Dr. J. S. Billings
Surgeon U.S.A.

1207 R.I.
Washington D.C.
Nov. 26 1883

My dear Doctor

I send herewith a package containing a book & papers by the late Dr. Horace Green L.L.D. who died in 1866, which I mentioned to you Saturday Evening.

The book is "A Practical Treatise on Pulmonary Tuberculosis", 8vo. pp. 355. ~~G. P. Putnam~~ John Wiley 1864

On the last page is a notice of him from N.Y. medical Journal Jany 1867 which I have pinned in.

I enclose five pamphlets, containing articles by him except one a defence of him by Dr. M. Mattson Mod. Boston in the Boston Medical & Surgical Journal March 1847, title "The Bronchitis War."

The other articles are by him.

1st Report on the Use & Effect of application of nitrate of Silver to the throat. — From "Transactions of the American Medical Association" 1855

2d "Dr. Horace Green on the Introduction of the Spray-armed Probang into the larynx and trachea." "American Medical Monthly" 1857

Genl. Benjn. Alvord.

With the respects of his friend.
the Author.

A PRACTICAL TREATISE

ON

PULMONARY TUBERCULOSIS.

EMBRACING

ITS HISTORY, PATHOLOGY, AND TREATMENT.

BY

HORACE GREEN, M.D., LL.D.

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TO

MRS. H. DOUGLAS GREEN.

BEING PERFECTLY AWARE, MY DEAR WIFE, THAT TO YOU BELONG ALL THE VIRTUES THAT ORDINARILY ADORN YOUR SEX, AND THAT, THEREFORE,

THIS WORK

MAY WITH PROPRIETY BE INSCRIBED TO YOU; YET, AS THE WORK OWES ITS EXISTENCE TO YOUR CONSTANT FAITH AND ENCOURAGEMENT,

I Dedicate the Volume

TO YOU, AS A SLIGHT TESTIMONIAL OF THE LOVE AND RESPECT OF YOUR

HUSBAND.

PREFACE.

I AM quite aware of the charge of presumption which, very properly perhaps, may be brought against me for venturing to give my own views on the subject of tuberculous disease, when our country is so full of mature and learned works on this subject. But I have no apology or excuse to offer. I am not ambitious of thrusting forward new or peculiar opinions on any medical subject.

I have only embodied views which twenty-five years of constant and extensive experience in the treatment of this class of diseases have given me, and do not ask my professional brethren to accept them, only so far as they are convinced of their truth.

This work has been divided into three parts.

The first embodies a historical sketch of the views of many of the most ancient and modern writers on the Nature and Treatment of Tuberculosis. The sources from which these views are derived are generally named. For some of the earliest acts to which reference is made I am indebted to the excellent work of Dr. Young; for those of more modern times to the different authors who have written on this subject. It has not been in my power to allude to all the works published on this disease, but I have intended by a brief reference to the writings of a sufficient number of them, to give an epitome of the most prominent views entertained by different authors of different ages on Tuberculosis.

The second part is devoted to an account of my own views of the pathology of the disease, or of the Nature and Origin of

Chronic Phthisis. I do not assume that all cases of Tuberculosis have their origin in a deterioration of the epithelial element, but of the truth of the theory in regard to the initiality of Chronic Tuberculosis after twenty-five years' experience in the constant treatment of the disease, I am quite positive.

In the third part, I have considered the treatment of the disease. I have endeavored to show the importance of local treatment in the early stage of the affection, particularly in the chronic form, especially where follicular degeneration has preceded the development of tubercles in the lungs. Great pains were taken in the examination of the cases of phthisis which presented themselves for treatment. Of 558 cases of phthisis that came under my observation, 311 were males and 247 females. Of this number, 377 had disease in the right lung, and 234 in the left. Of the females (247) 147 were first diseased in the right lung, and 100 in the left.

In the treatment of a large number of cases during many years of observation, about the same proportion in the nature of the lesion and in its location was remarked. Hence, the plan of treatment I have recommended, was adopted, and has been carried out during a period of over twenty-five years.

Great care has been taken with the microscopic illustrations. Most of them are original, with the exception of two from Kölliker, one from the work of Virchow, and one from that of Waters, on the Pathology of the Human Lung.

These views are submitted to the profession with entire confidence in their willingness to carry out the injunction, "Prove all things; hold fast that which is good."

HORACE GREEN.

New York, August, 1864.

CONTENTS.

PART I.

CHAPTER I.

PAGE

Pulmonary Consumption—General Remarks, ... 1

CHAPTER II.

Brief Sketches of the Views and Writings of Distinguished Medical Writers from Hippocrates to the present day on the Subject of Consumptive Diseases, ... 4

PART II.

CHAPTER I.

§ 1. Of the Elementary Parts, ... 117
§ 2. Cells, or Elementary Organs of Animal Tissue, ... 118

CHAPTER II.

Histological Inquiries, ... 123
§ 1. Special Histology of the Respiratory Organs, ... 123
§ 2. Oral Cavity, ... 125
§ 3. The Pharynx, ... 127
§ 4. The Larynx, ... 128
§ 5. The Trachea, ... 133
§ 6. The Lungs, ... 135
§ 7. The Ultimate Pulmonary Tissue, ... 136

CHAPTER III.

Theses, or Propositions regarding the Inceptive Pathology and the True Nature of Phthisis, ... 148

CHAPTER IV.

Morphological Changes in the Tissues, ... 150

CHAPTER V.

Nature and Progress of the Tuberculous Dyscrasia, ... 162

CHAPTER VI.

PAGE
Early Symptoms of Chronic Phthisis; or, Tubercular Dyscrasia, . 168

CHAPTER VII.

§ 1. Primary Symptoms of Tuberculosis, ... 177
§ 2. Extension of the Morbid Process along the Trachea, and into the Bronchia, and their Ramifications, ... 181

CHAPTER VIII.

§ 1. Second Stage, ... 185
§ 2. Condition of the System Preceding and Attending the Full Development of Tuberculosis, ... 188

CHAPTER IX.

§ 1. Third, or Tubercular Stage, ... 191
§ 2. Softening, ... 192
§ 3. General Remarks, ... 194

PART III.

CHAPTER I.

Treatment of the Præ-Tubercular Stage of Chronic Phthisis, . . 201
History of a Family, showing that Diseased Action of the Glandular Follicles may result in the Development of Hereditary Tuberculous Dyscrasia, ... 201

CHAPTER II.

Primary Lesions, ... 205
§ 1. Lesions of the Fossæ Nasales. Illustrative Cases, . . 205
Elongation of the Uvula. Case described, ... 211
§ 2. Lesions of the Tonsillar Glands, with Case, ... 214
General Remarks, and Illustrative Cases, ... 226
§ 3. Lesions of the Pyriform Sinuses, ... 240
§ 4. Lesions of the Epiglottic Cartilage. Cases reported, . . 245
§ 5. Ulceration of the Mucous Membrane, or of the Glands of the Epiglottis. Cases described, ... 257

CHAPTER III.

Treatment of Chronic Phthisis, following Follicular Degeneration of the Mucous Membrane of the Air-Passages, ... 279
§ 1. The First, or Præ-Tubercular Stage of Phthisis. Illustrative Cases, ... 279
§ 2. The Bronchitic Stage of Phthisis. Cases narrated, . . 290
§ 3. The Tubercular Stage of Phthisis, ... 297

CHAPTER IV.

PAGE

§ 1. Catheterism of the Bronchial Tubes. Reports of Cases, . 300

CHAPTER V.

Continuation of the Treatment of Chronic Phthisis, Local and General, ... 325
Topical Remedies, ... 325
Sedatives, ... 328

CHAPTER VI.

General Remedies, ... 329
Iodine, ... 329
Arsenic, ... 332
Manganese, ... 333
Iron, ... 334
Hydrocyanic Acid, ... 335

FORMULÆ, ... 336

APPENDIX, ... 344

INDEX, ... 349

LIST OF ILLUSTRATIONS.

PAGE

FIGURE 1. Specimens of Normal Cells, each cell composed of its Membranes and Cell Contents; Isolated Nuclei and Nucleoli; Molecules or Granules isolated, . . . 119
" 2. Portion of a Cartilage from the Humerus of a Child, showing the cell-territories, ... 121
" 3. Ciliated Epithelium from the human trachea, . . . 132
" 4. Diseased Follicles of Posterior Nares, in the commencement of follicular degeneration, ... 180
" 5. Expectoration from the Trachea, in chronic folliculitis, . 182
" 6. Tubercular Matter from the lungs of a patient dead of tubercular phthisis, ... 193
" 7. Cells taken from the Tonsils of the calf, ... 216
" 8. Hypertrophied and Diseased Tonsils, removed from patient laboring under chronic folliculitis, ... 218
" 9. Disintegrated Matter taken from the cavity of a Tonsillary gland, greatly diseased, ... 219
Plate X. See Appendix, ... 344

LITHOGRAPHIC PLATES.

PLATE XI. Tonsils slightly enlarged, not showing much External Disease. Ulcerated Portion on cut surface, as seen after excision, cavity filled with disintegrated or cheesy matter, ... 237
" XII. Disease and Ulceration in Pyriform Sinus, . . . 243
" XIII. Healthy Throat, ... 205
" XIV. Ulceration of Pyriform Sinus, ... 241
" XV. Erosion of the Left Side of the Epiglottis, . . . 249
" XVI. Ulceration of the Centre of the Epiglottis, . . 261
" XVII. Ulceration of the Epiglottis, ... 262
" XVIII. Erosions of the Entire Edge of the Epiglottis, . . 255
" XIX. Œdema and Ulceration of the Epiglottis, . . . 270
" XX. Ulceration of the Pyriform Sinus healed, . . . 244
" XXI. Elongated Uvula and Commencement of Follicular Disease, ... 212
" XXII. Ulcerations of Mucous Membrane of Larynx and Trachea, ... 296

A

TREATISE

ON

PULMONARY TUBERCULOSIS.

PART I.

CHAPTER I.

PULMONARY CONSUMPTION.

Since the publication of the writings of Bayle and Laennec, Pulmonary Tuberculosis has been defined to be that form of disease which is characterized by a development in the air-spaces of the lungs, of a soft, brittle, adventitious substance, denominated tubercle or tuberculous matter.

The physical characters, the microscopic structure, and even the chemical composition of tubercle are well understood by the modern pathologist. With the effects, too, of this morbid product on the animal economy; with the signs of its earliest manifestation in the lungs, as well as with those of its subsequent progress in the ultimate destruction of their vascular parenchyma, all well instructed practitioners are now familiar. But of the primary origin of phthisis—of those morphological conditions of the living body which precede and control the inception of the nascent tubercle, we are altogether ignorant. So, likewise, if we regard consumption as a

general disease, we know absolutely nothing of the abnormal phenomena which precede that condition of the animal frame, whether hereditary or acquired, to which the term phthisical constitution, or scrofulous diathesis, is applied. Unfortunately, it is not until the antecedents have given place to the consequent,—not until the morbid product has, to some extent, blocked up the air-cells, that the physical signs which constitute the only positive evidence of the actual presence of tuberculous disease. disclose to us the true nature of the malady.

It must therefore be apparent to all those who have directed any inquiries to this subject, that farther researches on this vital point are absolutely required; and that until our knowledge in the primary morphological changes which occur in early phthisis is extended, our success in its treatment must remain, as heretofore, limited and uncertain. "Before we can hope to acquire an accurate knowledge of Consumption," says Sir James Clark, "we must carry our inquiries beyond the pulmonary disease, which is only a secondary affection."

The great object of the present work is to contribute something to the attainment of this most desirable end; to extend, if possible, our knowledge of the causes of phthisis, that we may be enabled thereby to adopt a more appropriate and successful method of treatment.

Diseases of the pulmonary thoracic organs, it will be admitted, are more constantly observed than those of any other part of the human system; and, of the different affections of these organs, no one is so frequently present, or so generally fatal, as tubercular consumption. To contemplate the vast mortality caused by this world-pervading disease, is indeed humbling to our professional

pride. Great pains have been taken in this country and in Europe to obtain correct statistics on this subject, and from most extensive and reliable data it has been calculated that one fourth part of all the deaths occurring from disease, in all temperate latitudes, are caused by tubercular phthisis. Indeed, Sir James Clark, who is high authority, has declared it to be his opinion, that if we add to consumption of the lungs, tuberculous diseases of other organs, and deduct the mortality which occurs during the first months of life, it will probably be within the truth, to state that a third part of the mortality arises from tuberculous diseases!

So long, therefore, as a cause of mortality so universal and efficient, remains in force, every medical man, who possesses opportunities for observation, in any degree extended, will have failed in discharging his duty to his profession, and to humanity, until he has contributed something to advance our knowledge of the nature of this cause, or to insure the mitigation of its consequences.

But, before we can pursue, intelligently, inquiries which refer to primary morbid alterations in tuberculosis, it will be necessary to consider not only those views of the pathology of consumption, which the ancients entertained, but to refer to those which constitute present received opinions, concerning the nature of this disease.

CHAPTER II.

BRIEF HISTORICAL SKETCHES FROM THE TIME OF HIPPOCRATES TO THE PRESENT DAY.

It is not my purpose to review the many obsolete opinions entertained by the ancients, of the nature of Consumption: still, in a treatise of this kind, it is manifestly proper not only to refer to the opinions recorded by the more distinguished medical writers of the past, but to compare these views, that by combining the various discoveries of different epochs in medicine, we may gather material aid in our further researches from the accumulated experience of medical observers of all ages.

If we examine the earliest writings of the physicians of ancient Greece and Rome, we shall be surprised at the amount of accurate knowledge they possessed with regard to the nature, etiology, and treatment of Phthisis; and equally surprised to find what little progress, with all our boasted advantages and increased pathological knowledge, modern practitioners have made in the successful treatment of this malady.

OPINIONS OF HIPPOCRATES.

The prominent *rational* symptoms of genuine consumption are all accurately described by *Hippocrates*. In the Predictions and Aphorisms, Hippocrates alludes with much accuracy to the characteristic alterations occurring in Consumptive diseases. The "suppuration of the lungs," following the "short dry cough," "pain in the chest," and "temporary flashes of heat," attended with

"purulent expectoration after hæmoptysis, and succeeded by emaciation and colliquation," describes the genuine tuberculosis of the present day; and from his description it is at once recognised as such, by the modern pathologist. The great pathological doctrine advanced by Hippocrates is this, that the *fluids* are the primary seat of all disease; the formation of tubercles was attributed by him to the putrefaction of phlegm or of bile.

The most dangerous form of consumption, Hippocrates declares, is "caused by a rupture of the great vessels, or by a deflexion of matter proceeding from the head." The collected humors putrefy and produce the disease. "The lungs are filled with phlegm," remarks he, "and pus is formed which corrodes the lungs."*

He distinguishes the difference between pus and mucus by the greater specific gravity of the former. "If the expectorated matter sinks in sea-water," observes Hippocrates, "the disease will be shortly fatal."

In the treatment of Consumption, Emetics are particularly and very constantly recommended by Hippocrates. Occasional mild cathartics are advised, together with the external application of powerful caustics to the chest and the back. Oxymel, or honey, was the favorite demulcent employed by the ancients to allay the irritation which attended the cough.

A milk diet (asses' and mares' milk are particularly mentioned), with meat in moderate quantities, is recommended. Avoiding the vicissitudes of heat and cold, and employing exercise in the open air, especially that of walking, which should be gradually increased until a distance of ten or fifteen miles is accomplished daily—

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* *Hippocrates.* Aph. Vol. II. p. 125, and Predictions, p. 71.

these are among the most prominent of the measures recommended by the Father of Medicine for the treatment of Consumption.

It does not appear that Hippocrates knew aught of the remedy so universally employed at the present day in the treatment of Consumption, for we find no mention made of *cod-liver oil* in any of his writings; but the oil or fat of different animals, and particularly that of the wild boar, is advised by him in several portions of his works to be taken freely by consumptive patients.

DIOSCORIDES.

Few among the immediate successors of Hippocrates ventured to entertain any opinions, or to recommend any measures for the treatment of disease, different from those entertained and advised by the Father of Medicine. The employment of fumigations in the treatment of Consumption, and the internal administration of sulphur, were recommended by *Dioscorides*, the physician of Cleopatra.

ARETÆUS.

Aretæus, of the exact period of whose writings we are not positive, but who practised in the reign of Vespasian, employed the term of phthæ or phthisis to designate a disease characterized by a chronic cough, hæmoptysis, a purulent expectoration, and attended with ulceration of the lungs. In remarking upon affections of the chest, Aretæus makes the observation that in those where the disease proves fatal, the patient seldom despairs of recovery to the last.

His work on General Disease is written with much elegance, and his description of the rational signs of Consumption is uncommonly accurate. A more graphic

description of disease is not to be found in any writings, ancient or modern, than that which Aretæus gives of a patient dying of Consumption. "The patient," he observes, "feels a weight in the chest, with nausea, and chills in the evening, succeeded by heat towards the morning: he has partial sweats about the thorax: his voice is hoarse: his neck is slender, and as if contracted: the fingers too are shrunk, except at the joints, which become prominent: the nails are bent for want of support, and become painful: the nose is sharp, the cheeks are red, the eyes sunk, but bright, the countenance as if smiling: the whole body is shrivelled: the spine projects, instead of sinking, from the decay of the muscles; and the shoulder blades stand out like the wings of birds. At last a diarrhœa supervenes, and the case becomes hopeless."

Sea voyages and milk diet are recommended by Aretæus as the great remedies for the cure of Phthisis.

CELSUS.

The precise period at which *Celsus*, one of the most accomplished and learned of the Roman physicians, flourished, is not known; although from some expressions in his writings, it has been conjectured that he lived under the reigns of Augustus and Tiberius. He is the earliest Roman physician whose writings on Consumption have come down to us. In his treatise "On Medicine," he alludes to Phthisis as the most dangerous species of Tabes, "which beginning from the head descends to the lungs, and is accompanied by ulceration and fever, with cough and expectoration of purulent, and often bloody matter."

Some revulsives are advised by Celsus in the treatment

of genuine Consumption. The cautery is to be applied at several different locations, under the chin, over each breast, and under the scapulæ; and the ulcers, he directs, should not be healed until the cough has subsided. Turpentine, butter, and honey simmered together, are to be administered internally to allay the cough.

The juice of the plantain with honey, and vinegar of squills, are also recommended by Celsus in the treatment of this disease. But the remedy on which he most relied was a long sea-voyage, with a change of climate, inasmuch as the worst air for any disease, he declares, is that in which it has originated.

Among the earlier Roman physicians, some of the most eminent gave much attention to the improvement of pharmacy. The Materia Medica of the ancients, even at this early day, was quite extensive, but it consisted almost entirely of vegetable products.

PLINY.

Pliny the Elder, who was celebrated as a naturalist, describes many remedies, which by him, and in his time, were held to be specifics for the treatment of Consumption. He was the first to recommend a residence in woods affording an abundance of resinous effluvia, as a most favorable location for the consumptive. The fat of the mountain goat, taken in gruel, with honey, or dissolved in milk, was a very popular remedy in his day.

GALEN.

It is admitted by all writers on the history of Medicine, that Galen was "one of the most remarkable men that ever appeared either in ancient or in modern times." He was a great admirer and in many respects a follower

of Hippocrates, adopting as the foundation of his theory, the doctrine which he had advocated in his voluminous writings, that the fluids are the primary seat of all disease.

In his knowledge of Physiology, as evinced by his treatises on this subject, Galen greatly exceeded his contemporaries, and in the progress which he made in pathological anatomy, he surpassed all that had been accomplished by any of the ancients; and yet his views of the nature of Consumption were exceedingly erroneous. He describes hectic fever as existing independent of Consumption, and as frequently accompanying Marasmus, which is a disease generally incurable. Hectic fever, he admits, may be occasioned by affections of the liver, the colon, the bladder, or the kidneys, or indeed by chronic inflammations of any kind, but that it never succeeds to any visceral disease, without some affection of the heart itself being present. In its advanced stage it constitutes an incurable form of marasmus, in which "the substance of the heart is wholly dried up."

In the collection of Galen's works is a treatise on Medical Definitions, which, it is supposed, is not a genuine Galenic production. Phthisis, or Consumption, is "described in this treatise as an emaciation, occasioned by an ulceration of the lungs, attended by a cough and a slow fever," a definition evincing considerable advance in pathological anatomy.

In Galen's treatment of *pulmonary consumption*, which is considered at length in the fifth book of the Method of Healing, he alludes to the difficulties which occur in arresting hæmorrhages, and in healing ulcerations of the lungs. Such ulcers, he observes, require very powerful remedies, because the ulcers cannot be reached by

the immediate application of these remedies. The healing process is prevented, moreover, by the act of coughing, as well as by the movement of respiration. When a vessel has burst, unless it unites without inflammation, the disease, he declares, is incurable. The indications are, to relieve the cough, and to obviate the defluxion from the head.

To meet these indications, cathartics and bleeding are recommended, each to be repeated occasionally; observing proper intervals for recruiting the strength of the patient by nourishing food.

The remedies employed by Galen for relieving the cough, and promoting expectoration in diseases of the lungs, were principally such as had been recommended by medical writers of eminence who had preceded him, and in most instances were simple remedies, such as liquorice, saffron, frankincense, and other similar substances. The juice of hyoscyamus, but more frequently the seed of hyoscyamus, was occasionally administered. A milk diet was advised by him for his consumptive patients; and the milk of the ass and the goat was preferred to that of the cow. Whatever kind used, he recommended it to be drunk warm from the animal. His dependence, however, in the treatment of Consumption, was not so much, after all, on these mild remedies and diet, for he expressly states that, "All that are curable are cured by bleeding, purging, and strengthening the head,"—a depressing and "perturbating" plan of treating disease too common even at the present day.

So exalted was the estimation entertained of the opinions of "the divine Galen" by his contemporaries and successors, that for centuries after his death no important discoveries were effected in medicine; and few

indeed, and feeble, were the attempts which were made to improve the science. "Mankind," says Dr. Good, "seemed to be satisfied with the progress which had been made in the science, or were conscious of their inability to surpass the limits which had been assigned to it." Up to the middle of the sixteenth century, medical authors, both among the Greeks and the Arabians, adhered to the opinions and precepts of Galen.

PARACELSUS.

Paracelsus, who flourished before this period, presumed, it is true, to deviate from the practices of the ancients; and he even attempted to counteract the doctrines of Galen. Consumption is attributed by Paracelsus to a deficiency of moisture in the system; but he defines it to be a disease by which the whole body is dried up.

