true that the greater portion of the tumor consists of firm connective tissue with short fibers, but the delicate blood-vessels and islands of spheric lymph-corpuscles (Plate 32, Fig. 3) strongly suggest the picture of adenoid tumors in later

life. It would appear as if the new formation of connective tissue accompanying the process of involution had taken on a progressive atypical character.

Clinically, the tumor betrays its nature only when it begins to undergo rapid development, sending processes into the mesopharynx, the nose, later into every nook and cranny of the adjoining tissues, the pterygopalatine fissure, the sphenomaxillary fossa, the orifices of the accessory sinuses, and the orbits. Ultimately it invades the adjoining bones, not by infiltration, but by the pressure of its growth, enters the cavity of the skull, and brings about a fatal termination. The surface of the tumor is smooth, of a dull luster, slightly wavy (Plate 26, Fig. 3), and often marked by traumatic erosions and tissue defects.

The **symptoms**, of course, vary greatly according to the stage of the growth. Total nasal obstruction is always present; later irregular swellings appear in various portions of the face and of the maxillocervical region; still later blindness and deafness may develop. A certain dulness and desire to sleep are among the early symptoms. The cerebral irritation due to the pressure on the basal nerve-trunks completes the clinical picture. The frequent occurrence of hemorrhage is a characteristic symptom.

Although there is some hope of involution taking place, it is bad surgery to trust to it alone, for, on the one hand, it may not occur, and, on the other hand, the tumor may produce lasting injuries during the course of its growth. It is, therefore, advisable to proceed against the tumors as early as possible, especially as artificial diminution of the growth appears to stimulate spontaneous involution, and, in addition, avoids the disfigurement and the danger from inspiration pneumonia incident to an external operation. The latter was formerly much more commonly performed than at present, although it does not always enable the operator to do a radical extirpation and protect the individual against recurrence.

Small tumors that are not attached to the walls by adhesions can be removed with the hot snare. As it is often impossible to introduce the snare through the nose, because the space of the nasopharynx is entirely filled by the tumor, the free ends of the snare may be introduced through the mouth by means of a Bellocq cannula and drawn out through the nose. They are then drawn taut around the tumor by means of the carrier, and the base of the tumor is gradually divided. For the treatment of the stump and of tumors that cannot be removed with the snare electrolysis has been found extremely useful. Alternating currents of 20 to 50 milliampères applied for a quarter of an hour—*bipolar*—suffice to soften the hard peduncle and cause it to come away. Bloody procedures, avulsion of individual pieces with the forceps or with scissors, are to be deprecated on account of the already existing anemia in the patients; they are quite unnecessary if the above-mentioned measures are employed. The occurrence of postoperative gangrene in the necrotic portions can be avoided by the free use of iodoform.

MYCOSES.

Thrush is a frequent disease in infants, but rarely occurs in adults. The mouth and the anterior portions of the pharynx become covered with the threads of the oïdium albicans in small white islands, which later coalesce to form membranes on a somewhat reddened base (see Plate 14, Fig. 1). The aphthous membrane is removed with difficulty, and not without destroying the epithelium, as the threads penetrate the superficial layers of the tissue. Secondary lesions may occur in the brain and kidneys through metastases in the blood-channels. Except for this possibility the course is favorable, unless, as is chiefly the case in adults, the disease depends on a grave general disorder. Thrush never occurs in the mouth of healthy individuals. While in an infant's mouth the acid reac-

tion in itself forms a favorable soil for the growth of the fungus, which may be derived from insufficiently cooked food when the gastric function is somewhat disturbed, adults become predisposed only by a severe exhausting general disease or gastric disorder, and although the immediate infection may be removed, relapses may be expected as long as the general condition remains the same.

Treatment should, therefore, be directed chiefly toward the basal cause. The local treatment consists in painting the parts in infants with a watery solution of boric acid; in adults, with an alcoholic solution of salicylic acid.

The fungus, known as *leptothrix buccalis*, sometimes invades the surface of the tonsils. Small yellowish-white granules are found at the orifices of the crypts, more rarely on the neighboring mucous membrane, producing **pharyngomycosis leptothricia** (Plate 14, Fig. 3). So far it has been found impossible to distinguish the disease clinically from chronic cornification of the epithelium, which presents a picture similar in every respect. The presence of the fungus produces no symptoms beyond the psychic ones. Empirically, the smoking of tobacco has been found to be one of the best of the milder *remedies*.

Finally, mention may be made of **nasal mycosis** due to the growth of fungi in the nose. *Aspergillus fumigatus* and *glaucus*, *penicillium glaucum*, and *puccinia graminis* have been found, usually in the form of grayish-white or grayish-brown friable shreds adherent to the swollen mucous membrane of the nose or of the antrum. The aphthous membrane is readily removed and emits a musty odor like mildew. Purulent secretion has also been observed. The **diagnosis** can, of course, be made only by the aid of the microscope. A **cure** can be effected by means of mechanical cleansing and the use of mild antiseptics.

NEOPLASMS.

HOMOLOGOUS NEOPLASMS.

Homologous neoplasms are tumors that correspond in structure and arrangement with the basal tissue or its component parts. Neoplasms of individual portions of tissue present the true character of tumors, while hyperplasias of several or of all the constituents of the tissue are usually inflammatory in nature and have already been discussed in former sections. The commonest tumor derived from true connective tissue is the **fibroma.** Simple fibromata are not common in any part of the oropharynx. They occur in the form of a thin, pedunculated tumor on the soft palate and on the uvula more frequently than

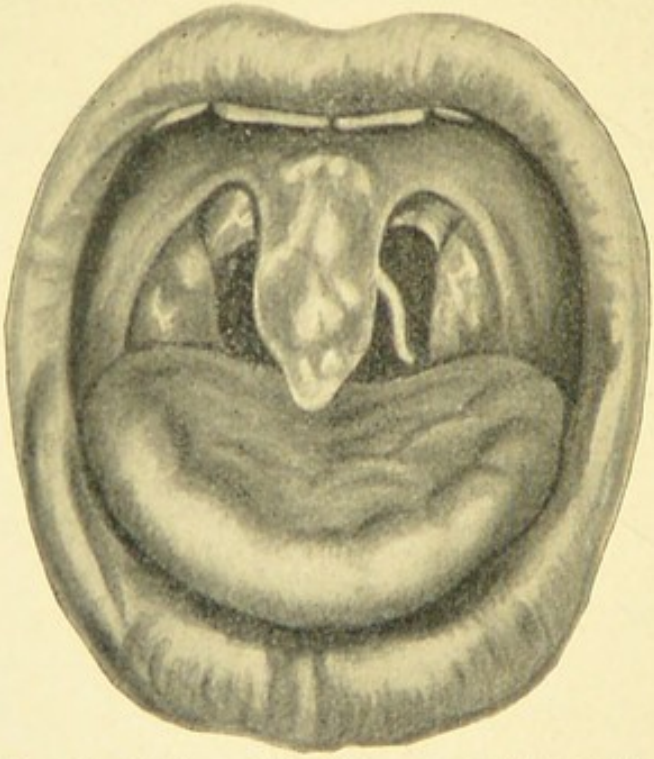

FIG. 27.—Pedunculated fibroma on the uvula.

elsewhere, and as they are in close contact with the tissues and resemble in color and smoothness the rest of the mucous membrane, they often escape observation (Fig. 27). On the tongue they are more apt to occur in the form of a broad tumor underneath the mucous membrane, which

may present superficial proliferation of the epithelium and thus mask the actual neoplasm. Broad tumors of this kind are also frequently seen in the hypopharynx (see *Atlas of Laryngology*, Plate 27, Fig. 2).

Granulomata are tumors consisting of loose-meshed tissue, containing principally round-cells. They occur in the neighborhood or at the site of frequently repeated irritation, and accordingly represent true inflammatory tumors. They are observed occasionally on the gums of carious teeth in the form of **epulis** (Plate 5, Fig. 1); if the growth is derived from the alveolar periosteum, it is designated more correctly a **periodontoma.** In the nose the tumors sometimes occur at the point where irritation is most frequent or around a traumatic ulcer. Here also they consist in the main of inflammatory, newly formed, round-cell tissue, containing a few glands; or they present a somewhat papillary form as the result of epithelium proliferation. Owing to the great vulnerability and exposed position of these little tumors and their tendency to frequent bleeding they have received the name of "bleeding polypi of the septum," a term that should, however, be discarded, since it is purely symptomatic, and bleeding tumors of a very different nature may occur in the same situation. After a time these granulomata may assume a more fibromatous character from the multiplication of connective-tissue fibers.

If the epithelium, either primarily or secondarily, shares in the abnormal growth, the connective tissue is drawn out into papillæ and there ensues, if the epithelial proliferation is extreme and extends into the depth of the tissue, the **papillary fibro-epithelioma;** or, if the epithelial covering merely becomes thickened and maintains its relation with the papillæ, the **papillary fibroma.** The former variety may also be described as the **hard,** the latter as the **soft, papilloma.** The hard variety is more frequent in the mouth, especially at the pillars of the fauces, and may be either broad and sessile or pedunculated (Fig. 28). It is rare in the pharynx and in the

nose (Plate 30, Fig. 2). The soft variety preferably affects the middle turbinate (Plate 28, Fig. 2), and is to be carefully distinguished from a lobulated mucous polypus, the base of the papilloma being always a solid plate, while the polypi grow each individually from the basal tissue.

Strictly speaking, homologous papillomata occur only in regions where papillæ are already present. They are

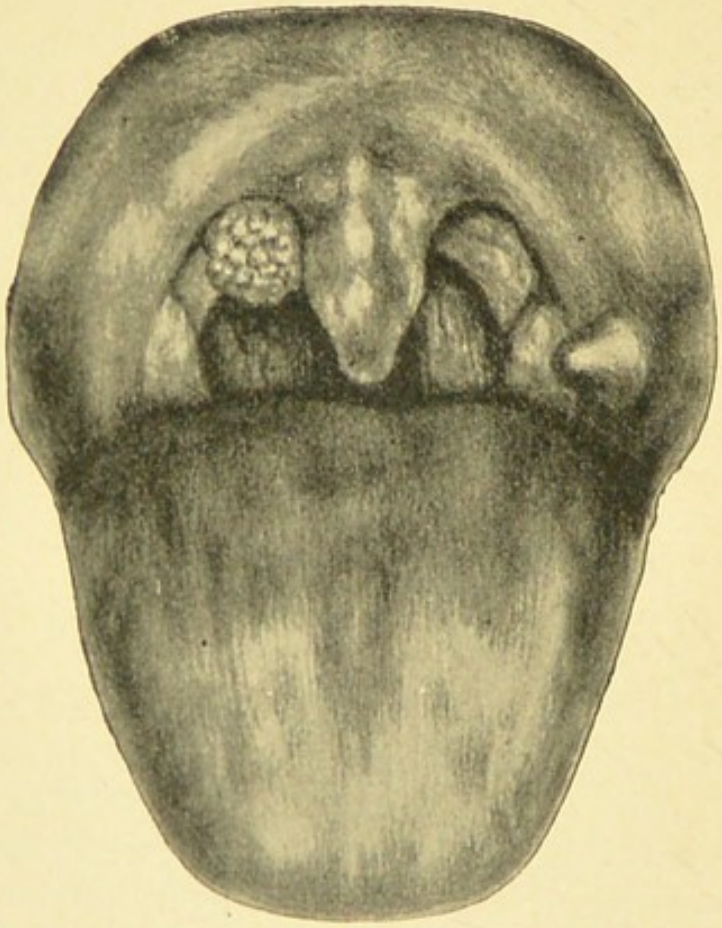

FIG. 28.—Papilloma and papilla foliata.

rare in the nose, because that structure contains no papillæ, and, accordingly, the epithelium occasionally undergoes atypical growth into the deeper layers (Plate 35, Fig. 2), so that the basal tissue is destroyed. The clinical course of these tumors is also marked by a strong tendency to recurrence, indicating a change to malignancy; hence the name "**malignant papilloma**" is justified.

The tumors can usually be removed without difficulty, either with the scissors or with the snare. For malignant tumors, however, the hot snare should always be used, and, if the gravity of the situation appears to warrant it, the surgeon should not hesitate to lay the interior of the nose open.