In his treatment of the disease he advised the employment of mineral remedies, such as crude antimony and crocus martis; recommending these to be fully administered. The frequent use of the bath, and universal friction with ointments, night and morning, together with a vegetable diet, are advised by Paracelsus in the treatment of Consumption.

RHOZAS.

Among the Arabians, Rhozas, who was not only well acquainted with general science, but was regarded as one of the most illustrious physicians of the ninth century, recommends, in addition to the measures advised by Galen, and others of the Greek physicians, for the treatment of Consumption, fumigations with a mixture which contained a portion of arsenic.

This is not the first instance, however, in which arsenical preparations had been recommended by the ancients in the treatment of pulmonic disease, for, in the third book of the Euporistics, addressed to Solon, we find that the yellow sulph. of arsenic, which is a less poisonous preparation than the oxide, is advised, not only for smoking, but to be taken internally with honey, as a useful remedy in pulmonary disease.

But it was not until several centuries after the death of Galen that the chirurgists, who for a long period were considered the empirics of the day, were able to introduce into the popular pharmacopœias of that period, active metallic preparations to any considerable extent. The Materia Medica of the Galenists was composed almost entirely of articles taken from the vegetable kingdom. In the writings of the Greek physicians, as well as in those of the Arabians, whose works consist principally in abridgments from, and commentaries on, the voluminous labors of Galen, frequent allusion is made to the injurious effects produced upon consumptive patients by the use of metallic remedies, whilst positive recoveries from the advanced stage of Consumption are frequently attributed to remedies many of which were perfectly inert. Forestus restored patients from a hopeless condition, by means of sugar of roses and chicken-broth; and Plateras, who copied very closely the doctrines and opinions of the Greeks, put great confidence in "the distilled water of snails," for the treatment of phthisis. Another effected remarkable cures with saffron and the whites of eggs; whilst Solenander arrested incipient consumption by administering the dew gathered from certain medicinal plants, such as the hyssop, bergamot, and betony (*betonica officinalis*), the last

of which was much employed in ancient medicine, in the treatment of consumption, gout, and sciatica.

The opinions of Galen were adopted, and the inefficient practice of the Greek physicians in the treatment of Consumption was very generally followed by medical practitioners in all civilized countries, during a period of nearly ten centuries after the death of Galen. There are some exceptions to this passive submission to the great authorities of antiquity. But whenever inquiring observers in medicine ventured to express opinions, and to advocate plans of treatment, different in any degree from the views and practices of the ancients, they were certain to be characterized, by the conservative portion of the profession, as irregular and empirical practitioners.

PATERIAS.

Paterias, who was physician to the King of France, employed many powerful chemical preparations, some of which have proved valuable remedies for the treatment of disease. In Consumption he administered the preparations of antimony, mercury, and gold, as well as those of phosphorus and the acetate of lead. Paterias also employed, according to Hoffman, who was his commentator, in addition to these remedies, inhalations of the vapor of sulphur, and other medicines, with great advantage, in the treatment of many cases of Consumption.

With regard to the nature of Consumption, the pathologists of the fifteenth and sixteenth centuries entertained and expressed views exceedingly fanciful and erroneous. But we shall not be surprised at this, when we remember how little was known of the minute struc-

ture of the human body by the ancients of this period. Some knowledge had been attained in anatomy by the earlier Italians, for in a few instances they had ventured to dissect the human body; yet scarcely any discovery, or any improvement deserving of notice, says Dr. Good, had been made for many years, until

VESALIUS,

about the middle of the sixteenth century, entered upon his course of inquiry. "He was the first anatomist who threw off the yoke of authority, which had been imposed by a blind veneration for the opinion of the ancients, and who ventured to conceive the possibility of error in the writings of Galen. Vesalius prosecuted his researches with unwearied diligence; and disregarding the obloquy which was heaped upon him, he succeeded in publishing an anatomical work, which at this day we behold with admiration, and which maintains its character as a faithful transcript of nature."

But, notwithstanding these improvements made in anatomical investigations by Vesalius, and by Eustachius and Fallopius, who were also of that period, and who were deservedly celebrated for their great anatomical skill, the progress which was made in pathological anatomy by the medical inquirers of this age was comparatively unimportant.

WILLIS.

As late even as the middle of the sixteenth century, Willis, who is considered by many writers as one of the most eminent medical philosophers of that age, and who was celebrated for his great learning and anatomical accuracy, says of Consumption, that it is not the disease

derived from the head, as the ancients asserted, but the "human expectoration," he declares, "exudes from the minute vessels of the trachea, the whole mass of blood contributing to overwhelm the lungs with its serous portion; and when the discharge putrefies, it forms ulcers."

SYDENHAM.

The views of Sydenham, whose commencing reputation as a medical philosopher and successful practitioner equalled that of any writer of any age, did not differ essentially from those of his predecessor, Willis, for he ascribed the primary origin of disease to certain morbid fermentations which take place in the fluids; and, like Hippocrates, he defined diseased action to consist essentially in the efforts of nature to rid the system of these morbific causes. In accordance with this theory, he describes Consumption as having its origin in cold taken ordinarily in winter, and which becomes fatal gradually in the course of the succeeding summer.

"As the diseased action progresses, the lungs become incapable of assimilating the proper aliment, they are overwhelmed by a crude phlegm, and scatter the miasmata over the whole body; hence arises a putrid fever, of which the paroxysms are terminated by sweating; and afterwards a diarrhœa, from the accumulation of humors and the loss of tone of the viscera. A part of the humors, which ought to be thrown off by perspiration, is retained in the lungs; another part is secreted by the salivary glands, and descending the trachea, causes coughing."

It will not be difficult to imagine the treatment that would be based upon these views of the nature of the disease. In all cases Sydenham recommended that

class of therapeutic agents which were deemed efficient in assisting nature to bring about the proper causes and to regulate the actions of the system. Bleeding with mild cathartics; refrigerants during the stage of febrile excitement; opiates, balsams, and emulsions for the cough, with the universally prescribed milk diet, these are among the measures advised by Sydenham, in the treatment of pulmonary consumption. But the great remedy on which he mostly relied in the treatment of the disease, was riding on horseback.

Of the benefit to be derived from this measure he thus speaks in his epistle to Cole. "Horse exercise is no less useful to the consumptive than to the hypochondriac: in several instances, some of my own relations have been restored to health by taking very long journeys on horseback, at my recommendation, when medicines had been of no avail: and not in slight cases only, but where night sweats and diarrhœa had supervened, as usually happens in the last stage. In short, notwithstanding the acknowledged fatality of this disease, which carries off two thirds of those who die of chronic affections, I do not hesitate solemnly to affirm, that neither mercury in syphilis, nor bark in intermittents, is more effectual than riding in Consumption: provided that the patient take care to have his linen well aired and to continue his journey long enough; the longer, as he is more advanced in life; and this I have learned by multiplied experience, which I have scarcely ever found to fail: nor is carriage exercise by any means to be despised, though not equal to riding."

STAHL.

In examining the works of Stahl and Hoffman, whose writings exerted a widespread influence on the opinions

and practice of the physicians of the latter part of the seventeenth century, we find no evidence that the true nature of phthisis was any better understood by these celebrated medical philosophers, than it was by the pathologists of a much earlier period.

Stahl admitted that hectic was truly a symptomatic fever, but he denied the doctrine of the humoral pathologists, that Consumption is dependent on the presence of any morbific matter in the fluids of the system; hence those modes of practice which tend to promote the evacuation of such matters from the system are generally unattended with success in the treatment of the disease.—(Stahl de Hectica, etc.)

Disapproving of many of the remedies recommended by Sydenham, Willis, and Paterius, Stahl relied principally on bleeding, inhalations, the internal administration of the distilled waters of different medicinal plants, particularly of such as were considered by the ancients to possess traumatic properties, and the persevering employment of horseback exercise. He disapproved of the employment of balsams, expectorants, and opiates; but to allay the cough advised the use of the extract of tobacco, and the inhalation of the fumes of crude antimony. A milk diet he considers of no account in Consumption, for in his commentary on Gideon Harvey's vulgar Latin, "The Art of Curing by Expectoration," Stahl alludes to this author's opinion, that milk is as useless in the cure of all internal disease as in that of a luxation. That ass's milk, so highly commended by the ancients, contains no fattening particles, for when set aside for twelve hours it exhibits no cream; it is therefore nothing but a cold mucus, and "fit only for asses."—(Stahl, Theoria Medica Vera, p. 1014.)

MORTON.

Early in the sixteenth century, the "Phthisiologia of Morton" was published, a work containing opinions concerning the nature and treatment of Consumption, not differing materially from those advanced by Sydenham and Willis, except in this, that the author considered the fever occurring in the confirmed stage of phthisis to be of a putrid intermittent character, the type of which is generally quotidian, but occasionally tertian; consequently the Peruvian Bark was the great remedy recommended and employed by Morton, not only as a preventive of phthisis, after the occurrence of hæmoptysis indicated its approach, but for the treatment of the affection in all its stages.—(Morton, Phthisiologia, pp. 174, 258.)

The employment of this therapeutic agent Stahl unqualifiedly condemns, declaring that the use of the bark has often induced not only Consumption, but jaundice and dropsy, after intermittents.

HOFFMAN.

Hoffman, who was the rival of Stahl, and his colleague in the University of Halle, advocated views which differed essentially from those advanced by his distinguished opponent. Rejecting the doctrines of the humoral pathologists, he embraced the opposite opinion, and contributed much, by his inquiries into the condition of the muscular and nervous systems, to advance the theory first promulgated by Baglevi, that the solids, and not the fluids, are principally affected in disease. Hoffman believed that phthisis, in a large number of cases, originated in hæmoptysis, and he recommended

that caution should be observed in the use of astringents, that the bleeding be not too suddenly arrested.

Exercise in the open air, small bleedings frequently repeated, opium to allay the cough and check the colliquative sweats, and nitrate of potash as a refrigerant, are among the remedies embraced in the plan of treatment recommended by Hoffman. The use of emetics and active cathartics he condemns; but he urges the employment of ass's milk and mineral waters, as important aids in the successful treatment of pulmonary consumption.

Hoffman was not alone in the opinion he expresses, that phthisis in many cases has its origin in hæmoptysis. Several eminent writers and pathologists before him had adduced the same opinion.—(Hofmanni Opera, iv. 112.)

The nearly universal practice of this period—that of employing venesection frequently as a prophylactic in persons predisposed to Consumption, had its origin mainly in the views which were entertained with regard to the exciting cause of the disease.

BOERHAAVE.

The celebrated Boerhaave, whose writings were published as late as the commencement of the eighteenth century, had no just idea of the true nature of Consumption, for he considered that both the blood and the chyle in this disease are converted into pus, and that when the ulceration which attends this condition of the fluids has destroyed the substance of the lungs, "so that the whole habit of the body is thereby wasted and consumed, the patient is said to labor under phthisis pulmonalis."—(Commentaries upon Boerhaave's Aphorisms, etc., by Van Swieten, v. xii. p. 1.)

DESSAULT.

In 1733 Dessault of Bordeaux published a work containing a dissertation on the nature of Consumption, in which he declares that *tubercles constitute the true essence of phthisis*, and that the ulcerations of the lungs are secondary—the effect and not the cause. Dessault adopts the opinion entertained by Galen, and many others of the ancient physicians, that Consumption is a contagious disease.—(Dessault sur les Malàdes, etc.)

For its treatment, he advises the adoption of measures not differing materially from those recommended by Sydenham, Baglevi, and Hoffman.

Although the inquiries and commentaries of many distinguished writers, on the nature and management of phthisis, were published during the middle, and towards the close of the eighteenth century, yet among the writings of this period few improvements are found recorded, either in regard to the pathology of the disease, or its treatment.

VALSALVA, MORGAGNI.

It is somewhat singular that the two great pathologists of this time, Valsalva and Morgagni, as it would appear, give less attention to the study of the nature of this important disease, than to that of any other which came under their observation. This is attributed by Dr. Young to the fears entertained by both these distinguished physicians, that in the dissection of subjects, dead of Consumption, the disease may be propagated by contagion! Valsalva advanced the opinion that the upper part of the lungs is more frequently in-

volved in the disease than the lower. Morgagni, on the contrary, believed that tubercles are found to occur as frequently in one part of the lungs as another, but he had not dissected consumptive patients enough, to determine with accuracy the immediate seat of the disease.—(Morgagni, De Sedibus et Causis Mor., Ep. xxii.)

VAN SWIETEN.

Van Swieten, who was a favorite pupil of the celebrated Boerhaave, and who adopted principally his theory of the nature of disease, has left on record in his "Commentaries on the Aphorisms of Boerhaave," some interesting observations on the cause and pathology of phthisis pulmonalis.

He coincides in the opinion advanced by Boerhaave, that any cause capable of stopping the circulation through the lungs, so as to convert the blood into pus, producing thereby ulceration of these organs, may justly be called the cause of a phthisis pulmonalis.—(Commentaries on Boerhaave's Aphorisms, etc., vol. xii., p. 3.)

Attributing the night perspirations and diarrhœa, which occur in Consumption, to the presence of a putridity in the system, Van Swieten recommends the use of powerful antiseptics, such as bark, camphor, myrrh, etc., in the treatment of the disease. Riding on horseback, with a milk diet, and opiates to allay the cough and expectoration, are also advised by him. Blood-letting, oft repeated and the practice long continued, is the important remedy urged by Van Swieten for the cure of Consumption.—(Commentaries on Boerhaave's Aphorisms, etc., vol. xii., pp. 90–91.)

Although the master mind of Cullen enabled him to

grasp almost the whole subject of medical science, and to contribute greatly to the advancement of general pathology and practical medicine, yet from an examination of his works we do not find that the special pathology of Consumption was any better understood by him than it was by his predecessors, Hoffman and Stahl.

CULLEN.

Cullen defines Pulmonary Consumption to be a disease or an expectoration of purulent matter from the lungs, attended with a hectic fever. The opinion seems to have been entertained by him, that ulceration of the lungs is perpetuated by the peculiar acid character of the pus, and that this condition of the purulent matter in Consumption is the cause of the hectic fever which is present.

Ulceration of the lungs is presumed by Cullen to exist, in every instance where an expectoration of pus is present. But he discards in his first lines the opinion he had previously entertained, that Consumption is nothing more than a sequel of hæmoptysis, and that this symptom is naturally, and almost necessarily, followed by an ulceration of the lungs. Several other causes of Consumption are enumerated by Cullen, but the presence of tubercles found in the lungs, is considered by him to be the most frequent of any, and when arising from an hereditary taint is believed to be almost certainly fatal.

An antiphlogistic or depleting plan of treatment is recommended by Cullen. To the preparations of bark and chalybeates he objects, as they tend "to increase the phlogistic diathesis." But counter-irritation in the form of blisters, issues, and rubefacients; he advocates,

together with opiates, vegetable acids, moderate exercise, and a milk diet.

RAULIN.

Among the French authors who wrote on Consumption towards the close of the seventeenth century is one of considerable celebrity, M. Raulin, whose work on Phthisis Pulmonalis (Traité de la Phthisie Pulmonaire) contains the history of some curious cases; he has also recorded many remarkable cases of Consumption. Raulin alludes to the employment of a remedy nearly a century ago, which has been greatly extolled recently by some writers. He says that in the West Indies it was the custom, where the negroes were threatened with disease of the lungs, to place them in the sugar-houses of the planters, where, from breathing the vapor arising from the boiling sugar, they were generally restored to health in a few months.—(Traité de la Phthisie Pulmonaire, p. 207, et seq.)

VOGEL.

About this period an elaborate treatise on the nature and treatment of the disease was published by Vogel (Vogel's Handbook, etc.), who was a firm believer in the contagious nature of Consumption. He considered hectic to be only a severe form of slow fever, during the progress of which the lungs, in nearly all cases, became sooner or later affected. Although Vogel has not furnished us with any new or peculiar views with regard to the treatment of the disease, yet he has done more than any other writer who preceded him, to call the attention of the profession to the fact that phthisis pulmonalis cannot be considered altogether a

local disease of the lungs, but as depending on a peculiar condition of the constitution denominated tubercular diathesis, or tuberculosis.

BAUMES.

In 1783, Baumes, who believed Consumption to depend upon a specific contagion, and to be distinct from scrofula, considered the latter as dependent upon the existence of an acid principle of a phosphorous or a phosphoric nature, which in the first instance thickens the lymph, and renders it liable to concrete, and ultimately tends to putridity. Whether this "acido-putrid" depravation takes its origin from the morbid blood in its passage through the glands, or from a fluid exhaled from the blood into the general cellular system, or whether it is formed previously within the lymphatic vessels, Baumes was uncertain.

MOSELY.

Dr. Mosely, who published a treatise on Tropical Diseases in 1787, has devoted many pages to the consideration of Consumption. For the treatment of the disease he urges the employment of vitriolic and alum emetics. Three drachms of the sulphate of zinc, with one of alum, are dissolved in a pint of water, of which solution a large spoonful is administered fasting. Vomiting is thereby promptly induced. After the employment of a course of emetics, a sea voyage is recommended by Dr. Mosely.

MASCAGNI.

It was during the same year that the great work of Mascagni, on the absorbents, was published (Mascagni,

Vasorum, etc.), in which he expresses his opinion with regard to the nature of the bronchial bodies, namely, that they are conglobate glands, and that the obstruction which is often found in them is caused by black particles brought there by the lymphatics; and that in treating Consumption the great indication is to remove the obstruction, which is best done by the exhibition of medicines in the form of vapor

BAILLIE.

But it was not until the publication of the "Morbid Anatomy" of Dr. Baillie in 1793, that we find anything like a correct description of tubercles of the lungs, as a true cause of Consumption.

In this work of Dr. Baillie, tubercles are described as firm, white bodies, interspersed through the substance of the lungs. They are very minute at first, but ultimately they unite in clusters of the size of a pea, or larger, and these clusters again uniting form large masses, which occasionally are changed into abscesses.—(M. Baillie's Morbid Anatomy of the Human Body.)

RUSH.

It was about this period, and near the close of the seventeenth century, that Dr. Rush, in his "Inquiries and Observations," published some new views on the nature and management of Consumption. In the opinion of Doctor Rush, Consumption is not essentially a disease of the lungs, but one affecting primarily the general system. That tubercles are the result of a collection of inorganic mucus in the lungs, and that in their nature they differ especially from scrofula. It is well known in America that Dr. Rush considered the

disease to be one of a decidedly inflammatory nature—as a kind of chronic pneumonia, particularly in its early stages. In accordance with his belief in the unity of disease, Dr. Rush expressly declares "the two diseases, pneumonia and phthisis, differ from each other only by the shorter or longer operation of the causes which induced them, and by the greater or less violence and duration of the symptoms. The pneumonia appears to be an acute Consumption, and the Consumption a chronic pneumonia."

In the treatment of Consumption, Dr. Rush recommends frequent and copious bleedings in the early or inflammatory stage, together with repeated blisters and small emetics. The milk diet of the ancients, and much exercise in the open air, or long journeys, are advised by him, to be followed by tonics, opiates, and a nutritious diet, in the hectic stage, when bleeding is no longer indicated. Sea voyages are also considered beneficial; but a residence on the sea coast is prohibited—because a mixture of sea and land air is deemed by Dr. Rush to be decidedly injurious to the consumptive invalid. Inhalations of the vapor of tar, and of the smoke of resin, are thought to be beneficial in some stages of the disease.

About the same period that the "Inquiries and Observations" of Dr. Rush were published in America, medical writers of England were advancing views concerning the nature of the disease, differing essentially from those entertained by Dr. Rush.

In the opinion of those writers Consumption was considered as originating in a scrofulous condition of the system. It was maintained by them that hectic fever was not peculiar to this disease—that it might occur

without the presence of suppuration, as it did in instances in nursing and in diabetes.

The contagious nature of the disease was denied, but no observations were made to advance a knowledge of its true pathology. In the treatment of Consumption more dependence seems to have been placed on a residence in a mild climate than upon therapeutic agents. Mercury was prohibited. Counter-irritation was recommended in cases attended with hæmoptysis. Emetics, a spare diet, and warm clothing, were considered appropriate in the treatment of the affection.

DARWIN.

Darwin, who in his "Zoonomia," published in 1794–6, alludes to the nature and treatment of Consumption, but without contributing anything to our knowledge of its special pathology, supposed the disease to arise from a deficient action in the absorbent vessels, and from an acid poison which he believed to exist in the ulcerous matters of the lungs.

He therefore advised for the treatment of the disease the inhalation of the vapor of ammonia, to neutralize this acid, and the employment of nauseating medicines, in order to arouse the action of the absorbents. Digitalis, the preparations of bark, a moderately generous diet, with weak wine or beer, and occasional small doses of opium, are among the remedies recommended by Dr. Darwin.

About the period of the publication of the writings of Darwin, and during several years subsequent to 1796, inhalations for the cure of Consumption were much recommended and employed, not only by some of the physicians of Great Britain, but by others on dif-

ferent parts of the Continent. The vapor of ether, impregnated with hemlock, was advised by Dr. Richard Pearson to be inhaled several times a day, and to be continued for one or two months.—(Duncan's Annals, 1796.)

Meechay, of Gottingen, recommended the respiration of carbonic acid in cure of Consumption.

ROLLO.

Rollo, who published a work in London in 1797, confined consumptives in small apartments filled with "hydrocarbonate and etherial vapor," which they were required to respire for a short period several times daily; and in 1799, Dr. Beddoes, in his "Contributions to Physical and Medical Knowledge," recommends the inhalation of the different gases, alone or in combination with the vapor of ether or hemlock, in the treatment of pulmonary disease.

Another class of physicians revived the use of digitalis, and during the first ten years of the eighteenth century its power as a therapeutic remedy in the treatment of Consumption was widely discussed in the European journals. As early as 1542, the foxglove, which had been described and recommended by Fuchius as a valuable medicinal agent, was employed by the German physicians for the purpose of "evacuating pus from the thorax," and for the "healing of ulcers." From this time digitalis, or the foxglove, was employed at different periods in the treatment of pulmonary affections; but although highly extolled by Solman, an English writer in 1710, yet it failed to gain much celebrity until just at the close of the eighteenth century, when, having been employed, and the virtues greatly extolled by

several English physicians, it was adopted very generally by the profession, and came to be considered by many practitioners as almost a specific for the treatment of pulmonary disease. So sanguine, indeed, was

DR. BEDDOES

with regard to the powers of this plant, that, having seen, as he declares, "many patients advancing towards recovery with so firm a pace," he was led confidently to hope that Consumption will henceforth be as regularly cured by foxglove as ague by the Peruvian bark.—(Essay on the Causes and Early Signs of Pulmonary Consumption. London, 1799.)