The filiform papillæ of the tongue undergo a peculiar multiple change described by the term **lingua nigra.** The papillæ, for the most part, become greatly elongated; robust layers of horny epithelium are formed; and the color varies from dark-brown to black. In extreme cases the tongue feels as if it were covered with hair (Plate 5, Fig. 3). The cause of this peculiar new formation is unquestionably specific in nature, but is quite unknown. Treatment is unnecessary.

Certain neoplasms consisting of aberrant tissue, so-called **lymphadenoid polypi,** are peculiar to the oropharynx. They are found on the surface or sides of the tonsils in the form of pea-sized, spheric, slightly elevated tumors, on a flat base, and consist of round-cells, with a sprinkling of follicles. **Papilla foliata** is a term applied to aberrant lingual papillæ, usually found adherent to the anterior pillar of the fauces (Fig. 28).

Lipomata are met chiefly on the tongue, on the floor of the mouth, on the buccal mucous membrane, and as "intramural" growths between the layers of the soft palate. Although they are of soft consistence and slow growth, the diagnosis is sometimes impossible before removal of the tumor unless the investing layer is so thin that the yellow color of the tumor is seen through it.

Myxomata are even more rare than the last-mentioned tumor, and have about the same distribution. They occasionally occur in the nose, usually in the wake of syphilitic processes.

Among connective-tissue neoplasms must also be mentioned **cartilaginous** and **osseous tumors.** The former, when homologous, occur only in the form of **ecchondromata,** and are found chiefly on the septum of

the nose, where they are not to be confounded with the ordinary crests and spines. They may be found on a deviated septum, as shown in Fig. 29, but they are never

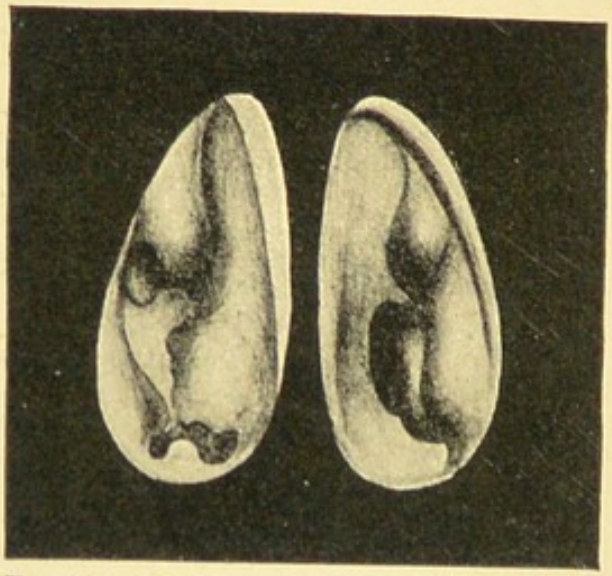

FIG. 29.—Enchondromata of the septum.

pointed or sharp, like ordinary excrescences, being usually knob-like in form, and never contain bone. Homologous osteomata are also observed in the form of exos-

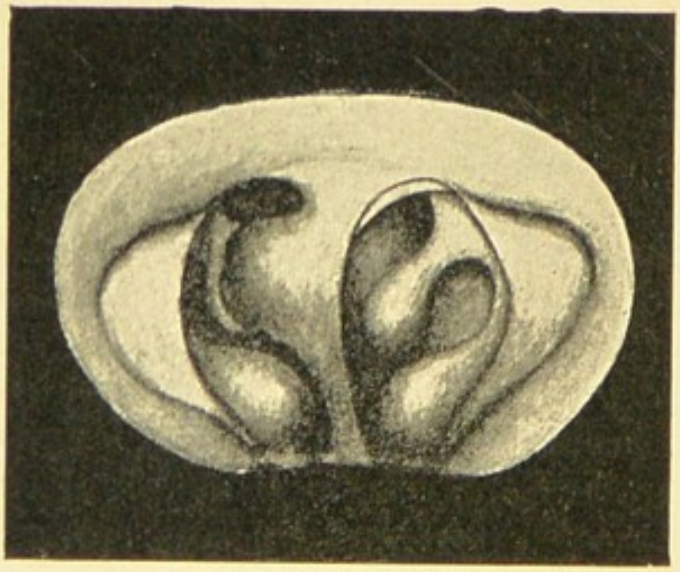

FIG. 30.—Exostosis of the vomer.

toses (Fig. 30) and large bony tumors within the nose, and must be distinguished from the ordinary bony hyperplasia of the septum. They are found in all the bony

portions of the nose and also in the accessory sinuses, where they occasionally assume large size and produce marked pressure phenomena. Whenever the tumors grow rapidly or the base is deep-seated, they must be removed with the same thoroughness as a malignant neoplasm.

Neoplasms consisting of *muscle tissue* occur in the tongue in the form of **total macroglossia,** which is always congenital, and, when of moderate extent, presents the picture of *lingua dissecata* (Fig. 31). It is

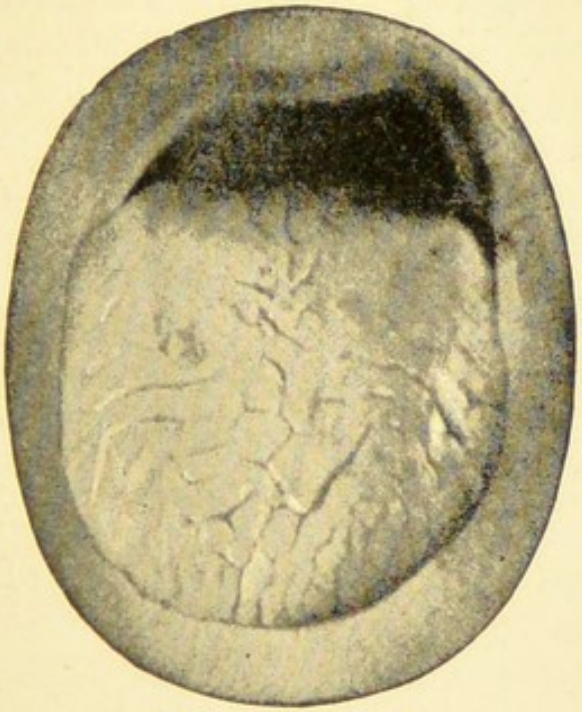

FIG. 31.—Lingua dissecata.

interesting to note that this abnormality is very apt to lead to the production of the superficial alteration known as geographic tongue (Plate 6, Fig. 2). Partial **fibromyoma** of the tongue has been observed in rare instances.

Vascular tumors include the **cavernous angioma** of the pharynx, which sometimes simulates hyperplasia of the tonsils. It is distinguished from the latter condition by the dark-red or blue color and the rapidity with which it shrinks on the application of cocain. It may be removed with the hot snare or by galvanopuncture.

Aneurysm is a much rarer, but much graver, occurrence. In the pharynx aneurysm forms a prominent, fluctuating tumor without altering the appearance of the mucous membrane. In spite of the presence of pulsation, which cannot escape attentive observation, these tumors have practically always been mistaken for cysts or abscesses and punctured, with the natural consequence of a severe hemorrhage. If the aneurysm is small and favorably situated, it may be enucleated, but, as a rule, the supplying vessel must be ligated.

In persons suffering from chronic catarrh or general venous stasis the dilatation of the pharyngeal veins may occasionally lead to the production of small **varices.** These are said occasionally to produce hemorrhages that may be quite considerable, and require for their control the application of the cautery.

Neoplasms consisting of **lymph-vessels** are a special feature in the mouth, occurring chiefly in the tongue. As a rule, they appear to be of an embryonal nature, as is indicated by the frequency of their occurrence in childhood and their predilection for the site of former branchial clefts. The exciting cause of their subsequent growth is usually some form of inflammatory irritation. Three principal forms are distinguished: **nodules, warts,** and the **diffuse** or **cystic lymphangioma.**

The nodular variety occurs most frequently at the base of the tongue, in the form of a broad, wart-like aggregation of hemispheric vesicles so minute that their true nature can sometimes be recognized only with a lens. A few scattered nodules may be found by the side of the principal aggregation. The diagnosis is complicated by the occurrence of frequent traumatic hemorrhages and the variable nature of the inflammation, which may be superficial or extend into the deeper layers of the tongue and into adjoining structures.

The diffuse variety presents the picture of a general enlargement of the lips and tongue, with a few visible

vesicles. The secondary changes in this variety are very marked and greatly confuse the diagnosis.

The rarest form of all—a real clinical curiosity and one that can be identified only by means of the microscope—is the lymphatic cyst, a smooth hollow tumor which so far has been chiefly observed in the tongue.

These lymphatic tumors are best **treated** by means of wedge-shaped excision, because the tumors usually infiltrate the healthy tissue. The indications for interference are rapid growth and secondary changes. Small tumors of this kind may exist indefinitely without producing symptoms.

Glandular tumors may occur anywhere, as hypertrophies both of the glandular layer of the turbinates and of the mucous and salivary glands of the mouth and pharynx. They take the form either of **solid** (diffuse or circumscribed) **adenomata** or of **cysts.** The diffuse variety is met most frequently on the upper lip, where it produces the deformity known as "double lip," and consisting of an additional fold of mucous membrane behind the normal vermilion; it is best removed by means of a wedge-shaped incision. Circumscribed adenoma occurs as a solid, soft tumor, sometimes in the nose in the shape of a polypus (Plate 35, Fig. 1), sometimes in the oropharynx as a broad, flat hyperplasia of individual salivary glands or as multiple small tumors of the mucous glands.

Cystic degeneration occurs chiefly as a concomitant of inflammatory hyperplasia of the turbinates (Fig. 36); more rarely it occurs in the form of isolated multiple cyst-formation in the same region. In the pharynx it is more common and represents the degeneration of individual mucous glands. Next in frequency of localization is the base of the tongue; and after that the various portions of the oral mucous membrane; in the latter situation the cysts rarely exceed the size of a pea.

Cystic degeneration of the **salivary glands** on the floor of the mouth leads to the formation of a typical

tumor known as a **ranula.** When the tumor occupies a median position it appears to be double, owing to constriction by the frenulum linguæ (Fig. 32). The cysts are, as a rule, readily recognized when they lie near the surface. If they are more deeply situated, an exploratory puncture may be necessary; before this is done, however, the differential diagnosis from a vascular tumor must be clearly established. The **treatment** consists in total removal by means of constriction; or, if the tumor is situated on a broad base, in extirpation of the cyst-wall.

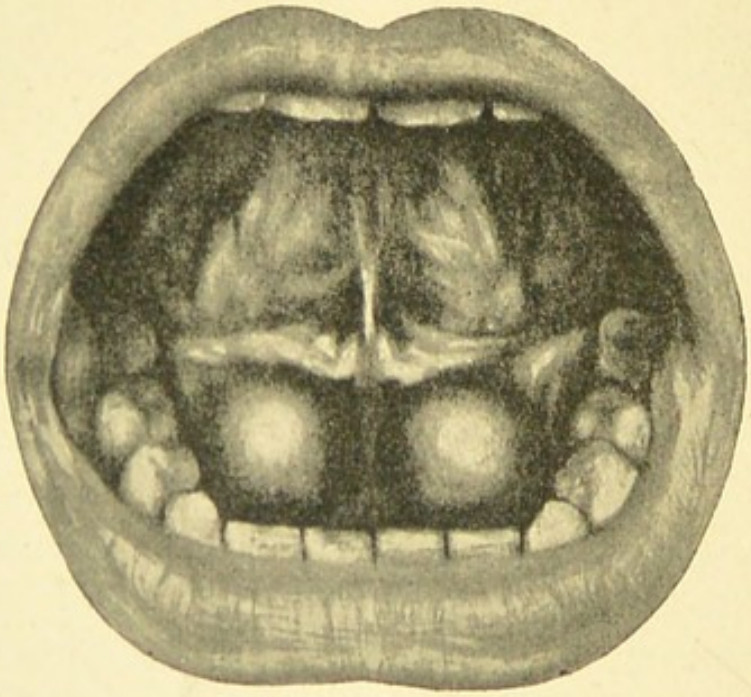

FIG. 32.—Ranula.

In this connection it may be well to refer once more to the *cysts* that are sometimes produced by adhesions between adjacent portions of the mucous membrane after inflammatory processes. They occur chiefly in the region of the lymphatic ring, and have already been referred to on p. 144. These cysts may, however, also be formed in other portions of the pharynx, particularly at the site of the branchial clefts. Hence they cannot always be distinguished, on the one hand, from dermoid cysts; and, on the other hand, owing to the fact that they are lined with epithelium, from cystic glands.

HETEROLOGOUS NEOPLASMS.

These tumors differ from normal tissue either by, first, an atypical arrangement of already existing structural elements, or, second, by the presence within their substance of foreign (atypical or abnormal) elements.

Most of the tumors of the first class also show a tendency to atypical, unlimited growth, and are, therefore, **malignant.** Even when they do not possess this clinical peculiarity at the outset they usually tend to develop it later on in their course. This is especially true of **endotheliomata.** Such tumors are composed of hyperplastic endothelium and perithelium of lymph- and blood-vessels, and accordingly present a reticulated stroma containing large and small nests of epithelioid cells the original nature of which is difficult to recognize, partly owing to the presence of fatty and mucoid degeneration and partly owing to their conversion into dense connective tissue and cartilage. The nature of the tumor is, accordingly, masked by a great variety of histologic pictures. Not infrequently the growth becomes excessive and leads to the formation of alveolar (endothelial) sarcoma or angiosarcoma, in which all the elements of the blood-vessels are represented (Plate 42). This degenerative process may be observed in any portion of the nasopharynx, whereas the typical endothelioma occurs almost exclusively in the substance of the soft palate, and if an "intramural" tumor is discovered between the two laminæ of the mucous membrane, the diagnosis of endothelioma in most cases is justifiable.

There is no doubt that these peculiar neoplasms are derived from remains of embryonal tissue in the same way as the **juvenile sarcomata of the nasopharynx** and the equally intramural **myosarcomata,** that have been described on p. 160.

Ordinary **sarcoma,** consisting chiefly of round-cells, more rarely of spindle-cells, occurs, in the pharynx, chiefly on the tonsils; in the nose its seat of predi-

lection is the anterior portion of the septum, so frequently referred to as the commonest seat of irritation, while on the turbinates and in the nasopharynx it is of distinctly less frequent occurrence (see Plate 23, Fig. 1). In the pharynx it appears as knob-like or nodular outgrowths, more rarely as a diffuse infiltration, while in the nose, at least during the early stages, it appears as a small bosselated tumor on a broad base that evinces a great tendency to hemorrhage. Glandular enlargement occurs early.

A neoplasm that is attached to the mesopharynx is the **lymphosarcoma,** which is more characteristic clinically than histologically. It consists of small round-cells with large nuclei, disposed in an alveolar arrangement, while the tumor itself, which is situated underneath the mucous membrane,—usually of the tonsils, the palatal arches, or the uvula,—has a slightly wavy surface, is rather pale in color (Plate 11, Fig. 2), and characterized by slow growth. A dense nodular infiltration, matting together the cervical and retromaxillary and submaxillary glands, develops early and may attain gigantic proportions. Both the clinical and the pathologic diagnosis in a given case are complicated by the fact that these tumors sometimes become converted into multiple leukemic tumors, the nature of which is confirmed by the typical findings in the blood and by the fact that the glandular infiltration may entirely overshadow the pharyngeal tumor, exactly as in the case of pseudoleukemia. These tumors also possess the peculiarity that they react to arsenic with such promptness as to give rise to the most optimistic hopes of recovery, hopes that in most cases are doomed to disappointment; for, although they apparently shrink, they may suddenly begin to take on new development. Although, therefore, in any individual case the question whether the tumors are merely local or represent a symptom of a hidden general disease cannot be decided, early and radical extirpation, as in the case of ordinary sarcoma, is, nevertheless, to be advised.

After the operation the general condition of the patient should be supported by giving arsenic in liberal doses, frequently varying the form of the remedy. Operations on large sarcomata of any kind are not very hopeful, because the tumors have usually become intimately united with vital organs in the neck or at the base of the skull.

Carcinoma may occur in any portion of the upper mucous membranes. Histologically, squamous, cylindric, and glandular carcinomata are distinguished. The so-called villous cancer of the nose is probably identical with the malignant papilloma. The favorite seat of cancer is—in the mouth, the lips, tongue, and buccal mucous membrane opposite the interdental cleft; in the pharynx, the tonsils; in the nose, probably the anterior portion of the septum, the inferior turbinates, and the antrum of Highmore. It is only in the latter cavities that true tumors are produced; in the mouth and pharynx carcinoma manifests itself chiefly in the form of a rigid, irregular infiltration that early undergoes ulceration, or merely in the so-called "carcinomatous ulcer," with a remarkably rigid and thickened base (Plate 12, Fig. 2).

On the *lip* the carcinomatous infiltration may persist for some time without spreading or undergoing ulceration (Plate 1, Fig. 2). It appears usually in the form of a wart or a flat swelling with central depression which ultimately undergoes more rapid enlargement and extends to neighboring tissues.

In the *tongue* the seats of predilection are the margin and the anterior half, the base being rarely attacked. It is caused in almost every instance by a carcinomatous degeneration of patches of leukoplakia and decubital ulcers due to the irritation of teeth, just as lip-cancer very frequently owes its origin to traumatic injuries, such as the irritation of a pipe-stem. On the surface of the tongue the cancer usually takes the form of a broad infiltration, while along the margins it is represented by a flat, carcinomatous ulcer with raised edges. Glandular enlargement occurs late, just as in the case of lip-cancer.

During the subsequent course the carcinoma extends to all the neighboring parts, so that the original seat can scarcely be recognized.

The same is true of carcinoma of the *buccal and intermaxillary mucous membrane.* It usually follows decubital ulcers from irritation of the teeth, and, owing to its position near movable parts, it early leads to impaired mobility.

Cancer is also observed on the *hard palate* in the form of irregular, spheric, deep infiltrations (glandular cancer), which tend to break through into the nose and antrum.

Within the *nose* and in the nasopharyngeal space carcinoma is quite rare; when it occurs it forms an irregular, speckled tumor, characterized by a great tendency to bleed, but its true nature is rarely recognized until the disease has reached an advanced stage.

In general the **diagnosis** of these tumors is not by any means easy. On the lip, it is true, the appearance is quite typical; but in the other portions of the mucous membrane epithelioma must be distinguished from benign tumors and sarcoma, and especially from infectious, chiefly syphilitic, processes. It is to be remembered also that cancer and syphilis are not rarely associated in the mouth, and that an ulcerated gumma may become converted into a cancer. Syphilitic lesions, speaking broadly, prefer the central, and carcinomata the lateral, portions of the structures, especially of the palate, but the rule is subject to many exceptions. Multiple cancers are extremely rare, while gummata not infrequently develop in several places at once or follow one another in rapid succession. The punched-out appearance of the tertiary ulcer serves to distinguish it in most cases from the more superficial, discolored carcinomatous ulcer with its elevated edges and the dense infiltration around its base. Other points in the differential diagnosis are the predilection of cancer for the third and fourth decades, and the presence of cachexia, which often develops quite early. As a last resort a therapeutic test must be applied, begin-

ning at once with relatively large doses of potassium iodid—10 to 15 grams (2.5 to 4 drams) in a dose. In many cases microscopic examination of an excised fragment may clear up the diagnosis, it being borne in mind, however, that syphilitic ulcers are frequently surrounded by proliferations of epithelium containing cancer-nests.

A serious error may arise in the case of primary lesions situated on the tonsils. The subchronic course, the density of the infiltration, and the cup-shaped depression are particularly apt to simulate the appearances of cancer.

Even tuberculosis, chronic phlegmonous processes with insufficient evacuation, and actinomycosis must be borne in mind to guard against possible error.

In the nose the error of mistaking carcinoma or sarcoma for a suppurative process in one of the accessory sinuses cannot always be avoided; for if the tumor is deeply situated, it reveals itself at first only by the secondary suppuration or by the production of inflammatory polypoid or granular proliferations, which are particularly misleading. Cachexia, early motor and sensory disturbances, and metastatic enlargement of the glands must be carefully looked for.

CONGENITAL NEOPLASMS.

The last, the *congenital neoplasms*, depending on embryonal abnormalities, form another class of heterologous tumors. True epignathal growths or remains of a second germ, which properly belong to the subject of teratology, may be left out of consideration. Among the tumors representing aberrant portions and excrescences of the germinal layer of the same individual are the so-called **hairy pharyngeal polypi.** These tumors are usually of moderate size; their stroma consists either of fatty or of fibrous tissue, in which lie imbedded portions of cartilaginous, nervous, or muscular tissue or even teeth; while the presence of sebaceous and sudorific glands in the superficial layer and in the hairy covering indicates

their ectodermal origin. Sometimes they present a cystic character—in other words, they are **dermoid cysts.** The first variety is usually found on the palate, the second occurs as a unilateral tumor, either submental—beneath the base of the tongue—or sublingual—beneath the tip of the tongue (Fig. 33). Within the nose and in the antrum of Highmore supernumerary teeth are sometimes observed, standing with the crown directed upward, and representing rests of **inverted odontoblasts.** True

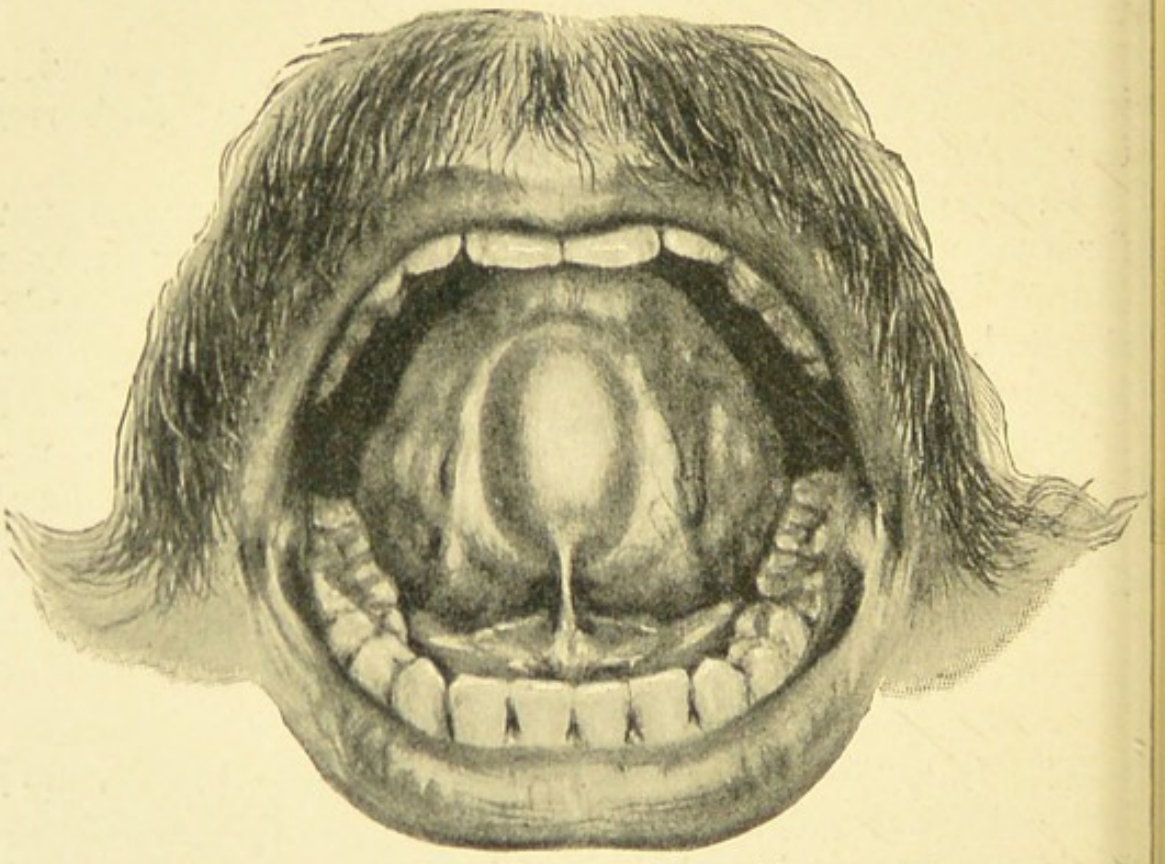

FIG. 33.—Sublingual dermoid.

cyst-formation occurs only in the antrum, and requires to be accurately distinguished from dental cysts (periodontal cysts).