It was condemned, however, by Dr. Parr in 1809, who declares in his "Medical Dictionary," published in London during this year, that digitalis is productive of more harm than good in the treatment of Consumption. (London Medical Dictionary, London, 1802.) During these discussions, which were continued through several years, respecting the therapeutic powers of digitalis, but little progress seems to have been made, either in England or on the Continent, in the pathology of phthisis.

HEBERDEN.

Heberden discussed the question of the contagious nature of Consumption and of its treatment, but adds no important contribution to the special pathology of the disease.

BADHAM.

In 1808, Dr. Badham published his "Observations on the Inflammatory Affections of the Mucous Membrane of the Bronchiæ," in which he first described and

named the disease denominated bronchitis, a disease which up to that time had been confounded with the other affections of the chest.

PORTAL.

The work of Portal (Observations sur le Nature, etc., 432), on the nature and treatment of pulmonary phthisis, was regarded as a very important contribution to medical pathology. It was translated into several languages, and some of his views, in France, Germany, and Italy, were entertained favorably by many of the profession. Portal subdivided the disease into numerous species, and gives several varieties of tubercles as occurring in these different forms of Consumption. The presence of tubercles, in the opinion of Portal, was owing to engorgement of the glands. He believed that there existed two kinds of tubercles—one kind found in the cellular membrane, and the other occupying the lymphatic glands.

In his treatment of the disease, mercurials, in combination with tonics, counter-irritants, exercise in the open air, as riding on horseback, sea-voyages, etc., are among the remedies proposed.

In Consumption following intermittent fever, in well marked atony, and in very aged persons laboring under phthisis, the administration of bark is advised by Portal. Of his knowledge with regard to the organic changes which occur in the disease, we may judge from his reference to the opinions of Fernelius, and some other authors who had preceded him, and who had described Consumption as being an "ulceration of the lungs." Such an opinion Portal condemns, inasmuch as it must depend on a fact which cannot be ascertained,

he believes, during the life of the patient. He therefore approves of the method adopted by Sauvages, as the more eligible, that of determining the nature of diseases from the symptoms only.

BAYLE.

Highly as the labors of Portal were esteemed by the profession at the time, his work on Consumption was soon followed, and in a great degree was eclipsed by the more elaborate observations of Bayle; who, in 1810, published in Paris a treatise on pulmonary phthisis (Recherches sur la Phthisie Pulmonaire, par G. I. Bayle, etc.), which for scientific research, and pathological accuracy, surpassed all other works previously published on this important subject. Having devoted many years to the study of the disease in the Hôpital de la Charité, and in the examination of the bodies of patients who had died of Consumption, Bayle adopted and promulgated the opinion, that the organic lesions which are found to constitute phthisis authorize a division of the disease into six varieties or species, which he denominates tubercular, granular, melanotic, ulcerous, calculous, and cancerous Consumption. Not aware that the different forms of tubercle are effected principally by mechanical causes, and that the minute anatomy of this morbid product is everywhere the same, Bayle proposed, as other pathologists who preceded him had done, a division of the disease into several varieties.

The granular form of phthisis was first described by Bayle, and the distinction which he draws between this and his first, or tubercular variety, is thus stated: "The lungs are stuffed with transparent, shining, miliary granulations, which appear to be of a cartilaginous nature

and consistence. Their size varies from that of a millet-seed to that of a grain of wheat; they are never opaque, and they do not dissolve. These different characters perfectly distinguish them from miliary tubercles, which are of the same size, but which are always grey, or white and opaque, and in the end totally dissolve." Tubercular Consumption, in the opinion of Bayle, always depends on a peculiarity of constitution, although it may be accelerated, and sometimes excited, by other diseases, particularly by pleurisy, fever, catarrh, or disease of the heart. Hæmoptysis is a frequent symptom of Consumption, and when present is considered by Bayle to depend ordinarily upon the presence of tubercles in the lungs.

The plan of treatment proposed by Bayle must be varied according to the nature or rather the symptoms of the disease. He believed that the lives of consumptives may be often greatly prolonged by treatment, but he was altogether incredulous with regard to the curability of the genuine affection. It is somewhat curious that Bayle himself ultimately sank under the ravages of a disease, "of which," says Dr. Forbes, "he had been the most successful illustrator, and the inevitable fatality of which he had been the most strenuous assertor." The measures recommended by him do not differ essentially from those advised by Portal, Morton, and other authors who had preceded him, in their writings on the nature and treatment of Tubercular Consumption. To prevent the disease in persons predisposed to Consumption, he advises the employment of tonics, alkalies, a nutritious diet, the use of the voice, as in public speaking, travelling, etc. Repeated emetics, with bitter purgatives and sea voyaging, in the opinion of Bayle,

have sometimes arrested the disease in its incipient state.

CAYOL.

During the same year that the work of Bayle was issued (1810), M. Cayol published an essay on Tracheal Consumption (Recherches sur la Phthisie Trachéale), in which he refers to a distinction between tracheal and laryngeal phthisis. The former, which he believes is not an infrequent disease, is indicated by severe or spasmodic fits of coughing, attended with dyspnœa, and a rattling respiration.

WELLES.

The attention of the medical profession in London was called to the subject of the antagonism of intermittent fever, or malaria, and Pulmonary Consumption, by Dr. Welles, in 1812, in a paper published in the transactions of the "Society for the Improvement of Medical and Surgical Knowledge." Dr. Welles advances the opinion that a residence in a malarious atmosphere affords a preventive for Consumption; and he adduces testimony from many physicians residing in fenny districts, which goes far to prove that Tubercular Consumption and intermittent fever, as diseases, are opposed to each other. As intermittents have decreased in London, Consumption, he declares, has increased; and he advises that people in the incipient stage of phthisis be sent to marshy countries, rather than to Madeira or Italy.

SOUTHEY.

Two years after the appearance of the essay of Dr. Welles, Dr. Southey, of London, published some interesting statistical observations respecting the frequency

of the occurrence of the disease in the different countries. — (H. H. Southey on Pulmonary Consumption, London, 1814, pp. 473.)

The author's views do not confirm the opinion expressed by Dr. Welles, that Consumption occurs less frequently in malarious districts than in places exempt from marshy exhalations. The apparent advantages, he believes, arise from the circumstance that in agueish countries, feeble children are carried off before they are of an age to die of Consumption.

In the opinion of Dr. Southey, the butchers of England and France, and the fishermen of Scotland, are less liable to Consumption, as well as other diseases, than the generality of mankind; whilst those persons of every clime, who are much exposed to the inhalation of floating particles of dust, as the coal-heavers, chimney-sweepers, and dressers of flax and feathers, are peculiarly liable to the disease.

The internal exhibition of digitalis, and the employment of the pea-issue, are deemed by Dr. Southey as being among the most important remedies for the treatment of Consumption. Riding, sea voyaging, and a removal to a warm climate, are advocated as remedial measures. Confinement to a room with a regular temperature, the thermometer being kept at sixty or sixty-five degrees, by appropriate means, may be substituted for a residence in a warm climate, and is especially advised for persons of strumous constitutions.

It was about this period, or soon after the commencement of the nineteenth century, that the spirit of rational empiricism, which from the time of Cullen especially had prevailed with, and had characterized the profession, began to decline; and medical philosophers,

disregarding theories, and devoting themselves to the observation and collection of facts, began to be fully aware of "the great principle, which is the foundation of true philosophy, as well in medicine as in every other department of science, that all theory not derived from the generalization of facts is objectionable, and almost necessarily leads to erroneous conclusions." In tracing, therefore, the literature of Consumption from this period up to the present time, we shall allude to the views of those only whose opinions with regard to the nature and pathology of Consumption, seem to have been derived from an intelligent and extended observation of facts, and from their cautious generalization.

LAENNEC.

With the publication of the labors of Bayle, and the more extended and important discoveries of Laennec, who was the contemporary and friend of Bayle, medicine began to assume more than it had at any former period—the true character of an inductive science.

We have seen that Bayle, who describes with great accuracy certain organic lesions which occur in disease of the lungs, yet admits, besides the tuberculous affection, the existence of a granular, an ulcerous, a calculous, a cancerous, and a melanic form of phthisis; whilst Laennec, on the contrary, maintains that there is but one single organic lesion of the lungs, namely, a tubercular deposition, occurring in those who die of phthisical disease.

With respect to the first of these species described by Bayle, it is, Laennec observes, a mere variety of the tubercular; the third is a partial gangrene of the lungs; and the three others are affections which have nothing

in common with tubercular phthisis, except that they have their seat in the same organ.—(Laennec on Disease of the Chest, etc., Forbes's Translation.)

Subsequent pathologists have confirmed this opinion of Laennec.

Laennec published his great work on "Diseases of the Chest and on Mediate Auscultation," in 1819. (De l'Auscultation Médiate ou Traité du Diagnostique des Maladies des Poumons et du Cœur. Paris, 1819.)

In this work are recorded those discoveries with regard to the true pathology of thoracic disease, and rules by which we are enabled to discriminate morbid changes in the pulmonary organs, with a degree of certainty and precision hitherto unknown in the diagnosis of these affections. So well known to the profession of the present day is the history of Laennec's immortal discoveries, that only a brief allusion will be made in this place to his labors. By means of auscultation and percussion he was enabled, as he in his work declares, "to deduce a set of new signs of diseases of the chest, for the most part certain, simple, and permanent, and calculated perhaps to render the diagnosis of diseases of the lungs, and heart, and pleura, as decided and circumstantial, as the indications furnished to the surgeon by the introduction of the finger or sound in the complaints wherein these are used."

By means, then, of the application of physical diagnosis to diseases of the chest, Laennec was enabled to establish certain signs founded on pathological anatomy, which when present seem to indicate with a great degree of certainty the existence of tubercles in the lungs. The diseases in which this method was chiefly employed by him, are phthisis, dropsy of the chest, chronic pleu-

risy, pneumonia, bronchial disease, emphysema, and diseases of the chest.

According to Laennec, tuberculous matter, which constitutes the true pathological cause of phthisis, commences ordinarily to be deposited in the upper and posterior parts of the lungs, although tubercles may be found indiscriminately in all parts of the cellular tissue of the lungs, continuing to augment after their deposition, until they have acquired a certain size. The tubercles commence at length to soften in the centre, and then open by one or more small apertures into the neighboring bronchiæ; or they may remain for a longer time closed, and constitute small vomicæ, containing a curdy, imperfectly formed pus. This matter being expelled through the bronchiæ, cavities are left, which Laennec denominated *tubercular excavations.*

In the treatment of phthisis pulmonalis, Laennec declares that although its cure is not beyond the powers of nature, yet our art possesses no certain means of obtaining this desirable end. "We may be well assured," remarks he, "that a disease is irremediable, when we find employed in its treatment almost every known medicament, however different or even opposite in nature; when we see new remedies proposed every day, and old ones revived, after having long lain in oblivion; when, in short, we find no plan constant but that of giving palliatives, and no means persevered in but such as are proper for fulfilling indications purely symptomatic."—(A Treatise on Diseases of the Chest, etc., translated by Forbes, p. 320.)

In the opinion of Laennec, a successive development of tubercles in different parts of the lungs ordinarily takes place in the progress of phthisis. When the first

tubercular deposit begins to be softened, a secondary crop is about this time produced; and still later other deposits follow, composed of crude, miliary tubercles, situated in the more inferior portion of the substance of the lung.

The indications of cure therefore are, as soon as the existence of the disease is ascertained, to prevent in the first stage the secondary eruption of tubercles. The second indication should be to promote the softening and evacuation or absorption of the existing crop of tubercles. To meet the first indication, Laennec recommends counter-irritation, which may be employed by means of small moxas, or, what is preferable, the caustic potass applied beneath the clavicle, or in the supra-spinal fossa. Bleeding ought never to be employed, declares Laennec, in the treatment of Consumption, except to remove the inflammation, or active determination of blood, with which the disease may be complicated. If blisters are employed, they should not be applied to the chest itself. Laennec prefers that their application be restricted to the arm, or the inner part of the thigh.

To promote the softening of the tubercles, not much dependence, in the opinion of Laennec, can be placed upon the inhalation of vapors or the gases, or the fumes of different kinds of resin, although these have been much employed by many practitioners of different ages, in many countries. A change of climate is considered by him as the important remedy in the treatment of phthisis. A residence by the sea-side, particularly in mild and temperate climates, is, in his opinion, unquestionably the situation where most consumptive patients have been known to recover. As palliatives for the

treatment of troublesome symptoms, emollient and mucilaginous drinks, antimonials, small doses of opium, and hydrocyanic acid, are recommended.

Derivation, which Laennec considers the most rational of our indications, and change of air, are the measures on which he places the most reliance. Yet the cure of tubercular phthisis, he repeats, is not effected by medicine. In order to make a direct attack upon the disease, continues he, we ought probably to be able to correct an unknown aberration in the assimilation or nutrition; that is, an alteration in the state of the fluids of the body.

BARON.

Dr. Baron, physician to the Gloucester Infirmary, published in 1819 the first volume of his "Inquiries Illustrating the Nature of Tuberculated Accretion."

His second volume was published in 1822. In this work he advances the hypothesis, that tubercles in their origin are of a vesicular or hydatid nature.

In their incipient state, according to this author, they appear as small transparent vesicular bodies with fluid contents, and may be distinguished by their shining surface, from the tissue which surrounds them.

They may occur on the surface, or be deposited between the layers of membranes, or they may be deposited in any viscus whose textures are of such a nature as to admit of their growth. In the first stage of the disease, the surrounding tissues experience little or no alteration, but, increasing in number and size, they become opaque, acquire consistence, and finally assume that state termed induration, or hepatization, which is directly the reverse of their ultimate condition as described by Laennec.

In this state they remain, and there is the strongest reason for believing, says Dr. Baron, that tubercles do not subsequently soften!

BROUSSAIS.

As early as 1816, Broussais, in his "Examination of Medical Doctrines," advanced views concerning the nature and origin of tubercles, in opposition to those of Bayle; and on the publication of Laennec's works, Broussais, in 1820, attempted a refutation of the doctrines of this eminent pathologist, by endeavoring to show that it is a very gross error, to attribute the primary cause of every pulmonary phthisis to tubercular granulations. The opinion advanced by Broussais is, that tubercles seated in the lymphatic system of the respiratory apparatus (their ordinary location in the belief of this author), or in any of the other systems or tissues of the body, owe their origin to a long continued irritation or inflammation of the organ or parts affected.

Whenever organs which contain numerous lymphatic ganglions, mucous follicles, or glandular grains, experience inflammation, these small bodies must necessarily become tumefied. If the inflammation is slight, observes Broussais, and rapidly disappears, these bodies regain readily their normal state. If it is acute and violent, they are destroyed by the suppuration which follows; but if it is chronic and continuous, they degenerate, according to their organization and location, into variously colored granulations. But these granulations, or lymphatic effusions, which are met with in a great number of phthisical patients, and which may become softened and reduced to a caseous matter, destroying the lung, or leaving a cavity, are not referred by Broussais

to a tubercular principle, nor do they merit, he asserts, the name of tubercles. To this form of phthisis Broussais would give the term *chronic pneumonia.* But when instead of these various colored granulations we find in the lungs white, roundish bodies, which resemble opaque mesenteric glands; when these bodies are seen softened in some places, reduced to a pulp in others, and followed by cavities and disorganization of the parenchyma, this form of phthisis merits the name of tubercular. (Examination of Medical Doctrines, etc., p. 445, et seq.; also Principles of Physiological Medicine, translated by Hays, pp. 253–9.) Persons predisposed to irritations of the lymphatic system are most liable to tubercular deposits, and in these they are the most freely developed. Without a preceding inflammation Broussais has never seen tubercles in the lungs.—(Op. citat., p. 252.)

GOOD.

Dr. Good, whose learned treatise on the "Study of Medicine" was published in 1822, devotes many pages of his work to the consideration of the nature and treatment of phthisis. Dr. Good alludes to the division of the disease as considered by Morton, Portal, and Bayle; and, although he admits the existence of the three forms of Consumption, yet he expresses his belief that by far the most frequent of these varieties is the tubercular.—(The Study of Medicine, by John Mason Good, American Edition, Vol. II., p. 31.)

Tubercles may be developed in every organ and tissue of the body, and in their origin, says Dr. Good, they seem to be single cysts, or, often perhaps, single follicles.

Although inflammation in a certain degree may be often favorable to the growth and general spread of

tubercles, yet the absence of all signs of inflammation in by far the greater number of passing cases, at least till the morbid growth has fully established itself, and operates by mechanical pressure, or some other excitement, is sufficient proof, in the opinion of Dr. Good, that this condition is not absolutely necessary for the production of tubercles.

Where a consumptive diathesis has once originated, it is often very evidently transmitted to succeeding generations, and there is great reason to believe, says Good, that the disease is in a certain degree contagious. (Op. citat., p. 45.) Dr. Good differs from Bayle and Laennec in believing that tubercular phthisis is not always a fatal disease, inasmuch as he has seen it terminate favorably in cases where the individuals appeared to be in the last stage of the disease; but whether from the treatment pursued, or a remedial exertion of nature, he will not undertake to say.

In the treatment of Consumption, Dr. Good advises that the remedies be varied according to the form or variety of the disease. The general indications are, to abate the inflammatory action, to correct the phthisical diathesis, to support under debility, to subdue the local irritation, and to improve the expectoration. If the symptoms indicate considerable inflammation, whether in the lungs or bronchiæ, our object should be to diminish vascular action, by every means in our power. Consequently, venesection is recommended by Dr. Good, and its repetition advised even to the third, fourth, or fifth time, if necessary, in the commencement of the disease. The employment of this agent should be followed by small doses of antimony or ipecacuanha, and when sufficient inroad has thus been made upon the in-

flammatory diathesis, cooling neutrals, with foxglove, the extract of hyoscyamus, etc., may be administered. An attempt should be made to correct the predisposed diathesis, by the internal and external use of the preparations of iodine, or minute doses of antimony in solution, as advised by Balfour and M. Leuthors (one grain of tartarized antimony dissolved in from eight to twelve pints of water), may be employed by the patient, for common drink, in every stage of Consumption.

Among the means recommended by Dr. Good for supporting the system are these: tonics that unite an astringent with a bitter principle, the preparations of iron, a mild but nourishing diet, exercise in the open air, etc. To subdue the local irritation, and improve the secretion from the lungs, terebinthinate fumigations are employed, together with the ordinary expectorants, such as squills, ipecacuanha, balsam of copaiva, etc. At the time of the publication of the observations of M. Andral on tubercular disease (Clinique Medicale, Part III., Diseases of the Chest), there prevailed in Europe three different opinions, which were especially prominent, respecting the nature of pulmonary granulations.

The granulations observed by Bayle were considered by him an accidental production, having nothing analogous in the healthy state. In the opinion of Laennec and others, these granulations were not essentially different from tubercles; indeed they were considered by them as being the first degree of tubercles; whilst Broussais and his followers reiterated the doctrine of Morton, that tubercles were lymphatic glands engorged.

ANDRAL.

M. Andral, after giving much attention to the pathology of the disease, and after making many critical observations, was led to dissent from all these opinions, and to consider tuberculous matter always presenting itself as a simple product of secretion. (Clinique Médicale, Tome III.) This product, according to M. Andral, appears principally in a liquid state, unorganized, but becoming solid according as its more fluid particles become absorbed.

Every tissue capable of inflammation and suppuration may secrete tuberculous matter. In the lungs it may equally be produced on the surface of their mucous membrane, in the pulmonary vesicles themselves, or in the areolar tissue of these organs. Whenever a strong disposition to tubercles is present, the slightest local congestion of blood will give rise to them; but when there exists no such predisposition, the most intense and the longest inflammation will not produce a tubercle. (Clinique Médicale, Tome III., p. 13.)

Pulmonary tubercles, therefore, in the opinion of Andral, are the product of a morbid secretion, and the deposition of this tuberculous matter within a tissue does not necessarily require that there should have been in this tissue either an increase or diminution of vital action; there is merely a perversion of its natural powers of secretion. The pathological process which ordinarily precedes the tuberculous secretion is a sanguineous congestion, more or less active, similar to that which precedes every process of secretion, normal or otherwise. The previous existence of any degree of

hyperæmia, however, is not necessary to the formation of tubercle.—(Clinique Medicale, Tome III.)

M. Andral, in his later writings (Notes et Additions au Traité de l'Auscultation Mediale de Laennec, par MM. Laennec et M. Andral. Paris, 1836) deprecates, in a still more decided manner, the attempts of the followers of Broussais to refer these lesions entirely to the presence of increased irritation or inflammation; although inflammation, he admits, may accelerate or determine the production of tubercle, when that modifying influence which is the real cause of tubercle is already present. Irritation does not always precede tubercles, yet it constantly follows them; for in every case where an organ has been invaded by these products there takes place around them a reaction, the result of which is an inflammatory process, and the end of which is the expulsion of the tubercles.

Phthisis is a constitutional disease; a depraved condition of the blood, being, in the opinion of M. Andral, the chief element in the tuberculous diathesis.

LOUIS.

In 1825, M. Louis issued his great work on phthisis (Recherches sur la Phthisie, par P. Ch. A. Louis. Paris), a work in which are recorded most important pathological results, obtained through careful and minute observation, and numerical analysis of a large number of facts. After devoting many years to clinical observations in the Hôpital de la Charité, M. Louis was able fully to confirm the opinion first announced and maintained by Laennec, that there is but one species of phthisis, and that the deposition of tubercles in the lungs constitutes the true anatomical character of the disease.