A peculiar form of tumor derived from aberrant germinal tissue is the so-called **accessory struma** (or thyroid gland), which is completely separated from the outer thyroid gland. Its nature can be recognized only by means of the microscope. The favorite seat is the base of the tongue, where the tumor grows from the remains of the

thyroglossus duct. The tumor must be distinguished from **retrovisceral struma** or abnormal lobes of the thyroid gland. These may extend far behind the structures of the mouth and pharynx, but always maintain some communication with the principal gland.

Clinically, it is necessary to distinguish benign and malignant tumors. Malignant tumors are again subdivided into those which, although not presenting atypical growth, may, from their position within a closed cavity, give rise to dilatation of that cavity, and thus lead to grave disturbance of the general health or even fatal results; and malignant tumors, in the strict sense of the term, which, by their atypical growth, destroy the normal tissue and bring on their own destruction and disintegration by interfering with the blood-supply.

The second variety includes all forms of sarcoma and carcinoma; the first embraces juvenile sarcomata, endotheliomata, and their derivatives, including dermoids. All other tumors may be called benign, except in so far as the presence of any growth at the upper boundary of the digestive tract and lower boundary of the air-passages may threaten life, even though it may be of very slow growth and attain a very small size. Tumors within the mouth and pharynx are constantly exposed to injury, and present the appearance of ulceration, which may be more than superficial, thus making them more liable to be confounded with spontaneously ulcerating malignant tumors or with specific processes.

Such conditions must be regarded as secondary, and although they may give a uniform clinical character to tumors of widely different kinds, they should not be allowed to affect therapeutic measures.

In the nose and nasopharynx the presence of a tumor first declares itself by interference with the breathing. Hemorrhage is also a common symptom, partly on account of the passive congestion, and partly on account of unavoidable small traumatisms. As the growth becomes larger it may be seen at the vestibule or in the

pharynx. When the tumor is deep-seated or tends to grow inward, the unpleasant symptoms of pressure and tension are produced. The confusion arising from the accompanying suppurations and secondary proliferative processes in the mucous membrane has already been referred to. Twisting or constriction of the pedicle of a benign tumor, and spontaneous necrosis of a malignant tumor, may give rise to gangrene and tissue decay with hemorrhage; but as these phenomena appear only in the advanced stages, they cannot be said to have any diagnostic value. It is well to remember that necrosis of bone may result from the pressure of large tumors or the invasion of the bone by malignant growths, because the condition is apt to be mistaken for the product of a specific process or of the presence of a foreign body.

In the **mouth** even a small tumor may become very troublesome by the salivation, abnormal sensation, and the sense as of a foreign body to which it gives rise, as also by producing a hypochondriac fear of cancer in the patient's mind. If the tumor is of any size, mastication becomes difficult; the patient, to his great discomfort, is constantly biting his tongue, and these repeated traumatisms obscure the clinical picture, as very few tumors will withstand the constant injury without breaking down. Pain is, of course, a frequent symptom. When the tumor is situated in the posterior portion of the mouth, the movements of the jaws are abolished, either by reflex means or from mechanical interference, particularly when the intermaxillary fold is involved.

Pharyngeal tumors, besides giving rise to symptoms similar to those that have just been described, interfere very much with the mechanism of deglutition; the food regurgitates into the nose or passes into the larynx; the patient has great difficulty in eating; there is pressure on the larynx or on some of its muscles, such as the posticus; and, finally, the patient complains of pain, which usually radiates toward the ear.

Treatment.—Destruction or extirpation is, of course

the only method to be considered. The only question that remains to be decided is whether the extirpation shall be total or partial. Whenever it is possible, access should be gained through the natural passages; but in the case of malignant tumors, a preliminary operation will frequently, and in fact usually, be necessary. Even in the nose, and when the tumors are small and situated at the entrance, the surgeon should not shrink from free exposure of the field of operation if he finds any difficulty whatever in obtaining a clear view, or if the tumor has returned after an endonasal operation.

For the removal of tumors situated at the anterior portion of the septum the lateral operation, as described on p. 51, is suitable. Tumors in the lateral portion of the ethmoid region may be reached by temporarily displacing the eyeball, as described on p. 107; tumors in the superior anterior portions of the nose will require Langenbeck's temporary resection of the superior maxilla; and, if still more room is required, the entire nose must be opened up.

The removal of tumors from the deeper portions of the pharynx practically always requires some preliminary operation, and often a very extensive one, which need not be explained in this place.

APPEARANCES OBSERVED IN THE UPPER MUCOUS MEMBRANES IN GENERAL DISEASES.

Certain symptomatic inflammations have been discussed in other portions of this work (see pp. 70 and 119). In addition, the nose and oropharynx take part in many other general diseases. **Anemia** and **chlorosis** are characterized by great pallor of the mucous membrane, by abnormal dryness in the throat and nose, and, as a consequence, a desire to cough, and the feeling as of a foreign body. Chlorotic girls are much subject to diseases of the teeth and of the gums.

A similar feeling of dryness, which may or may not be accompanied by atrophy of the mucous membrane, is also observed in **diabetes.**

Passive hyperemia is a constant concomitant of most **chronic digestive disturbances,** and also forms part of the **circulatory symptoms** observed in cirrhosis of the liver and in chronic disease of the heart and kidneys. In the milder grades the mouth and throat are of a dusky red, and the erectile tissue in the nose is hyperemic; later the veins at the base of the tongue and in the mesopharynx become permanently dilated and tortuous, and finally **hemorrhages** may occur from diapedesis. Hemorrhage of this kind is characteristic of **scurvy** (Plate 1, Fig. 1; Plate 17, Fig. 1), **morbus maculosus Werlhofii, Barlow's disease, leukemia,** and **pseudoleukemia.** The last disease is often accompanied by great hyperplasia of the lymphatic ring, in addition to which, in leukemia, yellowish-white, marrowy infiltrations may be present in various portions of the pharynx.

A rare condition known as **Moller's glossitis** sometimes develops under the influence of **chronic intestinal disorders.** It consists of a superficial exudative inflammation of the tongue, the appearance of which resembles that of the geographic tongue, except that the eruption is constant and painful.

Vasomotor disturbances in the nasal mucous membrane not infrequently depend upon the **sexual life** of the individual, especially in the female sex.

Hyperemia of the erectile tissue in the form of obstruction or severe nasal catarrh tends to recur at each menstrual period; and similar catarrhal symptoms, or even asthmatic conditions, that may or may not be noticed, almost regularly attend the climacteric. Asthma has also been observed in men after excessive sexual excitement. Both during menstruation and during the climacteric **vicarious hemorrhage** has been known to occur from the nose. As these hemorrhages are often quite alarming and not in the least affected by the usual styptics, it is

exceedingly important to recognize their true nature, since they are controlled by the extract of hydrastis canadensis, in exactly the same way as in metrorrhagia. Almost every inflammatory disease affecting the nasal region is more or less subject to the influence of sexual life in women.

Tabes and **syringomyelia** are occasionally accompanied by certain trophic disturbances, the former by loss of teeth and ulcers resembling "*mal perforant*," the latter by traumatic ulcers and tissue-loss resulting from hypesthesia.

Skin-diseases that involve the mucous membranes can always be diagnosed by the distribution of the cutaneous lesions. Thus in almost half the cases of **lichen planus** circular and serpentine groups of hard white nodules, the size of a lentil, are found in the mouth and on the palate. **Pemphigus**, both the vegetating and the bullous variety, is very rarely localized in the mouth, and its appearance here is a very bad prognostic sign for the general course of the disease. The eruptions are, of course, much less distinct on the mucous membrane than on the cutaneous surface, because vesicles never persist for any length of time (see p. 74). The same is true of the eruption of exudative erythema in the mouth. A few rare conditions in which skin diseases of various kinds extend directly from the vermilion of the lips to the mucous membrane need no special explanation.

DISEASES OF THE NERVES AND MUSCLES.

MOTOR DISTURBANCES.

Hypokinetic disturbances of muscular origin are sometimes met in the external nose. The function of the levator alæ nasi, owing either to congenital weakness or to atrophy from disuse, is sometimes so much impaired in mouth-breathers that the inspiratory current of air does not meet with the necessary resistance and compresses the nose, thus interfering materially with respiration. The

condition can be corrected by the wearing of supporting apparatus, among which the most suitable is that devised by Schmithuisen.

Paralyses in the mouth and pharynx are almost always due to **disturbances of innervation.** Paralyses of cerebral origin are typically exemplified in bulbar paralysis, a disease in which the lips, the tongue, the soft palate, and finally the deeper pharyngeal muscles are attacked. Articulation is first interfered with; later the patient becomes unable to swallow, the food is not properly conveyed into the esophagus, but remains in part on the base of the tongue. Some of these bulbar symptoms, or in rare cases all of them, may be produced by disease in other nuclei situated in the medulla oblongata, just as they are produced in all system diseases, tabes, sclerosis, and the like, and in a more accidental manner by the presence of tumors and syphilitic processes. The nuclei concerned are those of the spinal accessory, hypoglossus, and glossopharyngeus nerves. The question whether a high injury of the facial nerve affects the muscles of the pharynx still remains undecided. The inconstancy with which the nerve appears to be concerned in the action of the soft palate probably depends on certain individual peculiarities in the distribution of its branches.

Peripheral palsies are sometimes due to the presence of tumors and suppurations at the base of the skull. They are rarely isolated, being, as a rule, associated with paralysis of other cranial nerves. **Neuritis** of isolated branches, on the other hand, is observed somewhat more frequently; it rests on an infectious basis. The most important example is found in the diphtheric palsies of the soft palate and uvula, although these may also be due to some other infectious inflammatory disease of the pharynx, or even to pressure, such as that of a hyperplastic tonsil. Severe postdiphtheric palsies are readily recognized by the regurgitation of food into the nose from inability to shut off the upper air-passages, and by the presence of rhinolalia aperta, which renders the speech quite unintelligible

and which may persist in a mitigated form long after convalescence has been established.

Paralysis of the palate, whether complete or partial, is usually bilateral. Unilateral palsy occurs practically only in connection with paralysis of the spinal accessory, which is recognized by paralysis of the recurrent nerve. The condition is most commonly due to some process at the base of the skull.

Total paralysis of the muscles of deglutition may necessitate artificial feeding, if only to prevent the occurrence of inspiration pneumonia. If there is any prospect of recovery or improvement, peripheral palsies should be treated by local massage and faradization. The good effects that probably follow the administration of strychnin have been discussed on p. 62.

Hyperkinetic Disturbances.—In nervous persons **intention spasms** of the lips and extending to other muscles of articulation and phonation are sometimes provoked by the attempt to speak. The condition represents a variety of stammering. An occupation-neurosis in the form of spasm of the tongue has been observed in clarinet performers. **Perverse innervation** of the soft palate during the acts of speaking and swallowing, identical with perverse innervation of the larynx, occurs in paralytic and hysteric individuals; the nasopharynx, instead of being closed, is opened, with the usual consequences.

Tonic and clonic convulsions of the orbicularis oris, the muscles of the tongue, and the muscles of deglutition—trismus—may be produced reflexly by painful processes in the mouth, such as carious teeth. The condition depends on a general neurotic diathesis or on central or peripheral irritation of the nerves concerned in the reflex act.

Tonic convulsion of the pharynx is a familiar symptom of **rabies**, and occurs also in the early stages of central palsies. The spasm destroys the power of speech and deglutition, but the visible structures, particularly the soft palate, are seen to be tensely stretched instead of flexed, as is the case in paralysis.

Such spasms of hysteric nature may, by arresting a bolus of food or closing on an esophageal sound inserted for purposes of examination, simulate stenosis in the lower portion of the pharynx or upper portion of the esophagus, or even a diverticulum of the esophagus. The diagnosis, therefore, requires careful consideration of the general condition, repeated examinations, and a prolonged period of observation. When the spasms are due to rabies or a central lesion, they are, of course, hopeless; the hysteric spasms, however, can be successfully treated by psychic means.

A condition that is so rare as to acquire the character of a curiosity consists in **clonic rhythmic** contractions of the soft palate and uvula. It occurs occasionally in association with spasm of the levator tubæ and tensor tympani muscles in hysteria; or as a form of occupation-neurosis after excessive use of the voice in singers; or as part of the picture of tic convulsif. It has, however, also been observed in diseases of the medulla. The contractions of the tubal muscles sometimes produce a noise that may be perfectly audible to a third person, and is due to the opening and closing of the tubal orifice. Irregular contractions of the same kind may, of course, also occur.

SENSORY DISTURBANCES.

The nerves that are concerned only with the tactile sense may present anesthetic, hypesthetic, hyperesthetic, and paresthetic functional disturbances.

Anesthesia of the nose, when not of hysteric origin, is due to some interruption in the course of the trigeminal nerve, and is, therefore, chiefly observed when branches of that nerve have been destroyed during an operation. The loss of tactile sense in the skin and mucous membrane is, however, less noticeable than is the interruption in the reflex arc, so that the sneezing and lacrimal reflexes in the affected area, which is nearly always found to one side of the nose, are abolished.

Anesthesia of the pharynx is a more serious condition. It may be due to the same causes as paralysis of the pharynx, and occurs also as a result of the extreme desiccating effect incident to cholera, diabetes, and various forms of enteritis. It is particularly grave when the deeper portions of the pharynx are involved. In the upper regions of the pharynx anesthesia is of no particular consequence, because the movement of deglutition, when once begun, is automatically propagated to the palate, whereas closure of the larynx during deglutition is effected solely by reflex innervation, and, therefore, presupposes the sensory integrity of the deeper portions of the pharynx and of the tissues about the superior aperture of the larynx. It has been found by experience that solid morsels of food and fluids are most liable to get into the larynx, hence the food in such cases should be in the main semisolid or gelatinous; in extreme cases artificial feeding may have to be employed exclusively. Systematic mechanical cleansing of the mouth is necessary. The causal treatment is the same as that for paralysis.

The **hypesthesia of the pharynx** resulting from the habitual use of very hot, very cold, and highly seasoned foods and beverages, like the hypesthesia of the mucous membrane, which is due principally to the irritation of snuff and other constantly repeated forms of irritation, is not without significance. In the pharynx diminished sensibility destroys the natural protection against the introduction of injurious substances which develop their harmful influence in the lower portions of the digestive tract. This is shown by the frequency of gastric ulcers in cooks, who are in the habit of tasting very hot dishes, and by the wide prevalence of gastric catarrh in certain countries where the inhabitants habitually use ice along with excessively hot and highly seasoned dishes. In the same way loss of sensibility in the nose interferes with the normal reflex act of sneezing and the reflex engorgement of the erectile tissues which protect the

deeper air-passages against the entrance of dust and of larger foreign bodies.

Hyperesthesia, or excessive sensibility to ordinary sensory irritants, is observed in some individuals, and causes them to react to an excessive degree either by pain or by the performance of certain reflex acts which, under normal circumstances, would not be called into action. Thus many persons are painfully affected by cold air or air containing a small admixture of pungent substances, and at once react with sneezing and lacrimation. Hyperesthesia in the pharynx produced by psychic influences, such as the fear of vomiting, is too well known to every physician as a troublesome obstacle to examination to need any special description. This variety includes the morning nausea or vomiting which attends the abuse of alcohol or tobacco.

Paresthesia rests on a purely neurotic basis (hysteria, hypochondriasis, or neurasthenia), and assumes a great variety of forms, such as the feeling as of a foreign body, or the fancied presence of diseased areas in the pharynx and in the throat. It is particularly apt to take the form of incorrect localization of affections that are really present, but at some other place. The last-mentioned form is exceedingly common, as the ability to localize a sensation in the pharynx is very imperfect. The first-mentioned variety, on the other hand, is as rare in fact as it is common in diagnosis, because most sensations of this kind depend not on lesions of central origin, but on actual structural affections, which are, naturally, difficult to find. The diagnosis of "nervous" paresthesia must, therefore, be made only after every possible basal condition has been excluded, and when other signs pointing to the above-mentioned causes are present.

The **treatment,** it need hardly be said, is purely psychic.

It is proper at this point to mention **neuralgia,** since it in a sense also represents an abnormality of sensation. It may form part of a general trigeminal neuralgia, inas-

much as this nerve supplies the oral and pharyngeal mucous membrane, and it may appear as an independent condition in the form of **glossodynia.** This affection, which occurs chiefly in middle age, may be due simply to neuritis of the glossopharyngeus or of the trigeminus; it is, however, constant in character, and in this respect differs from neuralgia, which tends to periodicity, so that one cannot help thinking of a hypochondriac or hysteric origin. Accordingly, the results of **treatment** are extremely variable, all efforts in some cases being unsuccessful, while in others the effect is magical.

DISTURBANCES OF SPECIAL SENSE.

Disturbances of taste and smell practically always occur in association one with the other, as the ability to perceive fine distinctions in taste, such as the aroma of food and drink, presupposes the coöperation of the sense of smell. The perceptive powers of the unaided organs of taste are limited to the distinction between sweet and bitter, salt and sour, or, at most, to the perception of what is known as a metallic taste; and, as a matter of experience, disturbances of this character are extremely rare.

It is only the latter that can be designated as **ageusia** and **parageusia.** (The excessive irritability described as hyperageusia probably belongs to the domain of physiology, and also depends, in the main, on the olfactory element in the sense of taste.) Ageusia in this restricted sense may be due to mechanical causes preventing excitation of the nerve-endings by the presence of severe oral catarrh or a thick coating on the tongue—the so-called pasty taste. It may be due to paralysis of the sensory nerves, the trigeminus and glossopharyngeus, and especially of the chorda tympani and the trunk of the facial nerve. Neuritis of the facial and chorda tympani of rheumatic or inflammatory origin, as in otitis media, may produce parageusia, consisting in the inability to distinguish sweet from bitter and salty from sour. It need hardly

be mentioned that central paralysis of these nerves will have the same effect. Unilateral disturbances of the sense of taste are almost certainly due to neuritis.

Anosmia and **aromatic ageusia** may be due to the presence of some mechanical obstacles preventing the air-current from reaching the olfactory region, or to the fact that the air-current fails to follow its normal course through the middle meatus, and passes, instead, along the floor of the nose, as in the presence of abnormally wide nasal cavities. Insensibility to odors reaching the olfactory cells in the normal way is due to loss of function of the olfactory cells from constant bathing of the olfactory membrane with pus, or constant irritation of strong vapors or perfumes. Finally, a central anosmia may be produced by injuries, inflammations, or tumors of the olfactory bulbs and of the trunk of the olfactory nerve, but the diagnosis of this condition is possible only when other basal symptoms are present, or at the autopsy. Temporary anosmia is sometimes observed in the course of acute infections.

The **prognosis** in anosmia due to the presence of some mechanical obstacle, of course, depends on the possibility of removing that obstacle, just as the cure of a disturbance due to suppurations requires the cessation of the suppurative process. But even when the immediate cause can be removed, the atrophy due to prolonged disuse often proves irreparable.

The term **parosmia,** or aromatic parageusia, is used when certain odors awaken a sensation different from that which is produced under normal conditions. These perverse and, as a rule, disagreeable sensations depend chiefly on a hysteric cause. They occur not infrequently during convalescence from influenza, when they probably depend on direct injury to the olfactory membrane. The phenomenon is sometimes observed in all kinds of central and psychic diseases, where they must be distinguished, as always, from spontaneous olfactory hallucinations. Conversely, a diagnosis of hallucination is not justifiable

in every case when the individual complains of a bad smell which is not perceived by others, for a so-called subjective odor may be due to some decomposition process in the depths of the nose, particularly in the accessory sinuses, the source of the odor being so situated that the latter cannot reach the exterior. As a matter of fact, this condition, which is known as **cacosmia,** usually has an objective cause.

VASOMOTOR AND SECRETORY DISTURBANCES.

While the vasomotor nerves of the nose react to any irritation of the mucous membrane by congestion (see p. 195), that phenomenon is also observed as a concomitant symptom in congestion of the genital organs. The latter have already been referred to elsewhere (see p. 182); it manifests itself in alternate swelling and shrinking of the erectile tissue. The phenomenon is accompanied by a simultaneous discharge of watery mucus from the nose and by increased salivation, depending partly on peripheral, olfactory, thermic, and gustatory stimuli, and partly on nervous excitation in predisposed individuals. Such persons sometimes suffer from a sudden outpouring of enormous quantities of mucus from the nose—so-called **vasomotor nasal hydrorrhea,** which may in an individual case have to be carefully distinguished from the sudden discharge of secretions retained in an accessory sinus. True nervous hydrorrhea yields to atropin and to general nerve treatment.

REFLEX AND REMOTE SYMPTOMS.

Any unusual stimulus acting on any portion of the upper respiratory passages calls forth a defensive movement on the part of the muscles of respiration similar to that exerted to prevent the entrance of a foreign body. The diaphragm and the muscles of the thorax perform a respiratory movement or become arrested for some time in the expiratory position; the glottis closes; the muscu-

lature of the bronchial tree contracts; cough is produced when the irritation affects the larynx or the deeper portions of the pharynx; sneezing, when the nose or the extreme anterior portion of the palate has been irritated. These defensive movements are sometimes produced also in response to cutaneous stimuli, as appears from the fact that this normal reflex process is very apt to be started in some abnormal way; and, on the other hand, it indicates that the physiologic is separated from the pathologic by a very narrow boundary. The alteration in the reflexes presupposes a special predisposition of the conducting nerves that make up the reflex arc, or of the entire individual.

Peripheral stimuli which do not in the least affect normal individuals produce spasm of the bronchial and other respiratory muscles, **asthma,** or, in other cases, **paroxysmal attacks of coughing and sneezing.** Such is the simple basis of the so-called reflex neuroses of the nose and pharynx. The initial stimulus may be derived from repeated tickling, irritation of the mucous membrane by the contact of other movable parts, such, for instance, as a small polypus, or from the changes which are presumed to take place in the outermost nerve-endings of the turbinates and septum, which may start the reflex act even after a slight stimulus, such as a thermic impression, for instance, well within the domain of the normal. *One of the most frequent causes, and one which is very commonly overlooked, especially in the case of asthma, is the constant flow of nasal discharges into the pharynx,* so common in conditions associated with excessive nasal secretion. The laborious and often fruitless efforts to prevent the accumulation of this secretion, together with the general irritation due to the chemical and mechanical causes, readily bring on the expiratory reflex.

In addition to these local areas of excessive irritation and a general predisposition, there is in many cases a temporal and topographic element, the attacks coming on at certain seasons of the year or hours of the day, and in

certain localities. In a general way the bad season of the year and an inclement, dusty climate are predisposing factors, but it is particularly characteristic of the neurasthenic nature of the attacks that they do not take place in many individuals under circumstances which are apparently unfavorable, while they do take place in the most unexpected manner when the surroundings must be regarded as mild and particularly free from irritation. Hence the conclusions to be drawn from *cocainization* in regard to the connection between the irritation of certain portions of the mucous membrane have only a relative value. If anesthetization of a certain area in the nose or pharynx aborts or mitigates an attack of asthma, that area may be, as a rule, regarded as the cause of the trouble, but the connection between the two events is not sufficiently constant to form a trustworthy basis for a prognosis. Conversely, the cocainization of certain areas, especially in the pharynx, sometimes has no momentary effect whatever, because the irritation is not superficial enough, whereas if the condition responsible for the constant irritation of the corresponding portion of the mucous membrane is removed, the asthma is improved or even cured. [It has been pointed out that the addition of 2 per cent. of pure sodium sulphate to a 5 per cent. solution of cocain greatly increases the penetrative power of the latter by dissolving the albuminous elements of the secretion covering the mucosa. The anesthetic effects of this combination are equal to those of a 10 per cent. solution not thus fortified. The danger of constitutional symptoms is thus lessened, and the use of the remedy attended with less expense, a factor worthy of consideration in institution practice.—Ed.] Hence the nasopharyngeal treatment of asthma is in every case absolutely empiric. It serves merely to exclude from the causation any areas that are evidently pathologic, or may be suspected of being the initial point of irritation from the effects of an application of cocain; the fact that it is successful has no prognostic value. If treatment is instituted

at all, it should be done without promising the patient anything whatsoever. It includes merely the removal or mitigation of oversecretion, which may often be accomplished by the systematic use of nasal sprays and the cautious application of the cautery to areas found by the cocain test to be irritable. These sensitive areas are found chiefly on the tuberculum septi, the upper border of the inferior turbinate, and the granulations in the pharynx. It includes also the removal of movable polypi and other tumors capable of tickling the mucous membrane, and the restoration of free nasal ventilation. The senseless practice of indiscriminate cauterization in the hope that it may do some good, and especially the injudicious warfare against small excrescences on the septum and septal deviations, cannot be too sweepingly condemned. The treatment of the latter is justified only when the septum is in contact with the inferior or with the middle turbinate. The local treatment must be supported by psychic and general invigorating measures; pneumotherapy is not to be neglected; and potassium iodid must be given in considerable doses. The result is quite often satisfactory, but in many cases treatment is altogether without avail, and there seems to be no way of determining the results of treatment beforehand.