Tubercles, as defined by M. Louis, are small yellowish white tumors which soften after a certain time, and being evacuated into the bronchiæ, leave cavities in the lungs of variable size in their room. Associated with these tubercles, small bodies of a different aspect were observed by Louis, varying in size from a pea to that of a millet-seed, denominated by Laennec the "grey semi-transparent granulation," which are considered by Louis to be the first stage of tubercles; a stage through which the latter must necessarily pass before acquiring their own peculiar character. In almost every case examined by Louis, both the tubercles and the grey granulations were found by him of larger size and in greater number at the apex, than at the base of the lungs. In a great majority of instances, tubercles, and grey, semi-transparent granulations coexist in the same organs. Louis in all his observations met with only one case of encysted tubercles; and Laennec, in the space of twenty four years, observed only three or four instances of this species of the disease. The time necessary to change the primary deposition, the grey granulation, into the fully developed tubercle, is not positively known; it is doubtless extremely variable. In the acute form of phthisis, the development of tubercles is, occasionally, extremely rapid: on the other hand, many cases justify the opinion that years may elapse between their origin and the full manifestation of tubercular disease.

When the process of *softening* of the tubercles begins, which is also effected at different periods—the change commences in the centre of the tubercle, and with those first which occupy the apex of the lungs, so that, as the morbid process advances from the apex to the base of the lungs, the observer may successively discover cavities,

softened tubercles, crude tubercles, and grey semi-transparent granulations, in the same organ. In some rare cases, Louis observed softening to take place simultaneously, in every part of an entire lobe. These cases always belonged to the acute form of phthisis.

Tuberculous cavities, whether large or small, and whether they were recently formed or had existed for a long period, were found to communicate with the bronchi by a variable number of openings. Large tuberculous excavations existing in the upper lobe, were found closer to the posterior than the anterior surface of the lung. Large cavities are not observed in any instance in the centre of the inferior lobe of the lung.—(Ib., pp. 9--10.)

The mucous membrane of the bronchi in the immediate vicinity of tuberculous cavities was found in a majority of instances thickened and of a light red color; in some cases, it was the seat of small ulcerations. This increased vascularity of the membrane is attributed by M. Louis to the frequently repeated passage of the purulent matter over its surface.—(Ib., p. 27.)

With regard to the seat of the rudimentary tubercular deposit, Louis, in the later edition of his work, conforms in his opinion to that professed by Dr. Carswell, namely, that the terminal bronchial ramifications in the air-cells of the lungs are ordinarily the seat of the primary tubercular exudation. (Op. citat., p. 31.) The terminal bronchial ramifications and the air-cells are not, however, the exclusive seats of tubercles in the lungs, for this morbid matter has been detected in other portions of the pulmonary organs. Moreover, both tubercles and the grey granulations in which they originate, may be, and actually are, developed in all organs. M.

Louis does not accord with the opinion expressed by M. Andral, that tubercle is nothing more than concrete pus; nor with that of Baron and other pathologists, who regard tubercles as transformed hydatids.—(Ib., pp. 32–3.)

Ulcerations of the epiglottis occurring in the progress of phthisis, were noticed by Louis in about one quarter of the whole number of cases observed by him.

They were in most instances superficial, and occupied almost exclusively the laryngeal surface of the epiglottis. The larynx was found ulcerated more frequently than the epiglottis. In a hundred and ninety-three sub jects ulceration of the larynx occurred in sixty-three cases. These ulcers of the larynx differed in their characters from those of the epiglottis, or of the trachea, being rarely superficial, but of a certain depth, and looking as if made with a punch. Elsewhere the mucous membrane exhibited the appearance of perfect health. The most common seat of these ulcerations was at the point of junction of the chordæ vocales. The chordæ vocales themselves, the base of the arytenoid cartilages, the upper part of the larynx, and the interior of the ventricles, were also the seat of ulcerations; these ulcerations occurring in order of frequency as above named.

Ulcerations of the mucous membrane of the trachea occurred in upwards of one-third of the whole number of phthisical subjects examined by Louis.

When ulcerations were present the mucous membrane was commonly of a bright red color; and co-existing with this redness, a slight thickening and also softening of the membrane were observed in about one-fifth of the cases. These ulcerations being superficial, in many instances, of a pinkish color, and having flattened edges, frequently escape notice, unless due precautions are taken by wash-

ing the trachea, and conducting the examination with great care. M. Louis likewise discovered that ulcerations of the lining membrane of the bronchi are of frequent occurrence in phthisis. Indeed, this pathological fact may be considered as perfectly established, that ulcerations of the mucous membrane of the air passages increase in frequency from the epiglottis to the lungs. Of forty-nine phthisical subjects examined by Louis, ulcerations of the bronchial membrane were found in twenty-two instances.—(Ib., pp. 38–44.)

These ulcerations of the mucous membrane of the air passages were found to occur in males much more frequently than in females. In the same number of patients furnished by each sex, ulcerations were of double as frequent occurrence in men as in women.

M. Louis, in his pathological inquiries, found that the lungs were not the sole organs rendered incapable, during the progress of phthisis, of performing their functions. The heart was found frequently softened; and in a tenth part of the cases examined, the pericardium contained a considerable quantity of perfectly clear serosity.

The stomach in many instances was much disturbed, its mucous membrane more or less inflamed, and frequently slightly softened. Ulcerations in the small intestines were of almost universal occurrence.

In five-sixths of the bodies examined these ulcers were found in the small intestines, and they were of almost as frequent occurrence in the large intestines. Fatty degenerations of the liver were present in one-third of the cases. The walls of the gall-bladder were sometimes thickened and ulcerated; and the spleen and kidneys presented tubercles in a sixth part of the bodies

examined. The tissues of the brain, the arachnoid, and the subarachnoid, were in many instances the seat of a greater or less number of grey, semi-transparent, or actually tuberculous granulations. Various anatomical changes were observed in many other locations, some of which Louis considered proper to phthisis, and others which may be observed existing in different degrees, in chronic diseases of all kinds. Among the former he has classed ulcerations of the larynx, more especially those of the trachea and epiglottis; ulcerations of the small intestines and fatty disease of the liver. "So true is this," remarks Louis, "that the detection of an ulceration in one of the organs just named, etc., might, independently of all further investigation, be considered as the certain announcement of the individual presenting it—having died phthisical."—(Op. citat., pp. 152–3.)

Another general law laid down by Louis is, that after the age of fifteen, tubercles do not present themselves in any organ without being likewise seated in the lungs.—(Ib., p. 477.)

On the important point in the history of phthisis, its etiology, M. Louis declares that facts are wanting to demonstrate any class of causes which may be said to predispose to, or determine, the actual development of the disease; that is, that facts accurately established, facts of such a stamp as to qualify them for taking part in advancing the limits of knowledge, are wanting in regard to almost any question that may be started.—(Ib., p. 477.)

Among the predisposing causes which may influence the development of tubercles, M. Louis has classed *age*, *sex*, *constitution*, and *hereditary influence*.

With regard to the latter cause, hereditary transmis-

sion, inasmuch as only a tenth part of the subjects who fell under his observation came of phthisical parents, and as this disease might have been transmitted in these cases, or have been developed independently of such influence, "it follows in reality," remarks Louis, "that I have observed nothing decisive in favor of the hereditary character of phthisis."—(Ib., p. 483.)

The subject of the influence of climate in exciting or preventing the development of tubercles is considered at length by M. Louis, and the result of his inquiries on this point is, that phthisis, as it has been shown by the statistical evidence of many modern observers, is prevalent in all countries, the hottest as well as the coldest.—(Ib., p. 491.)

Hæmoptysis is not regarded by M. Louis "either of considerable or trifling account, as an exciting cause of tubercles." Indeed, with regard to this whole subject of causes of phthisis, whether predisposing or existing, M. Louis is of the opinion that observations accurately made are not sufficient to establish the fact that the existence of any one condition contributes a positive cause of tubercular disease. On the subject of the successful treatment of pulmonary phthisis, by any plan hitherto adopted, M. Louis is equally sceptical. He examines separately many of the prominent medicinal agents, which from time to time have been recounted as successful remedies for the treatment of tubercular disease. The *proto-ioduret of iron*, introduced into medical practice by M. Dupasquier, of Lyons; the *chloride of sodium*, recommended by Latour, as of immense utility in the treatment of phthisis; the *subcarbonate of potass*, employed by M. Pascal, of Strasburg; *sal ammoniac*, from the use of which Dr. Cless, of St. Catharine's Hospital

of Stuttgard, declares he derived great advantage; *chlorine gas*, which for a time attracted great attention as a means of curing phthisis; *digitalis*, which through a long period was esteemed by many in the profession, "capable not only of improving the state of phthisical patients, but of curing them;" these, with *hydrocyanic acid*, *creasote*, and iodine, have all been considered by Louis, and their claims, as being efficient remedies for the treatment of phthisis, thoroughly examined, and the conclusion to which the physician of La Charité has arrived is, that little or no dependence can be placed upon any one of these agents in exercising a curative influence on diseases of the pulmonary organs!

This disparaging appreciation of the therapeutic value of many of those means which hitherto had been esteemed more or less efficient in the treatment of phthisis, is followed by what the experience of M. Louis allows him to state, as the most plausible views concerning the prophylactic and palliative treatment of phthisis.

Under the head of prophylactic treatment, M. Louis admits what is not so fully stated in his chapter on etiology, that hereditary influence and lymphatic temperament really constitute a strong predisposition to the development of the disease.—(Pp. cit., p. 539.)

The prophylactic treatment, therefore, is recommended in the case of lymphatic children, and those born of phthisical parents. The chief things to be relied upon, in the opinion of Louis, for the modification of the lymphatic temperament, "are activity of life, a succulent diet, the use of bitters, complete change of habits, if the individual be of a certain age, and a judiciously laid out and healthful place of abode." All

these points are fully elaborated, and most excellent and judicious measures advised by the author, for managing in early life the child of a lymphatic temperament.

In considering the *palliative treatment* to be adopted, M. Louis remarks: "Although we cannot, in the existing state of knowledge, entertain the hope of curing phthisis, we may at least hope to retard its progress by a well-directed system."—(Ib., p. 544.)

In the first period of *chronic phthisis*, gentle vegetable tonics are indicated, provided the patient be of a lymphatic temperament, and neither febrile action, thoracic pain, nor diarrhœa, be present. For the cough, preparations of opium or stramonium are advised, together with the inhalation daily of the vapor of warm water, or of some narcotic infusion. Chalybeate waters, or some artificial preparation of iron, as the proto-ioduret, may be administered with the bitters. A milk diet, particularly in large towns, is not recommended by M. Louis, because it is well known that cows in large towns frequently die phthisical. To guard the patient against the effects of atmospherical vicissitudes, flannel should be worn, and a removal from a cold to a warm climate during the severe part of the year is recommended. No great confidence, however, is placed by M. Louis on the beneficial influence of change of climate on tuberculous disease. The effect of sea-voyages on the progress of phthisis is estimated in like manner with that of change of climate, by M. Louis. Bloodletting, unless signs of plethora or hæmoptysis occur, is not recommended in phthisis. A moderate diet is advised, weak broth, eggs in milk, jelly, isinglass, a few oysters, etc., etc., are allowed.

If hæmoptysis occurs, and does not soon cease sponta-

neously, hot foot-baths, sinapisms to the lower extremities, cold acidulated drinks, and laxative enemata, may be employed; whilst the observance of silence, the repose of mind and body, must be enjoined. Should the hæmorrhage be copious, and especially if the effusion be such as to endanger life by suffocation, venesection may be employed; the extract of rhatany-root, tannin, catechu, or other analogous medicines, be administered; and if the case is urgent, and the patient possesses some share of strength, we should not hesitate to apply ice to the chest. To abate perspiration and check the diarrhœa which so frequently coexists with perspiration, take bitters, chalybeates, astringents, acidulated drinks, cold infusion of bark, etc., etc.; these are indicated for the ulcerations of the trachea, larynx, and epiglottis. Inasmuch as the measures commonly employed are almost always powerless; "should we have more influence," asks Louis, "over the progress of these ulcerations and their destructive action by touching them with a sponge soaked in a solution, more or less concentrated, of nitrate of silver? I know not, but the plan deserves trial."—(Ib., p. 559.)

Many of these views of M. Louis on the etiology and treatment of phthisis were advanced in a subsequent edition of his work, published several years after the first edition of 1825.

CRUVEILHIER.

In a paper published by M. Cruveilhier, in 1826, this distinguished pathologist advanced the doctrine, that by simple irritation of the bronchial membrane, or the air-cells, by mechanical means, true tubercular disease may be produced. These views were based on the following,

and similar experiments: "I injected," says M. Cruveilhier, "ten ounces of mercury by an opening in the trachea of a dog; the greater part was rejected by coughing; he showed symptoms of phthisis, and died in a state of marasmus in a month; the lungs were studded with tubercles, isolated and agglomerated, having all the characters of miliary tubercles."—(Nouveau Biblioth. Med., 1826, p. 381.)

The centre of each tubercle contained a globule of mercury, and the substance of these tubercles appeared to M. Cruveilhier to be concrete pus; whence the author draws the conclusion that pulmonary tubercles have their origin in the bronchial vessels; that phthisis is probably produced by certain foreign bodies acting on the internal surface of the lining bronchial membrane. In the opinion of M. Cruveilhier, the tuberculous matter, which is the consequence of mechanical irritation, exists in a fluid form previously to that period when it is found presenting itself as a firm substance. These experiments of M. Cruveilhier, and their results, awakened much interest at the time among medical inquirers. They seemed to establish some direct communication between bronchial irritation and tubercular disease. They were repeated by MM. Andral and Lombard, and by some other pathologists, but failed entirely in their hands to establish the doctrine propounded by Cruveilhier. In the experiments instituted by Andral and Lombard, the globules of mercury found in the small bronchiæ were thickly coated with puriform mucus, and in many cases the bronchial parietes were ruptured, and the mercury being extravasated into the parenchyma of the lung, was found there also, surrounded by purulent matter; but these pathologists

observed no other changes. — (Précis d'Anat. Pathol., vol. XI., p. 551; Campbell, p. 99.)

In other instances the globule of the metal was surrounded by a thin layer of whitish matter, the lung remaining perfectly healthy, and presenting no appearance whatever of tubercular disease. Hence, as we have stated, subsequent experiments failed to establish this supposed immediate connexion between bronchial irritation and tuberculosis.

BAUDELOCQUE.

In a memoir published in the "Révue Médicale," in 1832, on the causes of scrofula, M. Baudelocque maintains that the sole cause of a scrofulous degeneration in the system, is the respiration of a vitiated atmosphere. Tubercular disease is, according to this author, one of imperfect nutrition, arising from this cause.

The respiration of an atmosphere not sufficiently renewed vitiates the blood; the materials of the secretions and of nutrition, participate at length in the bad qualities of the blood, and all the tissues are developed or repaired with elements of a vitiated nature. Hence M. Baudelocque declares, "however well chosen and nutritious the food, however minute the attention paid to cleanliness, with whatever care the clothing be adapted to the temperature or the duration of exercise, sleep and waking be regulated, if the houses are so placed that the sun's rays cannot reach them, or the fresh air cannot be renewed without difficulty, if, in short, they are small, low, dark, and badly aired, scrofulous disease will inevitably supervene."—(Mémoire sur les Scrofules, Révue Médicale, 1832, vol. I., p. 10.)

CARSWELL.

Some important researches on the nature of tubercle were contributed by Professor Robert Carswell, in the first Fasciculus of his "Illustrations of the Elementary Forms of Disease."

Dr. Carswell supposes tuberculous matter to be one of the inorganizable products of the system, having its origin ordinarily in the blood, and its seat upon mucous and serous surfaces. But "in whatever organ the formation of tubercular matter takes place, the mucous system, if constituting a part of that organ, is in general either the exclusive seat of this morbid product, or is far more extensively affected with it than any of the other systems or tissues of the same organ." Thus the mucous system of the respiratory, digestive, biliary, urinary, and generative organs is much more frequently the seat of tuberculous matter than any system or tissue which enters into the composition of these organs.* As the mucous membrane among the tissues is the one altogether most frequently the seat of tuberculous matter, so, of all the organs of the body, those of respiration occupy the first rank both as regards the extent and the frequency of tuberculous deposition. The definite rounded form of the tubercular deposit, a form which may have induced the belief that it is an organized substance, is considered by Dr. Carswell as purely an accidental circumstance, being determined altogether by the mechanical condition of the parts in which it occurs. When the process of softening takes place in tuberculous matter, this change, as Dr. Carswell ob-

* Illustrations of Elementary Forms of Disease.

serves, cannot originate in the substance itself, as this matter is inorganic ; the doctrine, therefore, which has been advanced by many pathologists, that the softening of tubercles always begins in their centres, is extremely incorrect. This process, he affirms, commences most frequently at the circumference of firm tuberculous matter, where its presence as a foreign body is most felt, by the surrounding tissues. The chemical composition of tuberculous matter is not always the same ; it varies not only at different periods at which it is examined, but in different animals, and probably in different organs. In man, tubercle is chiefly composed of albumen, with various proportions of gelatin and fibrin, and, "either from the nature of its constituent parts, the mode in which they are combined, or the condition in which they are placed, they are not susceptible of organization, and consequently, give rise to a morbid compound, capable of undergoing no change that is not induced in it by the influence of external agents." — (Illustrations of the Elementary Forms of Disease.)

On the subject of the *origin* of tuberculous affections, Dr. Carswell remarks, that whilst the presence of tuberculous matter constitutes the material element of the disease, the origin of this morbid product must be ascribed to a pre-existing, general morbid condition of the economy. It cannot arise from inflammation, inasmuch as inflammation in all its degrees has occurred in all organs and tissues without being followed by the formation of tuberculous matter ; and, on the contrary, the formation of tuberculous matter is found to take place in organs the functions of which were never observed to have been deranged, and in which after death none of those lesions could be detected which are known to fol-

low the presence of inflammation. In what, then, this general morbid condition of the economy consists, we have no means of ascertaining. It may depend, Dr. Carswell suggests, on a change, more especially in the function of nutrition in general, and which is made manifest to us by the presence of a particular morbid product, through the medium of secretion.

CLARK.

In 1834, Doctor (since Sir) James Clark published an article in the "Cyclopædia of Practical Medicine," on "Tubercular Phthisis," which met with such a favorable reception that the author was induced to revise, enlarge, and publish it, the subsequent year, as a separate "Treatise on Pulmonary Consumption." In this work Dr. Clark, after Laennec and Louis, restricts the term, pulmonary phthisis, to that form of Consumption which, for its anatomical character, depends on the presence of tubercles in the lungs. The opinion that tubercular disease is the result of inflammation, or local morbid action, is regarded by Dr. Clark "as not only erroneous, but productive of a very mischievous practice."—(A Treatise on Pulmonary Consumption, etc., by James Clark, M.D., p. 10.)

A pre-existing unhealthy state of the constitution, a condition which Dr. Clark denominates a *tuberculous* or *strumous cachexia*, is the necessary condition of the animal economy which determines the production of tubercles. Laying no claims to originality in the views he has advocated, Dr. Clark has sought, in his treatise, to make known a correct knowledge of the origin, nature, and treatment of tubercular disease. In this condition of the system, which Dr. Clark describes under the title

of tuberculous cachexia, a peculiar matter is poured out by the extreme vessels, and is deposited in the various tissues and organs of the body. This matter, from the rounded form which it assumes in certain situations, has received the name of tubercle.—(Ib., p. 193.)

Tubercle is described by Dr. Clark as a morbid, unorganizable product, having for its remote or predisposing cause a cachectic state of the human system, and for its immediate production some abnormal action of the vessels of the part in which it is deposited, but with the nature of which action we are not acquainted. (Ib., p. 144.) The circumstances under which this peculiar morbid condition of the animal economy may occur are thus explained by Dr. Clark. It is necessary to the maintenance of health that both these functions—the nutritive and excretory—should be performed in a certain ratio; and thus it may happen that imperfect assimilation on the one hand, or defective secretion and elimination on the other, shall give rise to such a disordered state of the constitution as may ultimately terminate in tuberculous cachexia.—(Ib., p. 175.)

In relation to the causes of the disease, it is earnestly inculcated that the ordinary exciting causes of Pulmonary Consumption will fail to awaken the disease unless a cachectic or tuberculous condition of the system be present; and this condition may exist from birth, or it may be accidentally acquired at almost any period of the subsequent life of the individual.

Among the causes which serve to awaken a strumous cachexia, in persons not hereditarily predisposed, Dr. Clark classed improper diet, impure air, abuse of spirituous liquors, and affections of the mind. But of all causes which act primarily on the constitution, he

believes dyspepsia to be "the most fertile source of cachexia in every form."

Although Dr. Clark admits that Tuberculous Consumption in all its forms has essentially the same anatomical character and constitutional origin, yet he describes the disease as presenting in its external features five different varieties that may be recognised in their earlier stages. *Acute or rapid Consumption*, which is the one form of the disease, is still further subdivided into two varieties, in the first of which all the ordinary symptoms of Consumption are present, in an unusual degree of severity, and succeed each other with great rapidity; the patient often sinking in the course of six or eight weeks, and dying of what is properly and expressively termed as "Galloping Consumption."—(Op. citat., p. 35.)

The *second* variety, which is observed most frequently in delicate young persons of the female sex, is a most insidious form of Consumption, the symptoms appearing but little marked at first, and often escaping observation till the lungs are fully tuberculous. Rapid emaciation, great prostration of strength, and quick, oppressed breathing, are the prominent symptoms, which manifest themselves as this variety of the disease progresses.

Febrile Consumption, which most frequently attacks young persons, is characterized by an unusual degree of fever. The disease is ushered in by fever, and is attended by it during its whole course. It attacks persons in a state of apparent health, often after exposure to cold, and commences with shivering, followed by a hot skin, frequent pulse, and other symptoms of fever. A cough soon comes on, with pain in one or both sides,

hurried respiration, and an expectoration, at first colorless, but afterwards assuming a yellowish or greenish hue, and being occasionally streaked with blood.

Chronic Consumption differs from the acute forms which have been noticed, in that it often occupies more years than the former do weeks; and it attacks most frequently persons of a more advanced period of life, and occurs in those not having hereditary or tubercular diathesis. The cough for a long period is little thought of, giving the patient very slight trouble, and often during the summer ceasing nearly altogether.

Latent Consumption is the term given by Dr. Clark to that variety of the disease in which a tuberculous deposit may exist in the lungs for a long time, and even to a considerable extent, without occasioning any local symptoms indicative of its presence, although silently effecting its work of destruction.

Consumption in infancy and childhood is the fifth and last form of Dr. Clark's subdivision of phthisis. In his opinion, Consumption occurring in the early period of life differs somewhat from the disease in adults, both in its symptoms and the site of the tuberculous deposit. The cough frequently occurs in paroxysms, resembling those of whooping-cough. Hæmoptysis is rarely present; and the hectic fever is likewise less frequently found, and the respiration generally less abundant than in the adult. Consumption in children is frequently preceded or accompanied by considerable derangement of the digestive organs; it often commences in the bronchial glands, and occasionally proves fatal without affecting the lungs or any other organ.

Respecting the *treatment* of phthisis, Dr. Clark observes that the condition of the constitutional disorder,

in which tuberculous disease has its origin, constitutes the most important part of the treatment. (Op. citat., p. 230.) Not only the individual constitution is to be regarded, but our treatment of tuberculous cachexia must be regulated, according to the predominance of particular symptoms. In many cases the most prominent derangement is a disordered state of the digestive organs. The diet, therefore, must be mild, and free from all stimulating condiments. Gentle, aperient medicines, preceded by mild mercurials, where there is torpor of the bowels, or defective biliary secretion, are advised, together with the occasional use of the warm bath and daily frictions over the whole surface. Until this disorder of the digestive organs is removed, all tonics, such as bark, steel, wine, etc., as well as a stimulating diet, are deprecated by Dr. Clark. This object being effected, tonics, internal and external, change of air, and such other means as act by exciting and bracing the general system, will prove of great utility.—(Pp. 281–3.)

Among the various medicines which are considered most useful, in correcting that cachectic state of the system which precedes and accompanies the formation of tubercles, Dr. Clark enumerates the following as deserving of most attention, namely, mercury, iodine, antimony, sulphur, taraxacum, sarsaparilla, mineral waters, alkalies, the nitrate of lime and of barytes, and chalybeates.

Blood-letting, under certain circumstances, as when pulmonary congestion exists, may prove beneficial; but its employment, in the opinion of Dr. Clark, requires "great judgment and circumspection." Emetics are regarded by him as of great value in the treatment of

Consumption. Those emetics which act most quickly, such as the sulphate of zinc, and sulphate of copper, are the kind best suited for consumptive patients. Iodine and its salts are recommended to be employed in the early stages of pulmonary tubercle. No great reliance is placed on digitalis as a curative remedy in Consumption, but when this disease is complicated with disease of the heart, it is a medicine of great utility.

As local remedies, the application of leeches, dry-cupping, counter-irritation, the employment of issues and setons, and the inhalation of medicated vapors, are all useful in different cases; but the practice of relying on any local remedy as a principal means of curing a disease, which originates in, and depends upon a morbid condition of the whole system, is decidedly condemned by Dr. Clark.

DAVIES.

The lectures of Dr. Davies on Diseases of the Lungs and Heart* contain a history of the nature, and remote causes of phthisis pulmonalis; but no attempt is made by the author to throw any light upon the proximate cause of the disease.

Tubercular formation, in the opinion of Dr. Davies, is a deposit from the blood-vessels. All adventitious matters are derived from the same source. To determine the proximate cause of phthisis would be to determine the reason why the blood vessels should deposit tubercle in one case, medullary sarcoma in a second, melanosis in a third, etc. The cause, Dr. Davies believes, "would probably be found in certain conditions of the system, or

* Lectures on the Diseases of the Lungs and Heart, by Thomas Davies, M.D. &c. London, 1853.

of the blood, peculiarly favorable for each particular deposit, of the nature of which conditions we are as yet perfectly ignorant." (Op. citat., p. 289.)

In regard to the treatment of phthisis, Dr. Davies considered this to be the least satisfactory part of the subject. Art has done little more than palliate this disease, for when a cure has been effected, it has been by nature's effort alone. "I believe the disease," adds he, "not to be *curable* by any means proposed up to the present time." (Ib., p. 2945.)

DR. PADLINÉ.

Some theoretical views concerning the essential nature of tuberculosis were published by Dr. Padliné in 1835. (Dict. Clas. de Med., tome xlv.)

There exists, in the opinion of M. Padliné, some cause that tends to exhaust the vital force, the organic assimilation causing a precocious decrepitude. The tendency to consumption, therefore, in robust subjects is in proportion to the strength of the preceding causes, and to the severity of the inducing influences, as the abuse of liquors, unbecoming licenses, and excesses of every kind.

CARMICHAEL.

Mr. Carmichael, in an essay on scrofula published in 1836, refers the disease primarily to the generation of an acid in the primæ viæ. This acid originating, according to Mr. Carmichael, in the first passages, is the result of a disordered condition of the digestive organs, most frequently produced by want of exercise. But Mr. Carmichael has failed to show that tubercle or any substance which can be regarded as its analogue, is ever found in

the products of digestion, so long as these are confined to the alimentary canal.

STOKES.

In 1837, Dr. Stokes of Dublin published his "Treatise on the Diagnosis and Treatment of Diseases of the Chest." In this work of Dr. Stokes a brief allusion only is made to the nature of tubercle. The diagnosis and treatment of "tubercle of the lung" are chiefly considered. The occurrence of tubercle is not referred by Dr. Stokes to *irritations of secretion.* On the contrary, he believes that irritations of every degree may exist without developing tubercle; and tubercle is produced when there is no proof that irritation has preceded it. When a predisposition to tuberculosis does not exist the presence of irritation will not awaken the disease. In discussing the treatment of the disease, Dr. Stokes considers it under the two heads, *curative* and *palliative.* He enumerates four forms of incipient phthisis which he deems curable forms of the disease, in many instances, if appropriate treatment be early adopted. These are the *Localized Bronchitic*, the *Tracheal*, the *Hæmoptysical* and the *Pneumonial* varieties.

Moderate depletion at first, if the pulse be inflammatory, a mild farinaceous diet, rest, with sedatives to allay the cough, and leeches in small numbers repeatedly applied alternately below the clavicle and in the axilla of the affected side, are advised in the treatment of the bronchitic variety. When the dulness is diminished, a blister of the size of a dollar may be applied, about every three days, for several weeks, under the clavicle, and over the scapular ridge. The blister may then be converted into a superficial issue by the application of

mercurial and savine ointments. After a time the diet should be improved, and exercise on horseback in mild weather be employed. The same plan of treatment may be adopted in the hæmoptysical variety; but to restrain the hæmorrhage, blood-letting, both general and local, must be more freely adopted.

In addition to other appropriate measures, in the treatment of the tracheal and pneumonic varieties, the use of mercury in the incipient stage of the disease is advised by Dr. Stokes.

Even after excavations are formed, the life in some cases has been prolonged for many years, and in a few instances complete recovery has been attained. The treatment advised in this stage is a seton, with frequent changes of air, sea-voyaging, resorting to a temperate and equable climate in winter, together with such measures as will tend to give enjoyment to the mind, and to strengthen the body. Dr. Stokes enjoins great caution in the employment of measures to check the expectoration, which is the natural relief of the lung. The inhalations of iodine, chlorine, and tar, act in this way, and are therefore hazardous. "They have no specific action on tubercle," declares Dr. Stokes, "but, by arresting prevalent secretion, they cause a more rapid development of the disease."

WILLIAMS.

The "Library of Practical Medicine," edited by Dr. Tweedie, contains the essays of Dr. C. J. B. Williams, on the "Diseases of the Organs of Respiration." In the essay on phthisis pulmonalis, Dr. Williams reviews the opinion of Andral, Laennec, Louis, Carswell, and some other eminent writers, on the nature and origin of tuber-

cular lesions, but does not advance any new views, especially in regard to the characteristic changes which are found to occur in the lungs of the consumptive. In alluding to the induration that commonly precedes the development of yellow tuberculous matter, he says that this induration differs from the healthy structure in these respects—it contains a greatly increased quantity of matter, that this matter is generally harder than the healthy tissue, and that this increase of substance is the result of increased secretion rather than of diminished absorption. To produce an increase in the nutritive secretion, there must, according to a well established pathological law, be an increased determination of blood to the part. In acute inflammation, as in pleurisy and pneumonia, the overflow of nutritive secretion in the form of coagulable lymph in the former, is soon engorged into a soft cellular or serous membrane; and in the latter into the red hepatization of the parenchyma of the lung.

When, however, the inflammation is of a lower and more chronic character, the effused matter forms in pleurisy a harder texture of lower vitality; and in the tissue of the lung the more prolonged and chronic inflammation, in the opinion of Dr. Williams, is followed by a deposit of a dark consolidation, with increased density, and differing in no essential particulars from some forms of the indurations of phthisical lungs.

"Without, then, going so far as to assert," added he, "that the miliary inundations of the pulmonary tissue are always dependent on chronic inflammation, we may fairly say that both they and the diffused induration are more akin to the products of this process than to any other with which we are acquainted." (Library of

Practical Medicine.) But Dr. Williams allows that tuberculous matter is sometimes deposited in tissues bearing no marks of inflammation or other disease. The structures thus affected are commonly those either very vascular naturally, or peculiarly liable to congestion of blood, as this morbid secretion is most likely to be found in those organs where the blood accumulates, or passes slowly. Dr. Williams is inclined to view this tubercle as a deposit of unhealthy fibrine from the blood. The fibrine losing its vitality is liable to be converted into tuberculous matter, independently of any action of the vessels, and may therefore be merely deposited in tissues, or on surfaces independently of irritation. To the condition of the blood, in Dr. Williams's opinion, we are led to trace one cause of consumptive disease of the lungs, " and it is probably a diseased state of this fluid that constitutes what is called the tuberculous or scrofulous diathesis, in which there is a tendency, by vessels in different degrees of activity, to deposit tubercle instead of lymph ; and when this diseased state exists to a great extent, the tuberculous matter is excreted from the blood without any increased vascular action, and merely as an accompaniment of the natural secretion of a membrane, or instead of the ordinary nutrient deposit of a tissue." — (Op. citat.)

In the treatment of tuberculosis, Dr. Williams considers the following to be the chief indications : to diminish these local irritations and congestions that lead to the formation of the indurations or tubercles ; to correct the condition in the system which degrades the nutritive process, and disposes to the deposition of imperfectly organized products ; to promote the removal

of those already deposited; and to treat troublesome symptoms and accidental complications.—(Ib.)

FOURNET.

The researches of M. Fournet on auscultation of the respiratory organs, and on the "First Stage of Pulmonary Phthisis," published in 1839 (Recherches Cliniques sur l'Auscultation des Organes Respiratoires et sur la première période de la Phthisie Pulmonaire, par Jules Fournet. Paris, 1839), are interesting from the fact that the author has therein disclosed some physical signs of the early stage of phthisis, differing, as he alleges, from all auscultatory signs hitherto noticed. These signs are indicated by changes in the degree of intensity and in the duration and alterations of quality in the respiratory murmur; and also in the presence of certain rhonchi that are peculiar to the early stage of phthisis. The *inspiratory* murmur is increased in intensity, but diminished in duration, and becomes dry, hard, and rough.

The *expiratory* murmur increases in intensity and in duration, whilst a sensation of dryness and hardness is at the same time communicated to the ear. Modifications of duration and intensity in the respiratory sounds are, according to M. Fournet, the very earliest physical results of tuberculization. Modified duration and intensity of the expiratory murmur have a greater diagnostic value than similar alterations of the inspiratory sound.

The rhonchi observed in the first stage of phthisis are stated by M. Fournet to be the *pulmonary crumpling sound*, and the *dry and hurried crackling*.

Under the name of pulmonary crumpling sound (*bruit de fraissement*) the author describes an ausculta-

tory sign, which in its intense form is a sound very closely resembling the *new leather* creak of pericarditis, and in a less marked degree it is a sort of plaintive sound, varying in tone with the rapidity of respiration. In its weakest and most common form it has a clear similitude to the gentle, quick, dry sound elicited by blowing on fine paper. It is generally observed in inspiration only, is restricted to a confined space, and is recorded by M. Fournet as belonging to the first stage of phthisis.

The dry and hurried crackling sounds are successive degrees of the same phenomenon, the first accompanied with a character of dryness, the latter of humidity.

The dry rhonchus is composed of two or three crackling sounds; the humid form is similarly constituted, but it gradually acquires a bubbling character. The dry sound generally accompanies the inspiratory movement, the hurried accompanies both murmurs. The dry is primarily observed at the summit of the lung, but it always originates wherever there is a tubercle in the first stage. Frequently a very few minute tubercles scattered through the pulmonary tissue are capable of giving rise to the dry, crackling sound. This sign follows the alteration in intensity and duration in the respiratory murmur, to which allusion has been made, and it passes successively to the humid form, the bubbling and the cavernous or gurgling rhonchus. The change from the dry to the humid character announces the establishment of softening, and as this process advances, the bubbling and cavernous sounds are developed.

CONSTATT.

The theory advanced by Dr. Charles Constatt, in

1841, in his work on "Special Pathology and Therapeutics," as to the nature of tuberculosis, coincides with the views expressed by Dr. Williams, to which we have referred on a preceding page.—(Die Specielle Pathologie und Therapie vom Klinischen Standpuncte, etc.)

According to Dr. Constatt, tuberculosis and scrofulosis are identical. The morbid deposits characteristic of these affections, whether tested physically, chemically, or microscopically, are indistinguishable from each other; the former is a disease of infancy and childhood, the latter of puberty and manhood.

These different periods of life determine the development of the disease in somewhat different forms, and in different organs, but the scrofulosis of infancy is but the tuberculosis of puberty and the contrary.—(Op. citat., p. 220; also Brit. and For. Rev., vol. XIII., p. 341.)

The formation of tubercle, in the opinion of Dr. Constatt, depends upon a degeneration of the albumen, and a consequent immature and abnormal fibrine, hence the plasma becomes defective, the albuminous fluids preponderate, and at length the vehicle of that albumen is no longer able to hold it in suspension, and it is in consequence deposited in the form of tuberculous matter, either on free membranes or in parenchyma.

CAMPBELL, GILBERT, ROKITANSKI.

Other works on pulmonary phthisis were published during this same year. Among these the essay of Dr. J. J. Campbell, entitled, "Observations on Tubercular Consumption," merits attention. In this work the author claims to have advanced new views on the nature, pathology, and cure of the disease.

Dr. Campbell believes that Tubercular Consumption

ought to be considered as a compound disease, the effect of some aberration from healthy action deeply rooted in the system. Whilst the properties of the blood, in phthisis, appear to be altered by a primary error of digestion.

The immediate determining cause of tubercle is to be traced, according to Dr. Campbell, to certain vices of organization, inherent in the capillaries of the pulmonary artery, and which, so far as the individual is concerned, are hereditary, and constitute the essential element of what has been named a strumous constitution. When these vices of vascular organization are present in an individual, it requires only an abnormal condition of the blood to call into full local development tubercular depositions. Hence the indication of treatment strongly urged by Dr. Campbell, is to change the quality of the blood, for it is by this alone, in the opinion of this author, that we can ever hope to effect any useful result. "The remedies most effectual," adds he, "in fulfilling this indication, I have, after some considerable experience, concluded to be the caustic alkalies."

With the character of these "new views" of the nature of Consumption, advanced by Dr. Campbell, the professional public do not seem to have been altogether satisfied; for only one year later we find Dr. Henry Gilbert publishing another book on the subject of Pulmonary Consumption (Pulmonary Consumption: its Preventive and Cure Established on New Views of the Pathology of Disease, by Henry Gilbert. London, 1842), in which this author claims to advance "new views" on the pathology of phthisis "now for the first time presented to public notice." In this work Dr. Gilbert lays it down "as the grand and prominent feature

of his pathology of phthisis, that it consists *primarily in a want of discriminating power in the mouths of the lacteal vessels.*" (Op. citat., Preface, p. 9.) The chyle, or nutritious fluid, which by the process of digestion is prepared and separated from the food, is termed by Dr. Gilbert organisable matter, from its being converted into the tissues of which the organs are composed. A great proportion of the food, however, does not undergo the change necessary to qualify it for this purpose. The consequence is, that a certain proportion of the ingesta remains inorganizable. Sometimes, from a want of discerning power in the mouths of the lacteals, a portion of this inorganizable matter is taken up by these vessels, and becoming mixed with the blood, is circulated with that fluid unchanged in its properties or composition. It is this inorganizable matter, absorbed from the alimentary canal, and circulated with the blood, that constitutes the seeds of Pulmonary Consumption. It is the irritation produced by these seeds when deposited in the lungs, that leads to all the melancholy consequences attendant on this dreadful malady.

Pulmonary Consumption, or tubercular phthisis, cannot take place till these seeds are absorbed and circulated in the blood. * * * When deposited in the lungs in separate masses, they are termed *tubercles*, and the resulting disease is denominated Consumption of the Lungs.—(Op. citat., pp. 88--9.)

In the plan of treatment proposed by Dr. Gilbert, no new or peculiar measures are recommended. Among the hygienic means for the prevention of phthisis, careful attention to the functions of the uterus in the female is enjoined; and as deposition of inorganizable matter in the lungs is generally determined by a local exciting

cause, such as catarrh, or some inflammatory affection within the chest, strict attention to the diseases of the respiratory system is inculcated.

The diseases of the digestive and cutaneous apparatus are regarded as having a tendency to awaken a tubercular diathesis, and demand, therefore, a watchful attention.—(Ib., pp. 216--20.)

In the class of general remedies for arresting the progress of Consumption, counter-irritants are considered of the highest importance; not indiscriminate, but regulated counter-irritation. "The nature of the case must determine the counter-irritant to be used—the tuberculated portion of the lung must point out the part to be counter-irritated; and the obstinacy and degree of irritation and inflammation which may exist must determine the extent to which it must be carried."—(Ib., p. 227.)

The frequent use of emetics, the inhalation of volatilized substances, as of the preparations of opium combined with warm water, and of tar, after the manner of Sir Alexander Crichton, are advised by the author in the treatment of phthisis.

In 1842, the celebrated pathologist, Karl Rokitansky, Professor of the University of Vienna, published the third volume of his great work on pathological anatomy. In this work the author has given his views of the nature of tuberculosis.* Two distinct forms of tubercular disease of the lungs are described by Rokitansky, namely, interstitial tubercular granulation, and tubercular infiltration. When the morbid product is infused in the air-cells, it is denominated by the author infiltrated tubercle; when in the interstices of the

* Manual of Pathological Anatomy, by Karl Rokitansky, vol. III. Vienna, 1842.

lungs, it is termed interstitial granular tuberculosis. The former is also styled, "hepatization by a tuberculous product." Tuberculous infiltration occurs especially in young subjects, and is always accompanied by tuberculous disease of the bronchial glands. The infiltration may be general, but it is much more commonly lobular. Tubercular granulations may be deposited either singly or in groups, but whether deposited in either of these forms, they gradually coalesce, more rapidly, however, when they are from the first arranged in groups.

The origin of tubercle, in the opinion of Rokitansky, is "founded in an as yet unknown dyscrasial constitution of the fibrine, or tubercle-blastema." This vitiated fibrin-crasis, upon which tubercle is based, is a granular exudation, an effusion out of the vascular system. A condition connected with this tubercle-crasis, as recognised by Rokitansky, is an impress upon the general nutrition indicative of a predisposition to tubercle, or, in other words, a "tuberculous habit."

The tuberculous nature of the exudate, Rokitansky holds, must be *indwelling*, be acquired either during the local process (inflammation), or in the general blood-disease, which preceded and prepared the exudation.

As the tubercular exudate is in the highest degree coagulable, the author infers that the *seat of tubercle* is without doubt precisely, or at least in close proximity to, the spot of its exudation. Along with the true tuberculous effusion is always associated more or less of a non-coagulable, serous, or jelly-like product. As a sort of which for the first, only a portion of the entire exudation appears as tubercle, whilst the remainder becomes gradually re-absorbed and disappears. The softening of

tubercles is a spontaneous metamorphosis, essentially proper to the nature of tubercles.

When softening occurs, each distinct granulation softens from the centre; the group present similar softenings at the centre of each of their component tubercles, and when all the tubercles in the latter have gone through the same process of softening, a large ulcer or cavity is the result; while from the former results a small ulcer. Cavities thus formed, Rokitansky says, enlarge by successive changes, softening, breaking down, and the removal of their walls in a regular concentric progress. The cavities, as they coalesce, may communicate by sinuses, or all may be laid into one.

Rokitansky offers no opinion on the subject of the treatment of tuberculosis.

GRAVES.

In a work on clinical medicine, by Dr. Graves, of Dublin, published in 1843, the author explains his views on the pathology of tubercle, which are somewhat different from those announced by most of the preceding writers. Dr. Graves entertains the opinion that tubercle, though a most frequent accompaniment of phthisis, is neither the essential cause of that disease, nor a necessary product.—(A System of Clinical Medicine, by R. J. Graves, M.D., Physician to the Meath Hospital. Dublin, 1843.)

A tubercular development is not, according to this author, the consequence of inflammation, nor has it been proved, he considers, that the presence of tubercles is the cause of phthisis. There must exist that particular state of the constitution which occasions what is falsely termed tubercular inflammation, but which is denomi-

nated "scrofulous inflammation," by Dr. Graves. "In all cases of phthisis," he contends, "the pectoral symptoms, of whatever nature they may be, are caused by scrofulous inflammation."

Every form of Consumption which has come under the author's notice, "is referable to one common origin: and this is the debilitated state of constitution which has been termed the scrofulous habit. One of the first tendencies of this habit is to the formation of tissues of an inferior degree of animalization, among which I class tubercles, whether occurring in the lungs, brain, or liver, whether they exist in a minute or granular form, or in large, soft, and yellow masses, or in the state of tubercular infiltration. I look on them as one of the first of these morbid changes dependent on a peculiar constitution of body, and most commonly found to accompany it.

"The weaker the constitution is the greater tendency is there to generate tissues of a lower degree of vitality, and on this principle I think we can explain the occurrence of entozoa and hydatids. * * * I look on tubercles in this light, and not as the consequence of inflammation, nor do I consider that it has been proved that tubercular development is the cause of phthisis."—(Op. citat., p. 279.)

Considering tubercular disease, therefore, in all its forms, as having its origin in a scrofulous tendency, the prophylactic measures advised by Dr. Graves are such as will give strength and support to the general system, and tend to improve its tone. Early rising, cold bathing, frequent and free exercise in the open air, with nutritious not stimulating diet, form the main part of the regimen which he recommends.

When tubercular disease has become fully developed, the treatment must be conducted upon the same principles as those which are recognised in inflammation of other organs, occurring in scrofulous constitutions.