The coughing and sneezing reflexes are less frequent but more distressing both to the patient and to the physician, unless recovery promptly ensues after definite points of irritation, such as the septum, the turbinates, the lingual glands, and the granulations have been excluded; the condition rests on a neurasthenic or hysteric foundation, and all efforts at cure are unavailing.

It is ever to be borne in mind that any one of these mucous membrane reflexes may be induced from other portions of the body, as, for instance, from the external auditory meatus. The sexual system plays a very important rôle, both as a direct cause of the disease and as an adjuvant in the process when the point of irritation is situated in some other portion of the body.

The reflex irritation may affect not only the respiration, but also the action of the heart by exciting or paralyzing the pneumogastric nerve.

Cardiac neuroses, tachycardia and bradycardia, arhythmia, and even stenocardiac attacks may be produced by mechanical and other irritation of the nasal mucous membrane. In a few instances **Basedow's** symptom-complex has been observed to disappear after treatment of the nasal affection.

It is, however, better to accept any such results as these thankfully, rather than count upon them, not to speak of promising them beforehand.

The last group of reflexes include the **vasomotor** and **secretory** phenomena—namely, erythema and edema of the nose and cheeks; permanent hyperemia of these parts; hyperemia of the erectile tissue in the interior of the nose when the disease focus is situated in some other portion of the body; hyperemia and catarrh of the conjunctiva and deeper portions of the eye, together with the symptoms of asthenopia and other functional disturbances. These last-named reflexes commonly accompany any severe chronic inflammation in the interior of the nose.

Reflex disturbances are to be carefully distinguished from *remote affections*, the latter being painful sensations occurring in areas near the oropharyngeal cavity or in some remote region of the body. Their origin is explained by the radiation of a sensory irritation acting on a definite point in the distribution of a nerve to other points supplied by the same nerve or by a neighboring system of nerves. Or it may be assumed that, owing to general hypersensitiveness, an irritation which, under other circumstances, would not be noticed, degenerates into a painful sensation in some remote sensory region. Examples of the first variety are found in the occipital headache that accompanies inflammation of the frontal sinus; the supra-orbital pain of empyema of the antrum of Highmore; toothache in the upper and lower jaws in

diseases affecting the distribution of the superior dental nerve, and particularly the symptom produced by hyperesthesia of the nerve-endings in the nose on the inferior turbinate and tuberculum septi. Examples of the second class, which constitute the true distant symptoms, are gastralgia, coxalgia, dysmenorrhea, and a host of similar undefinable painful sensations which disappear after cocainization of any portion of the nose or pharynx. But from the explanation of their origin that has been offered, it follows that there can be no logical connection between symptoms of this kind and the point of irritation. It is, at least, certain that no connection can be established between a definite region of the nose and dysmenorrhea, for example; or another region of the nose and gastralgia. Such relation as exists depends on the simultaneous irritation of widely separated regions often by very different causes, and the fact that irritation of the general sensibility through one or the other of the correlated regions is necessarily accompanied by irritation of the other. The basal disease may be either a simple neurotic affection or a local process of considerable severity, which is more likely to be overlooked or misinterpreted if the physician is a slave to his preconceived opinions, unless the diagnosis is absolutely clear from the outset. The author recalls a case of gastric ulcer which was never suspected until its presence was revealed by a fatal hemorrhage; the gastralgia which had existed for a long time had been treated as a nervous symptom and had promptly yielded to cocainization of the inferior turbinate. The interdependence of genital and nasal affections is even more common on account of the similarities of the vasomotor apparatus in both regions, and they, therefore, demand even more careful scrutiny. The predisposition to neurasthenic symptoms of this kind may be greatly enhanced by the venous and lymphatic congestion at the base of the brain, which has been described in connection with nasal obstruction (see pp. 18 and 26).

It follows, from what has been said, that the diagnosis

of a true distant affection must be made with the greatest caution; and in the matter of treatment, it would be well to promise the patient practically nothing and to confine one's self to a policy of non-interference, since too much treatment only tends to increase the state of hypochondriasis.

The **prognosis and treatment of direct radiating pains,** on the other hand, are much more favorable, because the pains are usually due to distinct changes in the corresponding region. Active local interference is, therefore, indicated. Any conspicuous local affection, such as a suppuration, an ulcer, or a tumor, is always a welcome point of attack; but a mere suspicious or slightly affected spot on the turbinates or septum should not be regarded and treated as the source of radiating headache, unless the characteristic pain can be elicited definitely by touching these points with the probe, and disappears after they have been anesthetized. The same precautions should be used in the investigation of the local cause of a distant affection. The offending areas of the mucous membrane are best cauterized with trichloracetic acid, and if that fails, with the galvanocautery puncture.

TRAUMATIC, MECHANICAL, CHEMICAL, AND THERMIC INJURIES.

Traumatisms of the oropharynx and of the nose do not differ, as regards symptomatology and treatment, from ordinary surgical injuries. It is well, however, to remember that injuries of the upper mucous membranes heal rapidly on account of the abundant blood-supply. Complications may occur whenever the opportunity is given for neighboring portions of the mucous membrane to form adhesions; hence prophylactic measures, consisting principally in the use of a tampon, play an important rôle in the treatment. Later on the question of a plastic operation or resection may have to be considered and must be decided on general surgical principles.

Injuries of the septum in certain respects represent a special class. A blow of moderate severity on the bridge of the nose, at the level of the cartilaginous septum, is followed by hemorrhage between the perichondrium and the quadrilateral cartilage of one or both sides of the nose. If, as is usually the case, the hemorrhage is bilateral, the cartilage is deprived of its nutrition and soon undergoes necrosis; but even when a unilateral hematoma results, necrosis in the form of the so-called "lorgnette nose" follows, because the extravasation becomes infected through the contused or lacerated mucous membrane and undergoes suppuration. Most cases come under observation during this stage—the stage of **septal abscess.** Up to this time the symptoms are insignificant, but now sharp pain and a sense of heat are complained of, with a moderate degree of obstruction. In the region of the tuberculum septi on one or both sides a soft spheric prominence is then discovered, which should at once be incised and packed with a thin strip of gauze, or, if suppuration has not yet set in, the clot may be turned out, and the mucous membrane held in apposition with the cartilage by loosely packing the superior nasal meatus. If portions of the cartilage have already become necrotic, they should be removed; otherwise the treatment should be as conservative as possible.

If the injury has been severe and has involved the turbinates, adhesions occasionally form—as, for instance, in the condition illustrated in Fig. 34. Such an adhesion, like all other adhesions between the turbinates and the septum, it may be as well to remark at once, should be treated on the same principles as congenital adhesions (see p. 212).

A caution in regard to the diagnostic significance of the bitten tongue of the epileptic: it would be wrong to infer the existence of epilepsy from every injury of this kind, as similar wounds may be observed in chronic catarrh of the mouth and in paralyses, attributable to the comparative helplessness and hypesthesia of the tongue.

Mechanical Injuries.—The mucous membranes are so constantly exposed to mechanical irritation that they often cease to react to them altogether. This is especially true in regard to various forms of dust. But under the influence of a special irritability which has never been satisfactorily explained, more intense effects are sometimes observed. Typical phenomena of this kind are observed in so-called summer catarrh, having its origin in the pollen of flowers and grass, the chief representative of which is **hay-fever.** During the season when these vegetable substances are active, the predisposed individual is subject to attacks of extraordinarily violent catarrh of

FIG. 34.—Broadening of the right middle turbinate and adhesion with the septum after fracture of the nose by the kick of a horse. Congenital adhesion of the inferior turbinate with a spine on the septum.

the conjunctivæ, of the nose, and of the pharynx, characterized by paroxysms of sneezing of unusual violence and incredible frequency. The catarrh may also extend to the deeper mucous membranes of the respiratory tract and produce a violent form of asthma. The number of remedies suggested for this condition is enormous, and their efficacy is correspondingly doubtful. The only hope of relief is removal to some region where the particular form of dust to which the individual is sensitive is not found. The island of Heligoland enjoys some reputation as a resort for this class of patients.

Chemical Injuries.—The irritation from the dust

of potassium chromate, cement, tobacco, and spices is both mechanical and chemical. Many artisans whose work brings them in contact with potassium chromate and cement are found to have traumatic perforations of the septum, the original cause of which is to be sought in the itching produced by these substances.

Poisons circulating in the blood, chiefly drugs, exert a purely chemical irritation. Thus **iodin** gives rise to the well-known coryza of iodism, and, like bromin, to acute stomatitis, a characteristic symptom of which is a certain whitish deposit on the gums.

In chronic **phosphorus-poisoning** the toxic agent, as every one knows, attacks the lower jaw by way of the gums and carious teeth, hence the earliest symptoms consist in gingivitis and alveolar periostitis. **Mercurial stomatitis** has been discussed elsewhere (see p. 57). Of the other metals, copper and lead remain to be mentioned. Both produce changes in the gums. In **copper-poisoning** these changes extend quite deeply, while in **lead-poisoning** they are only superficial.

Caustic acids and **alkalis**, introduced either for therapeutic or for suicidal purposes, produce a direct chemical effect on the mucous membranes. In the nose injuries of this kind are practically always due to surgical intervention, because when they are produced in any other way it is usually by means of excessively strong gargles or by poisons taken with suicidal intent. The lesions consist, in the main, of whitish crusts of variable thickness; sulphuric acid leaves brownish-red or black crusts; while nitric stains the tissues yellow. Later on the crusts may become dark in color, on account of the hemorrhage that so often follows cauterization of the tissues.

Burns in the nose are observed only after surgical operations. If the operation was justified, there is nothing more to be said about the course of the injury. If opposite surfaces have been affected, or if the eschars are allowed to remain in place too long, organization takes

place and adhesions result. This accident must be prevented by systematic use of liquid vaselin or the introduction of thin strips of gauze saturated in the substance. [We have found useful for this purpose narrow strips of gutta-percha such as is used by dentists for a temporary filling. It is non-irritating and non-absorbent.—Ed.]

In the mouth and pharynx burns are caused by the ingestion of very hot food and drink or the inhalation of superheated gases. Vesication is produced, but lasts so short a time that it is rarely observed. The exposed mucous membrane becomes covered with a fibrinous exudate. The treatment of these injuries consists solely in the application of remedies to allay the pain, such as ice, cocain, and orthoform, and in saving as much of the tissue as possible.

FOREIGN BODIES.

Foreign bodies may be classified as **organic** and **inorganic.** One form of inorganic foreign bodies occurring in the ducts of salivary glands and in the crypts of the tonsils has already been described in the concretions and calcareous accumulations known as salivary and tonsillar "calculi."

Similar calculi occur in the nose, where they consist chiefly of calcium phosphate. The calculi vary in size, and usually have as a central nucleus a cherry-stone or some other small object that children are so fond of introducing into their noses. In fact, most foreign bodies are introduced into the nose in this way; they are often of incredible size, and of such great variety that they might fitly grace the shelves of a museum. Not infrequently percussion caps and other parts of a rifle or even bullets may be found in the nose and in its accessory sinuses as the result of an explosion of some kind. Injuries received in battle also contribute a contingent to this class of foreign bodies.