There is one form of phthisis which Dr. Graves proposes to cure by rapid mercurialization; a method of treatment recommended many years ago in this country, by Dr. Rush. The form of the disease in which this practice is stated to have proved successful in effecting a cure, is that in which the lungs become affected before any general contamination of the system takes place.—(B. and F. R., v. X, p. 250.)

RILLIET AND BARTHEZ.

During the same year in which the clinical lectures of Dr. Graves were published, a treatise was issued from the Paris press, which embodied the joint researches of MM. Rilliet and Barthez, on the diseases of children.—(Traité Clinique et Pratique des Maladies des Enfans, par MM. Rilliet et Barthez. Paris, 1843.)

In this work the subject of tubercle is treated in a most thorough and interesting manner. In the opinion of these authors, tubercular disease and scrofula are identical; after having examined a very large number of scrofulous children at the "Hôpital St. Louis," and "Hôpital des Enfans," these authors affirm that they have never met with a single instance in which tubercle was not present in some organ or other. Their view of the nature of the disease is thus expressed: "Tuberculization is the deposition in organs of an accidental production, without analogy in the economy, to which the name of tubercle has been given; it is common to

meet with this foreign body simultaneously in several organs, and in whichever it is deposited, its nature, its evolution, and the greatest part of the phenomena it gives rise to, are all the same."

In classing the different organs according to the frequency with which they become affected by tubercle, these authors arrange them in the following order: the lungs, the bronchial glands, then, at a great distance beneath them, the mesenteric or abdominal glands, and the small intestines; next come the pleura and spleen, then the peritoneum, the liver, the large intestines, the membranes of the brain, the kidneys, brain, stomach, and pericardium.

MM. Rilliet and Barthez refer to the signification of the word phthisis, which has been applied by M. Louis and other pathologists exclusively to pulmonary tuberculization, and remark: "We believe that it is proper to reserve this word phthisis, to express the Consumption arising from tubercular disease, but we believe it is to restrict its use too much to apply it only to pulmonary tuberculization. * * * According to our views the deposit of tubercles in an organ constitutes its *tuberculization;* the Tubercular Consumption which succeeds should be called *tubercular phthisis;* and the inflammation which precedes it, or is the consequence of it, *tubercular phlegmasia.*"

Among the causes which in children predispose to a deposition of tubercles in organs of the economy, the authors have classed "a weak constitution, the age from six to fifteen, the feminine sex, and vaccination. Those which act either as predisposing or as occasional causes are, hereditariness, vitiation of the air, residence in a damp locality, bad nourishment, prolonged residence in

a hospital, onanism, some of the phlegmasiæ, pertussis, and measles."

In the treatment of phthisis, the authors recommend that every effort should be made to prevent the development of the disease where its occurrence may be suspected, inasmuch as confirmed tuberculization is difficult, if not impossible to cure, in the great majority of cases. To effect this object, the patient must be placed under the best hygienic circumstances which can be commanded for him. The prophylactic measures to be adopted, are detailed at some length by the authors, and are such as are universally recognised, as the appropriate ones for the management of patients who manifest a tendency to tubercular disease.

The writings of Bayle, of Laennec, and of Louis, on thoracic disease, were received generally with so much favor by the profession in America, that for many years but few attempts were made in this country, after the publication of the labors of Dr. Rush, to advance this particular branch of medical science by the published inquiries of other authors.

CHAPMAN.

But in 1844 an interesting work on "the more important diseases of the thoracic and abdominal viscera," was published by Dr. Chapman, of the University of Pennsylvania.—(Lecture on the More Important Diseases of the Thoracic and Abdominal Viscera, by N. Chapman, M.D., Prof., etc.)

In this work, Dr. Chapman expresses his opinion that there exists "a great and irreconcilable distinction" between phthisis and scrofula. Consumption, in the author's opinion, has its own peculiar physical structure

and aspect, evinced in the long, delicate neck; narrow, flat chest; prominent shoulders, high cheek-bones, long arms, large hands and feet, dark hair and eyes, with lengthened, drooping lashes, thick skin, and dingy complexion, and is moreover a disease most prevalent in mature age, whilst scrofula is an affection of childhood or youth.

But the great distinction consists in the positive pathological difference, which, as Dr. Chapman affirms, exists between the two affections, "tubercles being altogether an extraneous production, and strumous tumors, degenerations of lymphatic glands. The first is a new creation of an irregular nutrition, while the other is a diseased growth of a natural pre-existing organ."—(Op. citat., pp. 24--5.)

With regard to the treatment of phthisis, Dr. Chapman expresses the opinion, that "the alleged curability of matured tubercles is refuted by experience." Few are the remedies recommended by Dr. Chapman. To allay inordinate action, large doses of nitrate of potash are advised; and in the treatment of hectic fever, distilled vinegar, given in drachm doses, diluted with sugared water, and administered every two or three hours, is recommended. Medicated inhalation, more especially the vapors of iodine, of chlorine, and the vapor of the chloride of lime, are deserving of attention. Although Dr. Chapman cannot affirm that he has ever accomplished even an approximation to cure by them! The use of the latter remedy, he believes, often allays cough, facilitates expectoration, diminishes or corrects purulent and other secretion; abating, at the same time, most sensibly, hectic irritation, and hence appears the best suited to the affections of the mucous surfaces of the wind

pipe, and its ramifications. Yet there are cases with an excess of irritability of this structure, in which it is not tolerated, and if persisted in is evidently productive of harm. (Op. citat., p. 71.) To moderate night-sweats, sleeping in flannel is recommended, together with an application to the skin of brandy, in a half pint of which one drachm of alum is dissolved. Horseback exercise is advised by the author, except in those cases in which the inflammatory diathesis prevails; and for diet, milk and farinaceous food are recommended.

Reposing, apparently, no confidence in any known plan of treatment for the cure of phthisis, Dr. Chapman, nevertheless, is not without hope that an efficient remedy may yet be discovered. "He who shall determine correctly," says he, "the pathology, and indicate with any certainty the cure of this disease, will wipe away a reproach to our art, and earn a reward as much more glorious than the oaken wreath awarded by the Roman Senate to a soldier on saving an individual in battle, as the preservation of the lives of thousands is to that of one, or the triumphs of science compared with the solitary achievements of military intrepidity or prowess."—(Op. citat., p. 95.)

GELLERSTEDT.

During the same year, 1844, a very interesting essay on the "Nosography and Pathology of Tubercular Phthisis," was published in Sweden, by Dr. Gellerstedt, Physician to the Royal Garrison Hospitals in Stockholm (British and Foreign Med. Review, vol. XXIII., pp. 429–40). In this work the author has devoted his inquiries chiefly to the pathology of the disease, and especially to the earliest commencement of the organic

changes in the lungs. Dr. Gellerstedt is not a believer in the inflammatory origin of tubercles. They may appear under different forms, either as miliary tubercle or as crude tubercle, and their development *as tubercle* depends on some vitiation of the vital influence which controls the development of all healthy tissues. In other words, tubercle is a low standard of organization, and is, therefore, incapable of forming a union between itself and other tissues. Hence tubercular masses act as a foreign body, and irritate the surrounding parenchyma. But with regard to that irritated influence which determines the formation of tubercle in the body, Dr. Gellerstedt acknowledges that its peculiar nature has as yet eluded observation.

The author is convinced of the possibility of healing tuberculous disease. Tubercle, he thinks, may be absorbed; but more frequently it diminishes in size, and becomes surrounded with a cyst which isolates it from the surrounding parenchyma; at other times it is changed, he believes, into a calcareous mass. In those who have died of phthisis, Dr. Gellerstedt has found occasionally both lungs affected. Where only one lung was invaded by the disease, the progress of the malady was less rapid; and those were the cases where nature exhibited the strongest tendency to effect a cure.

Although the author allows that cases occur where every symptom of tubercular disease having existed, the patients, nevertheless, do recover their original health, still he expresses himself very cautiously in respect to the *cure* of the disease, by any plan of medical treatment. Even in those instances of apparent recovery, Dr. Gellerstedt thinks there is ever danger to the patient, unless the tubercular diathesis is entirely removed,

but how to effect this desirable object the author does not inform us.

LEBERT.

A work of great interest on "Pathological Physiology," was published in France, in 1845, by M. Lebert. (Physiologie Pathologique, ou Recherches Cliniques, etc., par H. Lebert, M.D. Paris, 1845.) In the first volume of his work the author presents some peculiar views of the nature and constitution of tubercle. The constant elements of this diseased product, as M. Lebert affirms, consist of a great quantity of perfectly round molecular granules, inclosed or surrounded by a hyaline material, or transparent membrane, by which the granules are united into a peculiar "globule," of a clear yellowish color. These globules, M. Lebert believes, constitute the characteristic and essential element of tubercle, or "tubercle-corpuscle." The author thus describes these corpuscles: "The form of the globule of tubercle is rarely perfectly round; * * * their somewhat angular outline depending probably on their close juxtaposition; * * * they are of a clear yellow color, and appear blackish under a powerful glass. Their interior is irregular, and of equal consistence, which gives them a spotted appearance, independently of the granules they contain. We have never been able to discover true nuclei in these corpuscles, although they sometimes present in their interior the irregular appearance of a vacuity resembling a nucleus. * * * The contained granules, disseminated irregularly through the substance of tuberculous globules, cannot be regarded as nuclei; they are, in fact, merely molecular granules, scarcely reaching, and never exceeding, a diameter of

0025 of a millimetre. They vary in number from three to five, or ten and upwards; are not regularly placed in the interior of the globule, and not all visible at once on the same plane."—(Op. citat., vol. I., p. 353.)

Tubercle-corpuscles are not changed by the addition of water; they are rendered more transparent, but are not otherwise changed by adding acetic acid. M. Lebert does not admit, as some distinguished pathologists have affirmed, that tuberculization is a modification of suppuration. It is well known that pus and softened tubercle are frequently found mixed together. Pus thus found, M. Lebert asserts, does not come from the tubercle itself, but derives its origin from the circumjacent textures. The grey granulation of Laennec and Louis is the first stage of yellow tubercle; and this form of tubercle is invariably composed of a "mixture of fibres of a greyish-colored hyaline substance, and the proper corpuscles of tubercles."

With respect to the identity of tubercle and scrofula, M. Lebert is of the opinion that tuberculous diseases, although they have a strong analogy to scrofulous affections, should be separated therefrom; for there is this difference between the two, tuberculous diseases generate a special substance, namely, tuberculous matter, characterized by the peculiar globules; whereas the pus of scrofula does not, as far as M. Lebert's examinations go, contain any special element distinguished from other morbid productions.

PHILLIPS.

A work by Dr. Phillips, of London, on "Scrofula: its Nature, Cure, and Treatment," which was published in 1846 (Scrofula: its Nature, its Causes, etc., by Benjamin

Phillips, F.R.S., etc. London, 1846), was followed the same year by the publication of an essay by Dr. Glover, also of London, on the "Pathology and Treatment of Scrofula." Both publications are works of interest; although the arguments adopted and the views entertained by these writers are, in many respects, widely different. With Mr. Phillips one of the principal subjects of inquiry is the following: "Are tuberculous disease of the lung, and scrofulous disease of the subcutaneous glands, identical in all other respects than in the seat of the deposit?" After much investigation, and a thorough examination into many facts and statements, the author arrives at the conclusion, that, so far as concerns the physical and chemical qualities of crude tubercular matter, from whatever organ obtained, and scrofulous deposit, we can at present draw no distinct line of difference between those products. (On the Pathology and Treatment of Scrofula, being the Fothergillian Prize Essay for 1846, by R. M. Glover, M.D. London.) But with regard to the condition of the part in which the deposit is made, an important difference, in the opinion of Mr. Phillips, exists. The scrofulous deposit in the subcutaneous glands is preceded by inflammatory action, whilst the tubercular deposit in the lungs is unaccompanied by any sign of inflammation, or even *active hyperæmia;* and in these respects, the author believes he has established an important difference between tubercular phthisis and scrofula.—(Op. citat., p. 63.)

The *proximate* cause Mr. Phillips believes to be the same in both, and that this consists in the deposit of a morbid product from the blood. "The blood is changed before the deposit is made, and the accumulation of certain morbid materials in the blood constitutes what is

known as the scrofulous diathesis or constitution."—(P. 89.)

In the treatment of the disease, Mr. Phillips recommends both prophylactic and therapeutic measures. Under the first head, well assorted marriages are deemed highly important in preventing the occurrence of scrofula. A well regulated dietetic plan should be adopted with infants, and active exercise, with an abundance of fresh air, should be employed. Among the therapeutical means recommended by the author, are some of the preparations of *iodine*, the *chloride of bromine*, the *hydro-chlorate of lime*, and *cod-liver oil.*

GLOVER.

The work of Dr. Glover contains an account of some original investigations into the nature of scrofulous or tuberculous matter, by means of both microscopic and chemical analysis.

The term tubercle is intended by Dr. Glover to include all "scrofulous formations, whether in the lungs, or in the lymphatic, or lacteal glands, in the heart, the liver, the kidneys, the spleen, the brain or spinal cord, the free surfaces of the serous or mucous membranes, the interstitial cellular membranes, the cellular tissue under the skin, the bones and periosteum, and, in short, in every conceivable tissue or organ."—(P. 25.)

In describing the various forms under which tubercle is found, Dr. Glover follows Barthez and Rilliet, and includes the following, namely, the miliary tubercle or grey, and yellow or crude tubercle, the grey and yellow forms of infiltration, and tuberculous dust, or *poussière tuberculeuse.*

In a careful microscopic examination of tubercles,

taken from the lungs, heart, and spleen, venal capsules, kidneys, and bladder, and from tuberculated mesenteric, bronchial, and cervical glands, Dr. Glover was unable to discover any essential difference in constitution. The ordinary element of tubercle present in all the forms which he examined, is the granular corpuscle, which is developed instead of normal cells.

As the result of both microscopic and chemical analysis, Dr. Glover found that "in scrofula we have an increase in the solids of the serum, and a diminution of blood-globules." In these analyses, however, the fats are not found to be deficient in the blood. (P. 115.) Dr. Glover considers the *treatment of scrofula* under the two heads, *hygienic* and *medicinal.*

Under the first head, the author recommends that attention be given to good nursing in infancy, and good physical training in childhood. And he especially urges the importance of observing great care in the selection of a matrimonial partner at manhood.

In the medication of scrofulous patients Dr. Glover is not deterred by chimeras, from the use of mercury in scrofula, although he avoids pushing this remedy to excess, lest it give rise to dangerous constitutional effects. In the commencement of scrofulous tuberculization, small doses of the milder preparations of mercury are employed, together with the compounds of iodine, bromine, and chlorine. Tonics are administered in every stage of the disease, and cod-liver oil in cachectic cases.

HASSE.

Several other monographs, on tubercular disease, were published in 1846. Of these I shall only refer to the work of Professor Hasse, of the University of Zurich,

and that of Professor Buffalini, of Geneva. In the former treatise, "An Anatomical Description of the Diseases of the Organs of Circulation and Respiration," Professor Hasse has devoted a portion of the work to an account of the origin and nature of tuberculosis of the lungs.

The production of tubercle, in the opinion of Professor Hasse, is not dependent upon accidental conditions, but upon a general predisposition, and this predisposition is one of scrofula (ut supra, p. 316); but the author does not attempt to trace the general connexion between scrofula and tubercular disease. When this real predisposition prevails, tubercles become developed in the lungs, under every variety of circumstances. "Sometimes they form very rapidly, almost suddenly, and prove fatal without any previous disturbance of the pulmonary texture, solely through disturbance to the respiration, as in tubercular hepatization, and in acute tubercle." (Ib., p. 319.) Most frequently the rise and progress of the affection are more gradual, and essentially chronic, and this latter form of the disease is by far the most frequent, and its ulterior stages follow so insensibly that the mischief frequently escapes ordinary observation until a very late period.

Acute tuberculosis, according to Hasse, arises under two forms, which may be denominated as primary and secondary forms; the first occurring in young persons, ordinarily between the ages of eighteen and twenty-five, the latter in those who are in the prime of manhood, or even in advanced age.

In acute tubercular phthisis, in very marked cases, one or both lungs are found, from the apex to the base, uniformly loaded with an extraordinary number of tu-

bercles. (Ib., p. 321.) These are always isolated granules, or miliary tubercles, mostly yellowish and soft, but occasionally greyish, and more solid. The tubercles are less uniformly miliary, when the disease is slower in its course; but they are in a great measure united into groups, and are more densely crowded at the apex. The acute form of the disease proves invariably and speedily fatal; and in such cases, where the disease has run a very rapid course, tubercles are not encountered in any organs besides the lungs.—(Ib., p. 322.)

In true chronic phthisis, the disease is one of a more general nature; the development of tubercle is, in a majority of cases, gradual, both lungs becoming assailed almost at the same time, though scarcely ever to the same amount.

In the opinion of Hasse, tubercle is first thrown out as an exudation on membranous surfaces, and within free spaces, out of which exudation morbid cells are subsequently formed; and the pulmonary vesicles are a fit locality for the accumulation of these cells, which become visible to the naked eye as minute tubercle.

The treatment of phthisis is not considered by Prof. Hasse.

BUFFALINI.

Tuberculous disease and scrofula, in the opinion of Professor Buffalini, are identical. In constitutions predisposed to scrofula, a vice in the assimilating organs occurs, followed by an excess of albumen in the blood, and a consequent deterioration of the respiratory process. Hence the albumen in excess cannot be changed into a more elevated organic principle. The diathesis,

in the opinion of Buffalini, consists not in a deficiency of respirative materials, but an insufficiency of that organic formation, which is under the influence of oxygen—a defect of the respiratory function.

In the treatment of the disease, he advises the adoption of those measures which will tend to a more exalted reparation of the oxygenated principles; such as a free use of animal food, gymnastic exercises, and all those measures which may contribute to more energetic hæmatosis, and to a greater development of the muscular mass.—(P. 328.)

BENNETT.

In 1847, Professor J. Hughes Bennett read a paper before the Royal Society of Edinburgh, which was published in the "Monthly Journal of Medical Science," for September, 1847, in which the author has briefly embodied his definition of the essential nature of tubercle. Subsequently, his views have been given more in extenso, in his most excellent and useful work, on the "Pathology and Treatment of Pulmonary Consumption."

In the first place, all organized structures consist originally of cells; and there is no elementary cell, Dr. Bennett affirms, into which both oil and albumen do not enter, as constituent parts. Both oil and albumen, then, are necessary to cell-growth, and to the formation of the tissues. The elementary globules of histologists, he regards as minute, oily particles, precipitated from the blastema, and these granules, either separately or united with other substances, constitute *nucleoli;* the latter being composed of oil, surrounded by an albuminous membrane. In this condition they become subject to the physical law of endosmosis and exosmosis, and under

the vital process the elementary granules and nucleoli are developed into cells, and transformed into the various tissues.

A disturbance of the healthy relations shown to exist between the oily and albuminous principles in the animal economy, constitutes many of the various forms of disease. "The whole range of morbid lesions denominated tubercular belongs to this class." (Ib., p. 9.) In all cases of tubercle there is found to be an excess of the albuminous, and a deficiency of the oily principles, and tubercles are especially liable to occur in organs destitute of fat.

With regard to the nature of tubercle, Dr. Bennett expresses the opinion, in his recent work on "Pulmonary Consumption," that it can scarcely be doubted that it is an exudation of the liquor sanguinis, but one which presents marked differences from other morbid exudations.

The two forms of inflammatory exudation, both simple and chronic, may occur at any period in life, and may attack any of the tissues. Acute exudation may be poured out in large or small quantities, and they have a great tendency to cell, or temporary formations. Cancerous exudation occurs for the most part in persons of adult or advanced life ; it may occur in any tissue, but is by far the most common in glandular or fatty organs, and has a great tendency to the formation of the most perfect forms of cell life.

Tubercular exudation takes place, for the most part, in young subjects ; it may occur also in all tissues, but is most common *primarily* in the lymphatic glands, and afterwards in fibrous or albuminous textures, as the lungs and serous surfaces. Its progress is generally ex-

ceedingly slow, and there is no disposition to the accomplishment of perfect cell-formation.

Taking pus, which is one of the products of simple inflammation, as the standard in the three kinds of exudation, tubercle is considered by Dr. Bennett the lowest, and cancer the highest, in the scale; but on what this difference depends, in the formative power of these different exudations, we are altogether ignorant. It is the opinion of the author, however, that these different changes and effects are dependent on the inherent composition or constitution of the exudation itself. (Ib., p. 35.) On this point most pathologists, he asserts, are agreed; and, moreover, that the character of the exudation depends upon the condition or composition of the blood. "But here pathologists pause — having once traced these lesions back to the blood, they are content." * * * "Now numerous facts render it probable that while the blood is normal in simple exudation, it contains an excess of nutritive materials in cancerous, and a deficiency of them in tubercular exudation."

Tubercle exudation transudes in a fluid state through the capillaries, and collects as a coagulated exudation in those places, outside the vessels that offer least resistance. In the lungs a small portion may insinuate itself between the elementary fibres of the pulmonary structure, but the principal part passes into the air-vesicles, and by coagulating in them obstructs the entrance of air. Preceding and accompanying this depraved exudation into the lung, there is present an impoverished condition of the blood, having its origin in a faulty nutrition. To this constitutional disorder is added the local disease, or tubercular exudation, and that compound affection is induced which we call phthisis pulmonalis.

In this way a miliary tubercle, constituting a foreign body, may block up from three to twenty of these air-vesicles. After a time the tubercle, whether miliary or infiltrated, begins to soften, and this process may commence in any part of the mass, and gradually affect the whole. This softening is a disintegration or a slow death of the tubercular exudation, constituting true ulceration, which is more or less extensive, according to the amount and extent of the morbid deposit.

In the treatment of Consumption Dr. Bennett's first indication is, "to improve the faulty nutrition, which originates and keeps up the disease." For this purpose it is important to cause a larger quantity of fatty matter to be assimilated, and to effect this object the cod-liver oil is regarded by Dr. Bennett as most efficient in pulmonary tuberculosis. Administered in table-spoonful doses, three times a day, or oftener, in some cases, "it operates by combining with the excess of albuminous constituents of the chyme, and forming in the villi and terminal lacteals, those elementary molecules, of which the chyle is originally composed," serves in this way to maintain the body, to check fresh exudations of tubercular matter, and to diminish the cough, expectoration, and perspiration.

To encourage the absorption of the exudation is the second indication with Dr. Bennett in the treatment of the disease.

The great problem to be worked out in the treatment of Pulmonary Consumption is, that while on the one hand it is originally a disease of diminished nutrition and weakness, and consequently requires a general invigorating and supporting system of treatment, on the other, it is accompanied by local excitement, which

demands an antiphlogistic and lowering practice. Still, Dr. Bennett recommends carefully to avoid depletion, and all other strictly lowering measures, and to depend solely on small doses of antimony, occasionally diuretics, and quinine, to relieve the acute symptoms, "together with good diet, and cod-liver oil, topical counter-irritation," etc.

The third indication is to prevent the recurrence of fresh exudations, and we must seek to accomplish this object, not only by the employment of therapeutic measures, which have been recommended, but also by the aid of appropriate hygienic regulations, such as exercise in the open air, a suitable diet, and a residence in a favorable climate. In short, the general treatment recommended by Professor Bennett for Pulmonary Consumption, is based upon the following pathological propositions: First, That tubercular diseases will heal of themselves, if we can support the nutrition of the system. Second, That, with this view, our efforts should not only be directed to the pulmonary, but especially to the digestive system; and Third, That the kind of morbid nutrition which exists is excess of the albuminous, and deficiency of the fatty element of the chyle. The kind of treatment applicable to correct both the lesion of the blood, as well as of the subsequent tubercular deposits, is not tonic, stimulating, or antiphlogistic, but truly analeptic or reparative, and directed to the supply of those elements of nutrition which pathology indicates as deficient in this class of diseases.

MADDEN.

No important accession to our knowledge of tubercular disease was made during the years 1847 and 1848.

But in the subsequent year several works, of more or less value, were brought before the profession. Among these the essay of Dr. Madden, of Torquay (Thoughts on Pulmonary Consumption, by W. H. Madden, M.D. London, 1849), deserves an especial notice. In this work the author advances the opinion, that the development of tubercular disease depends essentially upon a diseased condition of the blood—that phthisis, in short, has its origin in a poison of this fluid.

Although Dr. Madden admits that no poison has hitherto been detected in the blood, yet, by an analysis of the characters, both structural and chemical, of this morbid product, by attention to the function of nutrition, to all the characteristic symptoms of phthisis, and interpreting all by the light of analogies supplied by other diseases, Dr. Madden concludes, and aims to show, that scrofula is as much a poison-disease as any with which we are acquainted; and he endeavors to explain, or interpret, those conditions which precede and lead to a deposition of tuberculous matter.

Considering phthisis, therefore, as a poison-disease, and his grounds for this conclusion are mostly derived from the analogies traceable between tubercular disease and those diseases known to arise from morbid poisons, Dr. Madden's indications of treatment would be, first, to neutralize the poison. But inasmuch as no positive antidote is known, the next thing is the adoption of such measures as tend to promote the elimination of the poison from the system; such means, for example, as operate to increase the depurating action of the skin, frequent ablutions and frictions, the use of gentle exercise, in a moderately warm and dry atmosphere, are among the measures recommended. Decided advantage

may be gained from the exhibition of mild mercurials, and gentle laxatives and diuretics. Dr. Madden dwells especially upon the good effects of alkalies in the treatment of tubercular disease. The support of the system at large, in all diseases arising from morbid poisons, by a good diet, chalybeates, and other appropriate tonics, is an important measure.

ADDISON.

Simultaneously with the appearance of the work of Dr. Madden, another publication having reference to the nature and treatment of Consumption and Scrofula, was issued by Dr. Addison, of London. (On Healthy and Diseased Structure, and the True Principles of Treatment for the Cure of Disease, especially Consumption and Scrofula, etc., by William Addison, M.D. London, 1849.) In his treatise, Dr. Addison promulgates the novel theory, that a disposition exists in the nutritive processes to a change of structure, which he designates as a "retrograde morphology;" and that such alteration of structure is not merely concerned in the local manifestations of the scrofulous or tuberculous diathesis, but is the essential condition of the "unhealthy constitution," from which these proceed. This retrograde morphology, which is attended with a diminished formative energy of the cells and tissues, and a low vitality of the blood, manifests itself in a defective development of the healthy textures, and in the chemical and structural character of tubercle itself. It may be the result of an original taint of constitution, or the taint may be acquired from the presence of certain external conditions, and when acquired it may be, in the opinion of Dr. Addison, transmitted to offspring, and be again subsequently lost.

Without advocating the use of any new remedies in the treatment of Consumption, Dr. Addison has devoted nearly one hundred pages of his work to the consideration of the subject of "Therapeutics and Cure." "The details of a scientific medical treatment," says he, "are governed by the age, social position, occupation, constitution, temperament, education, and mental habitudes, of the patient; and the same malady may require the most opposite methods in the child and in the adult, in the poor and in the rich, in the country and in the city." (Op. citat., p. 298.) Alteratives, alkalies, tonics, both vegetable and mineral, counter-irritants, sponging the body, with exercise in the open air, and a suitable diet, are among the principal agents and means recommended by Dr. Addison.

LEGRAND.

During the same year, 1849, in which the last-named works appeared, namely, those of Madden and Addison, in England, a work was published in France by Dr. Legrand—(De l'Analogie et des Différences entre les Tubercles et les Scrofules, etc., by A. Legrand, Docteur en Médecine de la Faculté de Paris, etc. Paris, 1849), which seems to have been considered of sufficient interest by the French Academy of Medicine to have received the approbation of that body—on the distinction between tubercle and scrofula. In this work the author attempts to show that essential and characteristic differences exist between tuberculous and scrofulous disease. Indeed, the entire work is devoted to a history of the physical and chemical characters, and the seat and cause of tubercles, and also to a similar history of scrofula; and, finally, in pointing out what he considers

the essential marks of difference between the two forms of disease. Among the distinctions noticed by the author are the following:

"*Tubercle* has its principal, almost its only source, in the internal organs; and its external manifestations only proceed from *irradiation* of the morbid principle from the centre to the circumference.

"Scrofula, on the other hand, extends itself on precisely an opposite plan; it manifests itself in the skin and periosteum, and then radiates towards the internal organisms, which, however, are never disorganized by it, after the same fashion as by tubercle."—(Op. citat., pp. 400–1.)

Another distinction pointed out by M. Legrand is, that the tuberculous, as he asserts, are little subject to skin diseases, while the scrofulous are universally so; and, again, the albuminuria, which is a frequent complication of tubercle is never met with in the scrofulous.

LOUIGI PAROLA.

Adopting the physiological doctrine that an intimate analogy exists between the liver and the lungs, M. Louigi Parola, in 1849 (Della Tuberculosi, 1849), advocated the peculiar theory, that tuberculosis has its origin and seat in a defective respiration, or an imperfection of hæmatosis in the lungs; this defect of respiration being imperfectly replaced by the liver. Parola associates the functions of the liver with that of the lymphatic system; and states that, from hereditary weakness or accidental causes, the pulmonary function fails in proportion to the development of the frame, or the age of the individual, and the glandulo-hepatic performs a preternatural supplementary function. The diminished function

of the lungs results, necessarily, in a diminished power of sustaining the animal temperature, and this increases as life advances, and an increased quantity of chyle requires to be elaborated. The consequences of the defect of pulmonary development become more serious as life advances, particularly as aliment and exercise become more indispensable for the elaboration of vital heat, and for nutrition. Hence tuberculosis manifests itself especially in cold and humid climates, in dark and badly ventilated places, particularly in those individuals who have a vicious internal organization.

SIMON.

In a course of lectures on "General Pathology," delivered by Mr. Simon, of St. Thomas's Hospital, in 1850, the opinion is advanced that tuberculosis is a "disease of the lymph in the glands," originating in some misdevelopment of the proteinous ingredient of the lymph. This peculiar modification of the lymph is not a deposit from the blood-vessels, but an accumulation in the glandular tubes of a morbidly coagulable or inspissated lymph (A Course of Lectures on General Pathology, 1850); or, as Andral expresses it, who entertains similar views with regard to this morbid element in the glands, it is simply "the result of an alteration of the lymph itself, either spontaneous or caused by a morbid condition of the lymphatic vessels; or, perhaps, resulting from its stagnation, owing to some mechanical obstacle to its circulation through the lymphatic plexus."

It will be seen, however, that a much earlier writer than either Andral or Simon, namely, Baumes, in 1783, advanced the doctrine, that Consumption had its origin in the existence of an acid principle of a phosphoric

nature, which was either formed primarily in the lymphatic glands, or was deposited from the diseased blood. in the passage of this fluid through these vessels; and which serves, in the first place, to thicken, and ultimately to render putrid the lymph.

VIRCHOW.

During the years 1851 and 1852, several different pathologists in Europe published their views of the nature of tuberculous disease of the lungs. In 1842, Rokitansky had advanced the belief that "tubercle is an exudation" essentially pathological in its character. Ten years later, Virchow, an eminent pathologist of Würzburg, maintained the opinion that tubercle is not developed "exudation," but merely metamorphosed pre-existing tissue-elements; that is, tubercles, in the opinion of Virchow (Zur Geschichte der Tuberculose, Von Virchow. Würzburg, 1851), are composed essentially of dead tissues, the death of the part being occasioned by the accumulation of cells amid its vessels, and consequent compression of those vessels, and cessation of circulation through them. These cells, upon the formation of which tubercle is based, have their origin:

First, In the physiological cells (greatly increased) of a structure or organ. The first step in the tuberculous metamorphosis in these organs is an increase in the epithelium of the air-cells by endogenous formation. Subsequently the cells fall to pieces, a granular detritus is left, in which the nuclei remain for some time as shrivelled, irregular, and opaque bodies; finally these also crumble, and an entirely amorphous finely granular mass remains behind. It is these nuclei, shrivelled, irregular, and opaque, which, as Virchow declares, constitute the

tubercle-corpuscles. "They are not," says he, "exudation-corpuscles." "The peculiarity of the local process lies in the tendency of the organization, and by no means in a peculiar exudation."

Second, These cells may have their origin in the endogenous development, or in atrophy of the cells of cancer, pus, or typhous matter. They may also be developed in the fibrine poured out, in what is termed tuberculous inflammation. But whatever the origin of these cell-formations, the result is the same; by their accumulation the vessels are compressed, the death of the part is produced, and disruption, atrophy, and shrivelling follow; and this process, in the phraseology of Virchow, is *tuberculosis*, whilst *scrofulosis* is the term used by him to denote that constitutional state in which tuberculosis occurs.—(Die Cellular Pathologie, 1858; Med. Ch. Rev., Jan., 1853, p. 142.)

VAN DER KOLK.

The views of Professor Schræder Van der Kolk, of Utrecht, "On the Origin and Formation of Tubercles,"* were published in 1852. The doctrine of a tuberculous dyscrasia, as advanced by Rokitansky, Van der Kolk criticises and condemns.

On the subject of the origin and formation of tubercles, the author remarks: "The wall of each healthy air vesicle is everywhere covered with flat epithelial cells, of which some are smaller, and appear like only nuclei; others are larger; and all have a nucleus, with more or less granular matter." Now, pulmonary tubercles, in the opinion of Schræder Van der Kolk, originate in a greatly increased, and abnormal, or diseased

* Netherlands Lancet, 1852.

condition of these epithelial cells, which are found lining the walls of all air-vesicles. "If we examine," says he, "in a very thin section, an air-vesicle, at the border of a tubercle, where, for instance, the blood-vessels may be still filled with injection, we find no longer a single layer of these cells, but they are remarkably increased in number, and form sometimes two, three, or more, superjacent layers, till in the tubercle itself the whole air-vesicle is filled with them." In short, the conclusion to which Schræder Van der Kolk arrives is, that these cells which fill the air-vesicles, and constitute tubercles, are only the proper epithelial cells, changed and swollen by the imbibition of plastic matter—perhaps the liquor sanguinis—that has exuded in the cavity of the air-vesicle, and which are finally detached in successive layers from the wall of the vesicle, until its cavity is completely filled by this altered product, or tubercular formation.

Whilst eminent pathologists on the Continent were announcing the views entertained by them, as to the nature and pathological origin of tubercle, several writers in Great Britain were occupied in pursuing inquiries on the same subject. Among the works published in England on Tubercular Consumption, in 1852, were those of Drs. Cotton, Copland, and Ancell. An essay, to which was awarded the Fothergillian gold medal, of the Medical Society of London, "On the Nature, Symptoms, and Treatment of Consumption," was published during this year by Richard Paine Cotton, of London, Physician to the Hospital for Consumption and Diseases of the Chest.

COTTON.

Phthisis, in the opinion of Dr. Cotton, "may be either inherited or acquired; but of its intimate nature our knowledge is very limited."—(Ut supra, p. 2.)

Tuberculosis he regards "as an idiopathic blood-disease," recognised only in its effects. "Tubercular matter is formed in two ways: First, By a gradual and inflammatory separation from the blood; Second, By inflammatory action ending in a morbid scrofulous secretion, instead of a healthy fibrinous one. The first of these is by far the most common." The chemical and microscopical characters of tubercle may be recognised, but of the cause from which it springs, which is in fact the *disease itself*, we are completely ignorant.

With regard to the identity of phthisis and scrofula, Dr. Cotton is of the opinion that they "are but modifications of the same disease."

In the treatment of Consumption, Dr. Cotton advises attention to be given to the earliest manifestations of the disease. In the preliminary stage, or *dawn* of phthisis, good nursing, change of air, particularly to the sea-side, abundance of animal food, with steel and cod-liver oil, are especially recommended.

After tubercles are deposited, daily out-door exercise should be strictly enjoined, together with generous living, a full amount of animal food, as well as ale, or porter, or wine. Tonics, as the different preparations of iron, the mineral acids, vegetable bitters, and cod-liver oil, together with mild counter-irritation of the chest, are appropriate remedies in this stage of the disease.

In the third stage, the principles of treatment should still remain unchanged. Cod-liver oil, steel, and other

tonics, if possible, of a still more supporting kind, with such expectorants and sedatives or opiates as may be required to alleviate the cough.

ANCELL.

In the work of Mr. Ancell, published in 1852, on Tuberculosis (A Treatise on Tuberculosis, by Henry Ancell. London, 1852), the opinion is advanced that phthisis is a blood disease. "The position which tubercle occupies," says the author, "in the various organic structures, is confirmatory of the view taken in this work, of its origin from a morbid blastema, derived from the vitiated liquor sanguinis."—(Idem, p. 122.)

The formative material of tubercle is secreted by the capillary vessels from morbid blood, in a fluid form, the aqueous particles being subsequently absorbed. The tuberculous liquor being exuded, and infiltrated among the tissues, the increase is from the tuberculous blastema, and takes place mainly by the juxtaposition of particles around a primitive nucleus of tubercle, compressing ultimately the vessels and fibres of the part.

That condition of the system which is ordinarily supposed to indicate a predisposition to tubercular disease, is considered by Mr. Ancell to have its origin in, and to be the result of, the blood-disease, and is that morbid state of the system which he calls tuberculosis. This blood-disease is, in every case, the primary departure from health, and always precedes the deposit of tubercle. The plan of treatment recommended by Mr. Ancell in tuberculosis, does not differ materially from that advised by Doctors Bennett and Cotton. As in the case of these physicians, the cod-liver oil is considered

by Mr. Ancell as a most reliable remedy in phthisis pulmonalis.

COPLAND.

Dr. Copland regards tubercle and scrofula as nearly identical. Scrofulous and tuberculous matters are peculiar morbid formations, the product of an altered secretion and nutrition of the parts containing them, arising independently of inflammation, although frequently associated with a modified state of inflammatory action, apparently relieved by their morbid products. The organic nervous system, Dr. Copland believes, receives the first abnormal impression in tuberculosis. It is upon the "organic nervous influence, in the first place, and the circulating fluids in the second place," that primary morbid changes are observed in both the scrofulous taint, and in the more diseased grades of this taint, as manifested by external and internal tuberculosis." Although Dr. Copland considers the blood diseased in tuberculosis, yet he does not regard the affection as being precisely one of the blood; for although the "source of the morbid deposit may be traced to the blood, and to the exudation which takes place from the capillaries, in the seat of lesion," yet he refers all local tubercular diseases primarily to the state of the nervous influence of the part. (Dictionary of Prac. Med., Part XV., p. 750.) In whatever tissue or part of the system this power is most impaired, or most depressed by either external or internal causes, or hurtful agents, in these tissues, parts, or organs, will this primary change of nervous power affect the capillaries themselves, and the exudations from them.

The treatment of Consumption is elaborately consi-

dered by Dr. Copland. The digestive and assimilating organs should receive early attention, and their action should be promoted by the usual means, especially by change of air, by voyaging, by travelling in warm and dry countries, and by attention to the temperature and ventilation of sleeping-rooms. Depletion by bleeding, especially by local depletion, in those cases where vascular action is excited, or the pulmonary circulation is oppressed or congested, is advised by the author. When cachectic or anæmic symptoms are present, the preparations of iron are indicated. Emetics, in the early stage of the disease, are often employed with advantage. External medication, in the form of diuretics, is an important part in the treatment of phthisis. Tonics and cod-liver are recommended for the cough, hydrocyanic acid, henbane, acetate of ammonia, camphor, and appropriate demulcents, and anodynes, are advised by Dr. Copland in the treatment of the disease.

HALL.

In an article, "On the Mode of Development of Tubercle in the Lungs, in Chronic Phthisis," by C. Radcliffe Hall, Physician to the Hospital for Consumption, London, published in April, 1855, the author endeavors to point out the earliest deviation from the healthy state, in the part invaded by tubercle. Tuberculization of the lungs, in the opinion of Dr. Hall, commences as a degeneration of a normal tissue. The deposition of tubercle does not occur all at once, but progressively, increasing at its surface by accretion. Hence certain differences in color and diversity, at the peripheric portion of a tubercle, which is the most recent portion, are visible to the naked eye. Thus if we examine a distinct

tubercle, it will be seen, with the naked eye, that there is an abrupt line of demarcation between the healthy lung and margin of the tubercle; and, employing a simple lens, we shall find the margin of the tubercle appearing irregular, and these irregular processes will be found jutting out into the surrounding lung. The microscope will enable us to perceive that the edge of one of these jutting processes is not the limit of the morbid change; for what, on a cursory inspection, appeared to be healthy lung, is found, under the instrument, to be in reality diseased, but not yet actually tuberculized. Tracing onwards, then, from the healthy lung to the centre of a large crude tubercle, we shall find, as the first abnormal change, the prominent epithelial cells of the air-vessels to become more nebulous, enlarged, and here and there to be studded with oil-dots. As we near the completed tubercle, the epithelial cells become still larger and more fatty. Many of the cells will have no distinct nuclei, their places being occupied by large dots of oil; whilst some of the cells are detached, leaving the wall of the air-vesicle in one part bare, in another coated with compound tubercle cells. These are the preliminary stages of tubercle. At the next stage we arrive at the completed tubercle, consisting of compound tubercle cells, free nuclei, and granules in abundance, with some fatty epithelial cells; all held together by a tough membrane. The deposit is at first confined to the interior of the air-vesicles, but soon the intra-cellular tissue of the lungs is invaded, until the outer tissue of the affected lung becomes the seat of tubercle. The steps of the local morbid process, as described by Dr. Hall, then, are these: "Fatty degeneration," of previously normal epithelium; shed-

ding of this; its replacement by large cells containing several nuclei; shedding of these; their replacement by free nuclei and granules, imbedded in a structureless matrix. Up to this stage the tubercle is intra-vesicular only. The pulmonic fibres are next inclosed and separated by the morbid exudation, and free nuclei and granules are formed between and amongst them. Tuberculization of the lungs is more complete. After remaining passive for an indefinite period, varying from a few weeks to an unknown number of years, tubercles begin to soften. Commencing usually first in the centre of the tubercle, the softening progresses by degrees until the whole changes into a liquid fluid, and the softening is complete.

When a tubercle is fully liquefied, the surrounding lung tissue, if not already so, always becomes inflamed.

These observations, Dr. Hall remarks, refer to the chronic form of phthisis ouly—to that which, insidiously undermining the system, creeps on for some time before it unequivocally declares its presence. It is this form of the disease which commences in its local shape, with degeneration of the epithelium of the air-vesicles; whilst in the acute forms of pulmonary tuberculization, each tubercle commences as an exudation, without previous fatty degeneration of epithelium.

The author leaves untouched the constitutional characters of the disease; and on the management of the affection Dr. Hall remarks, that for the successful treatment of phthisis the indication is, to give tonic and tone; for when tubercles exist, he affirms, whatever their stage, *nature is adequate to their cure, provided there be time enough allowed*, and provided, moreover, fatal allied disease elsewhere does not arise, that a check is put to the

increase of tubercle, that inflammation is kept down, and the strength kept up. "The lungs," he continues, "must be spared by throwing extra work upon the liver and skin, care being taken to maintain these auxiliary organs of respiration in a fit state for duly discharging their vicarious increase of function."

SIEVEKING.

An article, "On the Seat of Pulmonary Tubercle," was published in the "British and Foreign Medico-Chirurgical Review,"* in 1853, by Dr. Edward H. Sieveking, Physician to St. Mary's Hospital, London. In it the author expresses the opinion, that morbid anatomists have hitherto failed in demonstrating with certainty the exact seat of pulmonary tubercle; that the statements of various observers with regard to the intra-vesicular or interstitial character of the deposit have been made more according to the theoretical bias by which they were influenced, than from actual observation.

After making a large number of microscopic examinations of lungs containing tubercular deposit, Dr. Sieveking became entirely satisfied of the intra-vesicular character of the deposit.

While Dr. Sieveking is not prepared to assert that tubercular deposit in the lungs is never interstitial, he is quite inclined to believe that it is never primarily so; and, moreover, that this morbid process is never effected without those local and molecular changes in the vascular system, which are characteristic of inflammatory action, marked, on the one hand, by enlargement and congestion of the small vessels, on the other, by formation

* British and Foreign Med. Chi.-Review, No. 33, p. 370.

of exudative matter in the shape of aggregated corpuscles, or definite exudative cells. (Ut supra, p. 407.) He believes, with Lebert, the tubercle corpuscle to be characterized by the absence of a nucleus.

PAGET.

In a course of "Lectures on Surgical Pathology," delivered in the Royal College of Surgeons of England, by Professor Paget, in 1850, reference is had by the author to the writings of Rokitansky, Virchow, Schræder Van der Kolk, and opinions in regard to the nature of tubercles are expressed by the author, in accordance with the views entertained by these writers. Paget believes that the origin of pulmonary tubercles, in their earlier stage, may be traced to changes in the epithelial cells of the air-vesicles.