In the mouth and pharynx foreign bodies that have been held between the lips are either aspirated with the

air-current or swallowed along with food. As a smooth object usually penetrates to the deeper portions, the foreign bodies that concern us in this connection consist chiefly of needles, fish-bones, and similar objects. Particles of gastric contents, finally, may be projected into the naso-pharynx during the act of vomiting.

The **consequences** of the introduction of a foreign body are manifold. The foreign body may remain *in situ* for some time without giving rise to any symptoms; but, as a rule, a violent local inflammation results. Sharp bodies may, by penetrating the tissues or at least opening the way for infection, give rise to erysipelas; abscess with erosion of the surrounding bone, as on the septum, in the floor of the nose, and in the cervical portion of the vertebral column; or deep abscesses burrowing in various directions. Severe hemorrhage also may be produced. Sometimes the foreign body becomes loose of its own accord and is expelled, or it may wander into distant portions of the body and prove fatal in this way, although in most cases the offending object is later removed artificially.

Symptoms due to a foreign body in the nose are almost always unilateral, and consist in obstruction; purulent, usually fetid, secretion, frequently mixed with blood; and violent pain referred to various portions of the nose, according to the seat and size of the foreign body. As these symptoms resemble the symptoms of infectious processes, especially syphilis, and as the reactive inflammatory and proliferative processes, such as bleeding, granulations, and polypoid tumors, are quite capable of simulating the appearances either of syphilis or of malignant tumors, the history of the accompanying circumstances needs to be carefully weighed. The surface of the foreign body being usually rough, like that of necrotic bone, the sound elicited with the probe is very similar in both cases, while incrustations and aberrant teeth, owing to their grayish-white color, are even more apt to be mistaken for necrotic bone.

Foreign bodies in the **mouth** and **pharynx** are less apt to produce these deceptive symptoms; but, on the other hand, they may slip under the mucous membrane, especially such objects as needles and fish-bones, or they may remain hidden from view in one of the recesses of the oropharynx. Pain and the sense of the presence of a foreign body make their appearance early, but they persist for some time after spontaneous expulsion of the foreign body, either as the result of the actual changes or for psychic reasons, and finally they may even be produced by the mere dread that a foreign body may have effected an entrance.

It follows that the **diagnosis** rests chiefly on the direct demonstration of a foreign body. If it is seen at once, the matter is settled; but if not, the nose must be explored with a probe. In any case the pharynx should be palpated, because a pointed object may penetrate so far into the tissue that its external extremity can be detected only by the palpating finger. Care is necessary to avoid displacing the foreign body or forcing it deeper into the tissues. If nothing is found by these methods, or if, for instance, the examination of the nose leaves the surgeon in doubt as to whether he has to deal with a foreign body or with beginning necrosis of the bone, additional information may be obtained by means of the Röntgen rays, which are particularly useful in demonstrating the presence of foreign bodies.

The **treatment** must, of course, begin with the extraction of the offending object. I cannot indorse the various methods of expulsion by means of a current of air which have been recommended in the case of the nose, as they are usually ineffective, and almost never without danger to the ear. Instrumental extraction should be tried in every case, either after careful cocainization or, in little children and in difficult cases, with a general anesthetic. In the nose it is important to introduce the instrument behind the foreign body, so as to push it forward; a bent curet (Fig. 13), a wire loop, a bent probe,

or some other similar instrument may be utilized for the purpose, according to the conditions of the case. If the foreign body is to be seized from in front, either in the nose or in the nasopharyngeal cavity, instruments should be used which would make it impossible for the foreign body to escape and be pushed farther into the cavity; the best instrument is, therefore, a sharp bone forceps. Large soft bodies, like swollen cereals and the like, may, if necessary, be broken up *in situ*.

In extreme cases an external operation, freely exposing the cavity that contains the foreign body, may, of course, have to be considered. If the foreign body is in one of the accessory sinuses, such an operation can scarcely be dispensed with, although occasionally a small object that is easily seized may be extracted from the antrum with a wire snare introduced through an already existing operative fistula or an opening in the alveolar process.

Organic foreign bodies include the larvæ of various insects hatched from eggs that have been laid in the nose. Sometimes, as in the case of the larvæ of the various species of œstrus, the symptoms are quite mild, but in most cases the presence of such bodies leads to profuse purulent and sanguineous discharge, edema of the face, and rapid destruction of both the soft parts and the bone. In India this accident is observed so frequently that it has received a special name—"**peenash.**"

The larvæ of other dipterous insects occasionally develop within the nose, as well as myriapods (centipedes), earwigs, and termites. Larger creatures, such as leeches, pin-worms, ascaris lumbricoides, and even lizards are met among the "cave-dwellers" of the nose. The symptoms of **myiasis** or disease due to the presence of the larvæ of flies include, besides the objective ones already described, violent headache and vertigo going on to delirium, fever, insomnia, and, at first, violent attacks of sneezing. Unless the disease is treated, death may result from extensive destruction of tissue. The true nature of the trouble can be determined with certainty only by

recognizing the organisms, either mixed with the nasal secretion or lying free within the nose. To bring about the death and elimination of the larvæ, irrigation with chloroform-water has been found effective. In the case of other parasites, instrumental interference is usually necessary.

MALFORMATIONS.

Owing to the development of the oropharyngeal cavity from the external nasal process and the four pairs of branchial arches, malformations due to failure of union

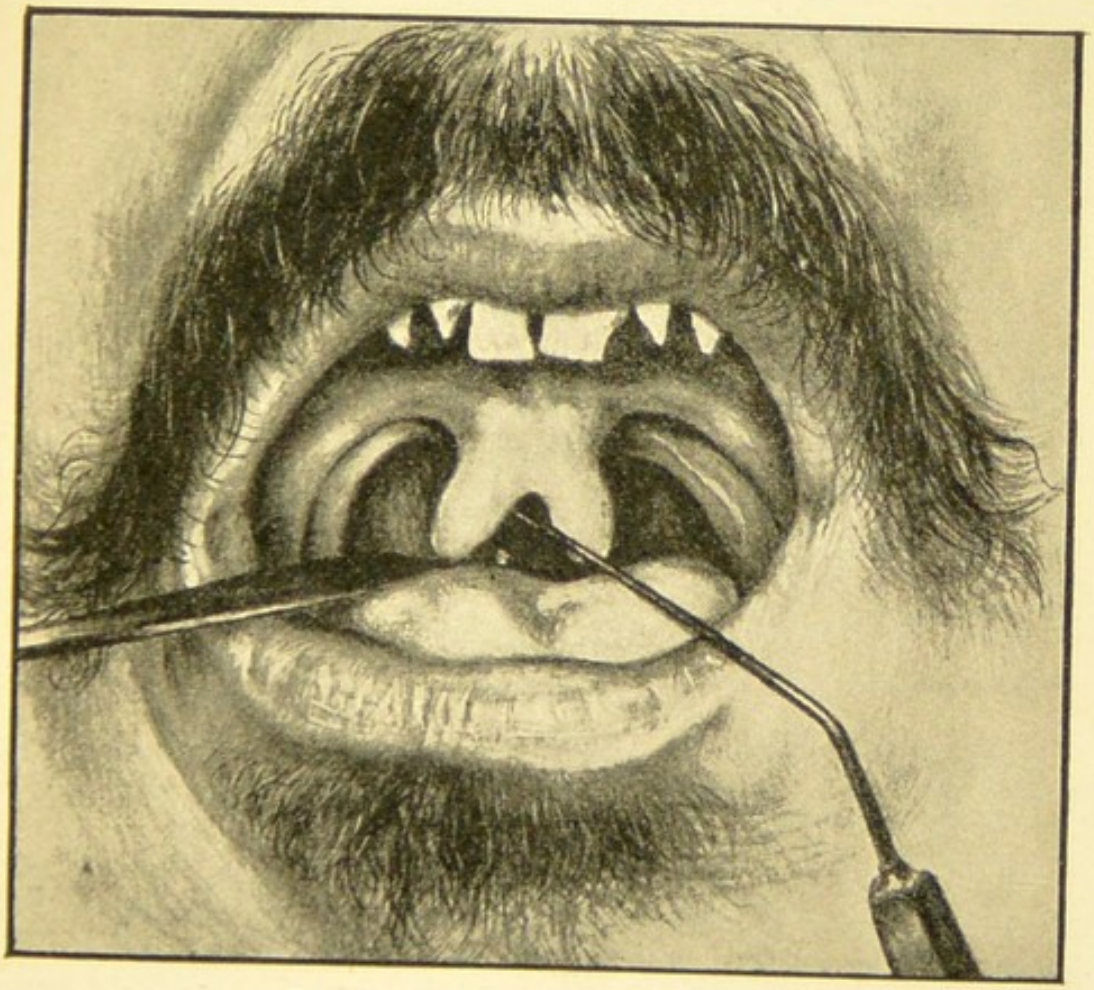

FIG. 35.—Bifurcation of the uvula.

are the commonest abnormalities observed. The most familiar of these malformations is the well-known harelip deformity; similar congenital clefts are, however, also observed in the deeper portions of the mouth and in the

pharynx, the most frequent of which, consisting in bifurcation of the uvula (Fig. 35), usually escapes detection on account of the adhesion of the two halves of the structure. In the nose median clefts are found, ranging from barely perceptible impressions on the bridge of the nose, to the deep saddle-shaped deformity. Complete absence of the central portion of the soft and hard palates, exposing the entire interior of the nose (Fig. 36), also occurs,

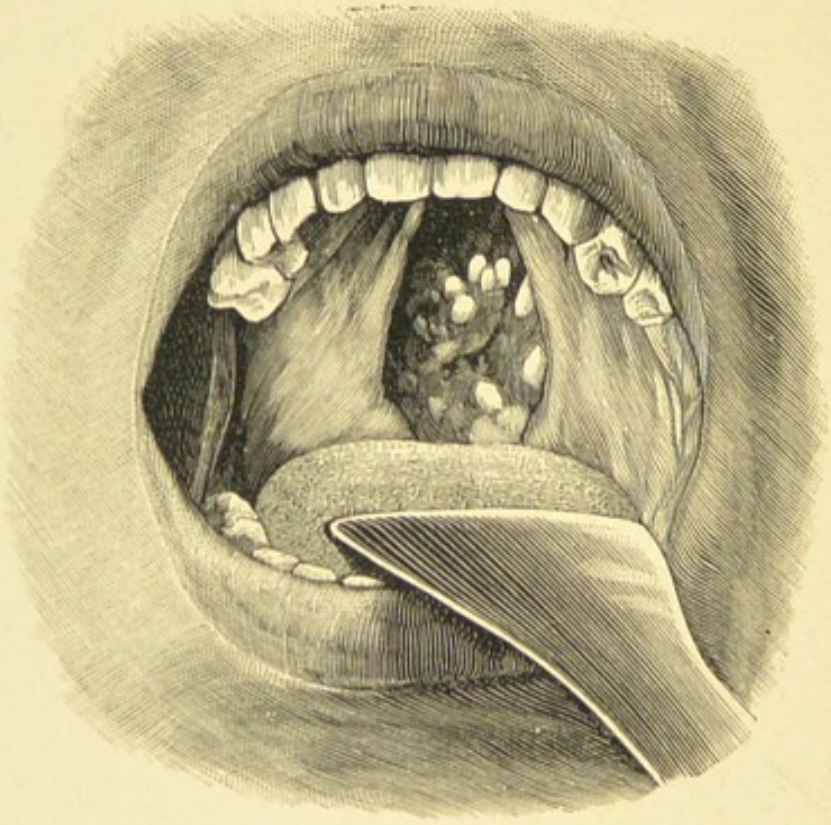

FIG. 36.—Median cleft-palate in a child four years old. Within the cleft the hypertrophic pharyngeal tonsil is visible by the reflection of the light on the prominent portions of the tissue.

and may in later life be erroneously attributed to syphilis instead of to congenital malformation.

These and other similar median clefts are due to failure of the supramaxillary process to unite with the internal nasal process. Incomplete union between the supramaxillary and external nasal process, as well as imperfect development of the intermaxillary bone, results in the formation of a lateral cleft. The former produces the

oblique facial cleft; the latter, the lateral maxillary and palatal clefts.

Lateral clefts may be unilateral or bilateral. In the first case there is a linear defect to the side of the intermaxillary bone; in the latter, the peculiar formation of the so-called coccyx. The latter consists of the anterior portion of the intermaxillary bone and several teeth, flanked on each side by a sagittal cleft running backward through the lip and the maxilla.

Rudimentary clefts are also observed in the form of congenital absence of a canine tooth, a lateral notch in the upper lip, or a similar defect in the soft or hard palate. The small defects seen in the palatal arches may be attributed, if syphilis can be excluded, to congenital malformation; just as the inversion of odontoblasts in the nose or antrum of Highmore is to be attributed to a failure of the lateral maxillary cleft to become closed. **Cervical fistulæ,** either complete—that is, provided with an internal and an external opening, the internal opening being always in the region of the palatal tonsils—or incomplete,—that is, with only one opening,—are the result of incomplete closure of the branchial clefts. The deep **dermoid cysts** of the neck and pharynx and the **pharyngeal diverticula,** which are always of congenital origin but may undergo enlargement in later life, are to be regarded as rudimentary structures of similar origin.

During the closure of embryonal clefts superficial portions of the body may become displaced into deeper strata, and these islands of epidermal and epithelial tissue, owing to the untrammeled growth of embryonal life, are apt to form tumors known as **branchiogenetic carcinomata,** which, on account of their deep situation along the vessels of the neck, may present insuperable obstacles to extirpation.

Peculiar disturbances of an obstructive character are not infrequently produced by excessive development of bone, cartilage, and connective tissue in the upper respi-

ratory passages. Narrowing of the mesopharynx and hypopharynx has been observed as a result of marked prominence of the bodies of the second and third cervical vertebræ, a condition usually described somewhat loosely as lordosis of the cervical vertebral column. Marked wing-like prominence of the upper portion of the posterior border of the vomer, the ala vomeris, sometimes presents an obstacle to the extirpation of a pharyngeal tonsil, or at least may alarm the inexperienced. Exostosis of the vomer (see Fig. 30, p. 168) and of the perpendicular plate of the ethmoid bone at the crest of the septum; excessive

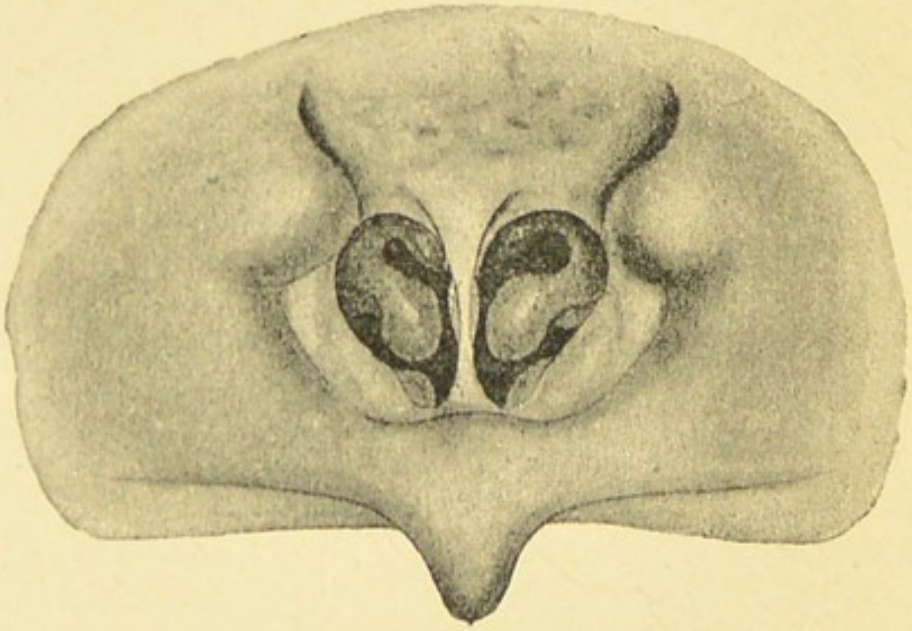

FIG. 37.

prominence of the pterygoid process with narrowing of the choanæ (Fig. 37); the formation of a membrane behind the nose (Figs. 38, 39); total or partial bony or fibrous septa within the nose, especially in its posterior segment; and, finally, rudimentary adhesions resembling bracelets in form (Fig. 40), and distinguished from acquired adhesions by the absence of cicatrization, are some of the more important malformations of this class.

An anomaly that is observed more frequently than any other of this kind consists in a **spine** on the nasal septum, associated usually with exostosis of the crista septi (Fig.

34; Plate 27, Fig. 1). The anomaly is produced by imperfect insertion of the cartilage or bone of the septum into the process of the intermaxillary bone.

All these anomalies should be subjected to **treatment** only when they give rise to actual functional disturbances or other injuries that require removal or palliation. Accordingly, the war of extermination that is waged by many surgeons against spines of all kinds is to be utterly condemned. Nothing less than interference with respira-

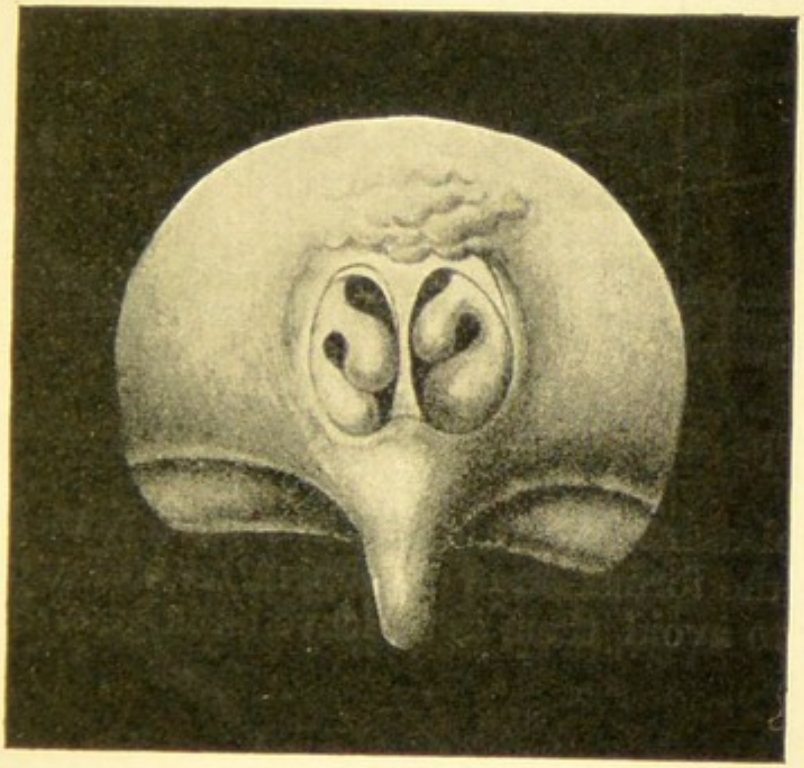

FIG. 38.—Membrane behind and covering the tubal folds.

tion or the irritation due to contact with the inferior turbinate and the stagnation of secretion justifies a recourse to the knife. The popularity of these operations is responsible for the enormous number of methods and instruments that have been devised. For the removal of large and broad excrescences I recommend a curved sculptor's chisel, with which the growths are chipped away under inspection; for moderately large and small excrescences the fenestrated knife, illustrated in Fig. 41, which is drawn over the bone or cartilage and makes a clean cut

like a razor, may be recommended. The treatment of atresia depends on the conditions of the individual case;

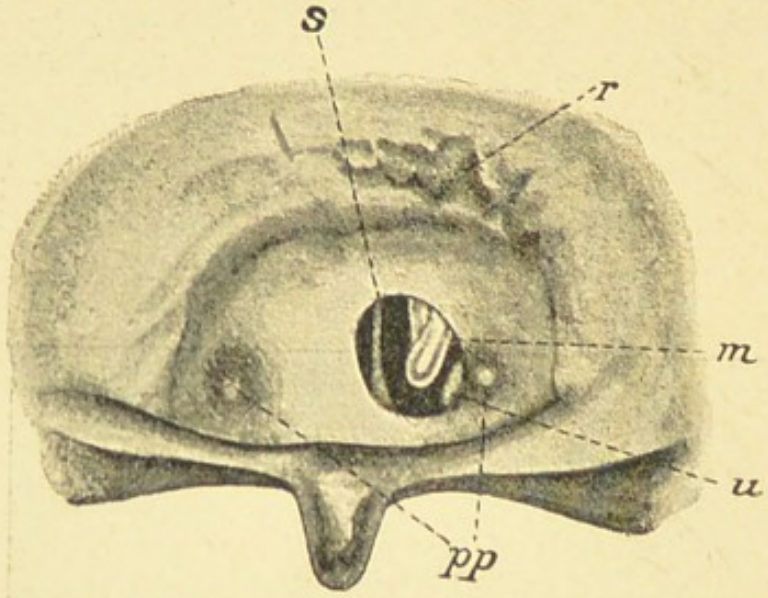

FIG. 39.—Membrane behind the right choana and the tubal folds: *pp*, Projecting pterygoid process; *u*, inferior, *m*, middle, turbinate; *s*, septum; *r*, recess in the pharyngeal tonsil.

bone-forceps may be used to advantage in these operations.

An unpleasant feature of all these operations is the tendency to the formation of postoperative adhesions. The best way to avoid them is to leave as large a distance as

FIG. 40.—Rudimentary adhesion.

possible between the abraded surfaces from the very beginning. It is, therefore, better not to be content with

mere division of synechiæ and membranes, but to supplement the procedure by the extirpation of a portion of the foreign growth. After division with the galvanocautery adhesions are so frequent as to be the rule. In any anterior synechia, especially between a septal spine and the inferior turbinate (Fig. 34, p. 199), the bridge should be divided with a knife or scissors or chiseled away close to the turbinate, and the basal portion cut away with the fenestrated knife. The opening later enlarges of its own accord. If an adhesion threatens to form, it may readily be prevented by introducing thin strips of gauze saturated with liquid vaselin, which permits superficial epitheliali-

FIG. 41.—Fenestrated knife (the handle is shown in Fig. 13, p. 52.)

zation to take place and are free from the disadvantage of causing a fresh traumatism at each renewal.

Deviation of the nasal septum is a common deformity (Plate 27, Fig. 1). What has been said in regard to treatment of malformations applies even more forcibly to this condition, which very rarely justifies operative intervention. A certain degree of deviation of the septum to one side or the other is physiologic. Even very marked deviations are often observed that do not in the least trouble the owner, although, unfortunately, they appear to trouble the rhinologist a good deal. They occasion hardly any interference with respiration, because the narrowing of the side corresponding to the convexity of the septum is compensated by a corresponding widening opposite the concave surface, and operation for the purpose of relieving the stenosis is really indicated only when tumors or insuperable obstacles to the escape of purulent and other secretions are to be removed. In such cases an

operation to correct the deviation is justifiable, and the author much prefers the rapid bloody method to the uncertain and slow mechanotherapeutic procedures. The operation, for which many methods have been proposed, consists in the main of making an incision corresponding to three sides of a square on the bulging portion of the septum, leaving the fourth side intact. The remaining portion of bone or cartilage is then forcibly broken, and the protruding mass pushed over to the concave side. The fragments are then retained in their correct position for several days by firmly packing the nose with gauze.

Complications with hyperplastic processes at the site of the bulging are quite common and demand the removal of the thickened tissues. If possible, a flap of mucous membrane should be reflected, the hyperplastic tissue resected, and the flap returned to its place. These operations, of course, require a rhinologic technic which cannot be learned from books.

Two forms of **hypoplasia** that occur in the oropharynx deserve mention on account of their clinical importance. They are shortness of the frenum of the tongue, producing the condition known as tongue-tie, which must be relieved when there is actual interference with the movement of the tongue; and shortness of the hard palate, usually described as insufficiency of the velum, so that when the velum is contracted, it fails to reach Passavant's fold. The effect is the same as that of paralysis of the soft palate—namely, rhinolalia aperta; while failure of the glottis to close the larynx rarely occurs, because the individual learns to adapt himself to the abnormal condition.

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