The most peculiar character of tuberculous matter is its early degeneration, its abortiveness. It is a material which, after proceeding for a little way in the acquirement of organic structure, then stops in its course, recedes and degenerates, appearing in a shrivelled, granular state of set-free nuclei and cells. These later changes are still further degenerative, proving tuberculous matter to be not only very imperfectly developed, but generally incapable of development.

In the proper softening of tubercle, Professor Paget thinks that this process usually commences at or near its central part. As the stage of degeneration progresses, it becomes liquid, like thin pus, with flakes of grumous particles, in a pale, yellowish, turbid fluid. The usual sequence of the liquefaction is the discharge of the liquid by ulceration of the tissues inclosing it. But if the liquid be retained it may undergo further

changes; its fluid parts are gradually absorbed, and its fatty and calcareous matters increase, till it becomes a dry, greasy, matter-like concretion. The discharge of a quantity of liquefied tuberculous matter, by ulceration through an adjunct bronchus, leaves a cavity or vomica. In these changes the tissues involved in the tuberculous deposits soften, are disintegrated and discharged with them. The tissues bordering a cavity, if these are not tuberculous, may become infiltrated with organizable, inflammatory lymph, which, in its development, may form a tough boundary to the cavity or ulcer, and if fresh tuberculous matter be not deposited in it, may lead to complete healing.

On the subject of the identity of scrofula and tubercle, Mr. Paget remarks: "At present we must be content, I believe, to be sometimes in doubt whether the substance found in lymphatic glands, and commonly known as scrofulous matter, be truly tuberculous matter, or degenerate lymph or pus." In persons of a scrofulous or strumous constitution, both tuberculous products and the varieties of degenerate and withered lymph and pus, are especially frequent. It is sometimes impossible, in the opinion of Paget, to distinguish degenerate lymph and pus from tuberculous matter; and hence scrofula and tuberculous disease are often regarded as the same disease; "but I doubt," the author remarks, "whether it be practicable to make 'scrofulous' and 'tuberculous' commensurate terms, as at present generally employed —the former has a much larger import than the latter."

WILKS.

Dr. Samuel Wilks, in his "Lectures on Pathological Anatomy,"* delivered at Guy's Hospital, in 1857–8, and published in 1859, describes the two commonest and most striking varieties of tubercle, the miliary and yellow tubercle, as being composed, the former of fibres and cells, and the latter as consisting only of irregularly shaped cells, containing fat granules. Dr. Wilks does not agree with Laennec in the opinion that miliary tubercle is the originally found tubercle, and that subsequently it softens into the yellow variety. The two forms he considers as being quite distinct in formation and character; the former, being of a fibrous structure, grows in the cell-wall, until it attains a size sufficient to occupy several air-vesicles; while the soft yellow tubercle is formed in the cells themselves, and appears to approach an inflammatory product in its nature. The author considers it to be still a question how morbid products in parenchymatous organs are formed; whether they are altogether new, like the lymph cells, exuding from free surfaces, or whether they are not essentially normal epithelial cells, originating in the vesicle itself of the lung, but so altered in character as to constitute the true tubercle. The miliary tubercle is slow in its formation. The yellow or softer deposit may or may not be associated with miliary tubercles. The former is often rapidly developed, and is, in the opinion of Dr. Wilks, essentially the morbid product present in true tubercular phthisis; it is the morbid material formed in the cells, and its development is always accompanied, he

* Lectures on Pathological Anatomy. London, 1859.

believes, with these symptoms, and the ordinary disorganizing processes that are observed in Consumption.

TIMMS.

Doctor Godwin Timms, of London, whose work, "On Consumption,"* was published in 1860, enters on the consideration of this subject with the declaration that phthisis arises from a loss of equilibrium between what is added to the tissues, and what is taken away as worn out; that the disorganization of the lung in phthisis is a local effect of the constitutional disease; or, in other words, "that the morbid condition which constitutes Consumption, and which results in the deposit of tubercle, is an exaggerated activity of that part of nutrition called destructive assimilation, by which more atoms of tissues are broken down, dissolved, and absorbed into the blood, than can be expelled by the excreting organs, until the blood becomes so laden with the débris, or detritus of the textures, as to precipitate and deposit it in the form of tubercle in favorable situations." (Vide loc. citat., p. 12.) The blood in phthisis, Dr. Timms affirms, is always overloaded, or, in the language of chemistry, saturated with broken-down, effete atoms of tissue in solution; and that although the blood in health always contains in solution effete atoms of tissue, yet in Consumption it contains more than its usual quantity; and this excess of effete tissue in the blood is due to an exaggerated activity of destructive assimilation, by the agency of which more effete tissue is sent into the current.

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* On Consumption: Its True Nature and Successful Treatment, by Godwin Timms, M.D., Member of the R. C. of Phys. London, 1860.

PART II.

CHAPTER I.

SECTION I.—OF THE ELEMENTARY PARTS.

If now we institute a critical analysis of the views advanced by the different authors whose works we have been considering in the preceding pages, we shall find that much the greater part of them may in truth be regarded as humoro-pathologists, inasmuch as a majority of all the later writers on tubercular phthisis consider the disease as having its origin in a permanent dyscrasia, or a derangement in the constitution of the blood.

On this point Dr. J. Hughes Bennett declares, that most pathologists are agreed that the character of the dyscrasiæ depends upon the condition of the blood. "But," he adds, "here pathologists pause—having once traced these lesions back to the blood, they are content."

Mr. Ancell, after reviewing most of the theories now in vogue, in relation to the essential nature of the disease, expresses the opinion that Dr. Bennett's views, in regard to its true nature, approximate more closely to the real question than those of any other pathologist, ancient or modern. Still he declares that not only the essential nature of the tuberculous state of the blood is at present *unknown*, but that many of the most plausible views that have been promulgated are unsupported by experiment and general observation. Mr. Ancell

himself traces this fatal disease to a primary error or defect in the blood-making process.

Now, I propose to go back of all this, and to show that the blood itself is not the real and primary seat of the tuberculous dyscrasiæ.

But before we can prosecute our inquiries further in this direction, intelligently, it will be necessary to consider briefly, not only a history of the *elementary animal cell*, but the *special histology* of those organic tissues which are believed to be especially involved in the lesions that precede the full development of tuberculosis.

SECTION II.—CELLS, OR ELEMENTARY ORGANS OF ANIMAL TISSUE.

The tissues of all animal organisms consist of minute, perfectly closed vesicles, called elementary cells. These bodies, which are so minute as to be made distinctly visible only by the aid of a high magnifying power, are considered by histologists to be endowed with peculiar vital powers, and to be capable not only of absorption and of assimilation of growth and of multiplication, but of generating almost wholly the higher elementary parts of the fully developed body.

The elementary cell consists essentially of a delicate investment, the *cell-membrane* and *cell-contents*—the latter a fluid containing exceedingly minute molecules, or granules—a cell-nucleus, and inclosed within the nucleus, in fully developed cells, another structure, the so-called *nucleolus*.

The nucleus, one or more of which exist in all cells, may be considered as the life of this elementary body, as it is the part which is the most constantly unchanged,

and which maintains, so long as the cell is endowed with a vital power, its original form.

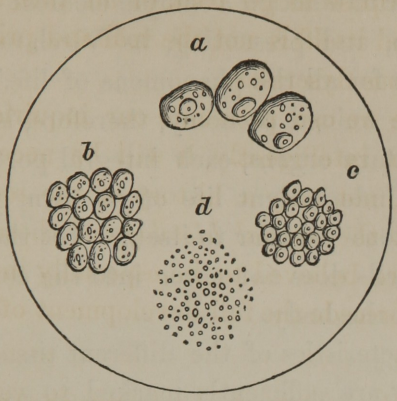

FIG. 1.

a, Specimens of Normal Cells, each cell composed of its membranes and cell-contents; *b*, Isolated Nuclei; *c*, Isolated Nucleoli; *d*, Molecules, or Granules, isolated.

Enclosed within the nucleus are found the same dark molecular granules that are contained in the cell-membrane. The membrane of the nucleus, in its chemical constitution, is nitrogenous, and, although exceedingly delicate, is insoluble in dilute acetic, or mineral acids, whilst the cell-membrane is readily rendered hyaline, or is dissolved by these re-agents. Nuclei also occur independent of the parent cell, and frequently take part in the formation of certain tissues.

Nucleoli are not always found in nuclei. In young cells they are generally absent, and are sometimes wanting in the mature cell. At present, therefore, the nucleolus is not considered to be an essential constituent of the cell. As it is nearly always found in the older and fully developed animal cell, it is considered by histologists as marking the highest degree of cell-development. This cellular element, then, composed of these

constituents, the cell-membrane, the nucleus, and their contents, occurs with great certainty in all animal tissues, forming by combination a simple element of a peculiar conformation, and presenting, as Virchow declares, "a definite basis for all the phenomena of life."

The entire animal economy, therefore, is built up of these elementary organs, each integral portion of which possesses an independent life of its own, performing a series of actions peculiar to itself. Yet the same grade or type of cells does not enter into the composition of all tissues of the body.

The characteristics of the different tissues of the animal economy are sufficiently marked to warrant histologists in arranging them into several divisions; ordinarily, however, all normal tissues may be classified under three different heads.

One group of tissues consists exclusively of cells, that lie in close continuity, and which constitute what, at the present day, is correctly denominated cellular tissue. The second variety is that form in which the cells are separated one from another, by an intermediate substance, termed intercellular matter. Formerly this variety was called cellular tissue, but it is now universally termed connective tissue by modern histologists. It is that portion of the tissue that enters so largely into new or pathological formations.

The third class includes that large group of tissues which belong exclusively to the animal economy. The cells of which these tissues are composed, are of a type entirely peculiar, being those that have reached the highest form of development. They go to compose the blood and its vessels, and the nervous and muscular systems.

The first group of tissues, to which reference has been made, namely, those composed almost entirely of cells, in immediate contact with one another, is quite limited in amount. In the other tissues, which are much more extensive than these, there are found developed large quantities of matter, which, lying between the cells, is denominated *intercellular matter*, and is the immediate homogenous substance which Schwann, and some other histologists, believe to be the material out of which new cells are developed.

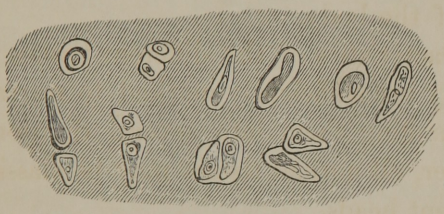

FIG. 2.

Portion of a cartilage from the humerus of a child, showing in the homogenous mass (intercellular substance) the so-called *cell-territories*, over which intermediate matter each cell is supposed by Virchow to have, in addition to its own contents, a superintendence of a certain quantity of matter external to it.—VIRCHOW.

On the other hand, Virchow contends that the intercellular matter is dependent upon the cells; and being divided into definite *cell-territories*, each given district of intercellular substance is ruled over by the cell, over which, in addition to its own contents, the cell exercises the superintendence.

Hence it will be seen that the cell is not only the ultimate element of all tissues and organs, but that each cell, in addition to its own contents, has the superintendence of a certain quantity of matter external to it, and, moreover, as Virchow declares, that "every animal *presents itself as a sum of vital unities, every one of which manifests all the characteristics of life.*"

If, then, histologists are enabled to trace all vital forces to the elementary organs, and to find independent life in each primordial cell, why may we not look for the first morphological change in diseased action, *in the individual cell, or even in the molecular contents of the cell itself?*

CHAPTER II.

HISTOLOGICAL INQUIRIES.

SECTION I.—SPECIAL HISTOLOGY OF THE RESPIRATORY ORGANS.

THE organs of respiration, like the other portions of the animal economy, are composed entirely of the elementary cells, of which a description has just been given.

In referring to the minute histology of organs of respiration, I shall include a description of the *oral cavity*, the *larynx*, the *trachea*, and the *lungs*.

All these parts are lined by a mucous membrane, which is a continuation of the external integument or skin. It is of a pale pink color, in a state of health perfectly smooth, and adheres with considerable firmness to the structure beneath it. In lining the internal cavities of the air-passages, the mucous membrane sends prolongations into the secreting organs, and helps to form the tubes and follicles of the glands.

The essential constituents of the mucous membrane are its *epithelium*, its *basement membrane*, and *connective tissue*. It is abundantly supplied with *mucous glandules* and *lymphatic vessels*.

The epithelium, which covers the lining membrane of the air-passages, consists mostly of a layer of ciliated epithelia. This layer is composed of several laminæ, the superficial one being made up of cylindrical cells, surmounted by cilia, whilst the deeper laminæ are com-

posed of immature cells, and are not furnished with cilia. The cilia appear to consist of delicate prolongations of the membrane of the cell. They are conical in their shape, arising from the cell by a broad base, and gradually taper to their free extremity. According to Valentin, each cell has an average number of from ten to twenty-five cilia. The epithelial cells are all furnished with a distinct nucleus and nucleolus. They also contain a quantity of granular matter, and portions of fat.

The Basement Membrane, placed beneath the epithelial layer, is a delicate structure, homogenous in its nature, which is universally spread over the areolar tissue. It is thin and transparent, and is analogous in its character to the basement membrane of other mucous tissues. In it the deeper portions of the mucous membrane terminate.

The Connective Tissue, situated beneath the epithelial layer and the basement membrane, is a white and yellow elastic tissue, which forms the deepest portion of the mucous membrane. It is called the connective tissue, and in supporting the basement membrane it constitutes that part of the structure in which the blood-vessels ramify.

The follicular glands and lymphatic vessels, with which the mucous membrane of the air-passages is abundantly supplied, being, as I believe, especially involved in the earliest manifestations of pulmonary tuberculous disease, will be carefully examined, and described in their various localities along the aerial membrane.

SECTION II.—ORAL CAVITY.

Oral Cavity.—The *follicular glands*, found in the cavity of the mouth, are both simple and compound in their structure. Lying immediately under the mucous membrane, at the root of the tongue, is a layer of *simple follicular glands.* This superficial layer of follicles extends as far as the base of the epiglottis, and stretches almost uninterruptedly from one tonsil to the other. Each follicle, according to Kölliker, is a small globular mass lying loosely in the sub-mucous tissue, surrounded externally by a fibrous investment, and showing on its free surface a punctiform aperture, which leads into a funnel-shaped cavity. This cavity is filled with a greyish mucous matter, and is lined by a process of the mucous membrane of the oral cavity, with its papillæ and epithelium, and contains between the two linings, imbedded in a delicate, fibrous, vascular matrix, a certain number of large, completely closed *capsules* or *follicles*, which closely resemble the vesicles of lymphatic glands. Indeed, Weber affirms that lymphatic vessels have been discovered proceeding from these glands.

The *isthmus faucium*, or that opening by which the mouth communicates with the throat, or pharynx, is bounded above by the palatine arch, from which depends the *velum pendulum palati*, or the soft palate. The velum palati is a floating membranous septum, which is attached to the margin of the palate bones, and which descends from thence, at the posterior border of the mouth, obliquely downwards and backwards, towards the base of the tongue. It is composed of a dense cellular membrane, and of several muscles, whose office is to stretch or relax this movable septum. One

of these muscles, the *azygus*, descending vertically from the posterior nasal process to the inferior border of the septum, on the median line, helps to form that conical prolongation which is called the *uvula*. The whole is covered by a mucous membrane, which is a prolongation of the palatine membrane, and beneath which numerous subcutaneous mucous follicles are placed. These follicles are especially large and numerous towards the inferior extremity of the uvula. Not unfrequently they become diseased, in affections of the throat, causing a chronic enlargement and elongation of the uvula, with a thickening of its mucous membrane, until in some instances this organ reaches the opening of the glottis, producing constant irritation on the base of the tongue, and at the top of the windpipe.

Continuous with the velum palati, at the lateral parts of the throat, there is, on each side of the posterior part of the roof of the mouth, a fleshy prominence, which, extending towards the base of the tongue, becomes bifurcated in its descent, and forms two vertical eminences, which are composed of folds of the mucous membrane, containing muscular fasciculi. These are called the *pillars of the fauces*. Occupying the angular space formed by the inter-columniation of these pillars, are formed the *amygdalæ*, or tonsillary glands. These bodies are of an oval form, corresponding in size and shape to an almond, from which they receive their name. They are composed almost entirely of a great number of compound follicular glands, aggregated into a hemispherical mass, and held together by a fibrous investment of connective tissue. As in the follicles at the root of the tongue, each separate gland of the tonsil is completely lined by a membrane, with its papillæ and epithelia, and

containing in its cavity the same greyish-white material that is found in the lingual follicles. Like those, also, the follicles of the tonsil are numerously supplied with vessels, which ramify in close and abundant network around the proper membrane of each capsule.

It has been found by the most recent histological investigations, that the *follicles of the tonsils* possess precisely the same structure, but less complex, that is to be found in a *lymphatic gland.* The individual follicles of Peyer's patch, Virchow declares, are "nothing more than a lymphatic gland, spread out, as it were, upon the surface." These, as well as the solitary follicles of the intestines, correspond to the individual follicles of a lymphatic gland; and the follicles of the tonsil, and those of the root of the tongue, or those of the valleculæ, belong, in the opinion of Virchow, to the same category.

SECTION III.—THE PHARYNX.

The pharynx is a musculo-membranous canal, situated between the palatal arch, or the posterior boundary of the oral cavity and the œsophagus, and lying immediately before the upper part of the vertebral column. At the upper and anterior part of the pharynx are the nasal fossæ, opening from above downwards into this cavity, and at its superior and external part are the mouths of the Eustachian tubes. The mucous membrane that lines the pharynx is separated from its muscular layer by a tense fibrous membrane, composed of connective tissue and elastic fibres. In its structure, the mucous membrane of the pharynx has this peculiarity, namely, that whilst the membrane of the oral cavity of the lower half of the pharynx, and of the œsophagus, has a *tesselated* epithelium, the mucous membrane lin-

ing the wall of the pharynx, the posterior surface of the soft palate, the uvula, and the nasal cavity, have a *ciliated* epithelium, like that covering the membrane of the larynx. The pharynx is abundantly furnished with *glands*. In its upper portion, where the mucous membrane is closely attached to the base of the skull, numerous follicular glands, simple as well as compound, are met with. On the posterior wall of the pharynx, a little above the free edge of the *velum*, a dense layer of follicular glands, extending from the opening of one Eustachian tube to the other, and resembling in all essential respects the follicles of which the tonsils are composed, may be constantly found. There occur also, around the opening of the tubes, on the posterior surface of the *velum palati*, on the lateral walls of the pharynx, and below the base of the epiglottis, down into the pyriform sinuses, or sub-tonsillary *fossæ*, numerous small and large follicles, of the same structure as those found at the root of the tongue.

The mucous membrane of the pharynx is plentifully supplied with *lymphatic vessels*.

The lining membranes of the oral cavity and of the pharynx have great numbers of *racemose mucous* glands, which supply through their excretory ducts the secretion proper to the membrane. These have not been described, but they differ essentially from the follicular glands, and the latter are not to be confounded with them.

SECTION IV.—THE LARYNX.

The Larynx.—Highly complicated in its structure, and differing essentially from most other organs of the body —in that it performs two of the most important functions of the animal economy—the larynx becomes to the

anatomist and physiologist, whether viewed in its healthy or morbid condition, an object of the highest interest.

The larynx is a cartilaginous tube, which is placed at the top of the windpipe. Through it is transmitted the air, in its passage to and from the lungs; and within its cavity is placed that delicate structure which forms and modulates the vocal sounds. It commences at the base of the tongue, where it is attached to the os-hyoides, and passing down directly in front of the pharynx, it is connected, by a membranous union, to the first ring of the trachea. To afford protection to the delicate vocal organs, the larynx has a framework, composed of several strong cartilages. Of these the most prominent is the *thyroid cartilage*, which forms the upper and anterior part of the larynx. It is composed of two lateral plates, which, uniting on the median line, at the upper part of the neck, form that prominent angle to which the name of Pomum Adami has been given. Below the thyroid, and forming the inferior boundary of the larynx, is the *cricoid cartilage*. It is of an annular form, irregular in its shape, being much broader behind than it is in front; and it is so connected with the thyroid cartilage that a triangular space is formed, in front, between the two cartilages, which space is occupied by the crico-thyroid membrane. It is at this point that the operation for laryngotomy is commonly performed.

The arytenoid cartilages are two small bodies of a triangular shape. They are situated above the cricoid cartilage, at the upper and back part of the larynx. They are narrow above, and broad at their lower extremities, and when connected together the cartilages present the form of the mouth of a pitcher, whence they are named. The opening between the lips of these

two cartilages is called the superior orifice of the larynx, or the aperture of the glottis. Over it is placed a fibro-cartilaginous valve, to which the name of *epiglottis* is given. This cartilage is of an ovoid form, and of a tissue very elastic. It is placed immediately below the base of the tongue, and above the entrance of the larynx, whose aperture it closes completely, guarding it, like a valve, against the ingress of food, during the act of deglutition, and directing the morsel, at the same time, towards the œsophagus. The upper and larger extremity of this oval body is free; the smaller or inferior one is somewhat elongated, and is attached, by ligamentous fibres, to a notch, in the anterior face of the thyroid cartilage. By its natural elasticity, it preserves ordinarily a vertical position, and its broad margin may often be seen elevated above and overlooking the base of the tongue.

Within the larynx are parts essential to the formation of the voice, which are frequently seriously affected, in diseases of the air-passages. Extending from the arytenoid to the angle of the thyroid cartilage, are two remarkable ligamentous cords, placed one beneath the other, which are called the *chordæ vocales*, or vocal ligaments. The superior cords are semilunar in shape, and consist merely of a duplicature of the lining membrane. The inferior pair are more strongly marked than the others. They are formed of highly elastic and parallel fibres, enveloped in a fold of the lining membrane of the larynx. They are about two lines in breadth, and from half to three-quarters of an inch in length; and they are rendered more or less tense by the action of the small muscles with which they are connected. These ligaments bound a triangular interval, called the *rima glottidis*, and from their connexion with the spe-

cial function of the larynx, are called chordæ vocales. Just above the vocal ligaments, on either side, a cavity of an oval shape is formed, which is called the sinus, or ventricle of the larynx. These cavities, with the vocal ligaments, perform an important part in the formation of the voice. The mucous membrane which lines the interior of the larynx is continuous with that which is described as covering the pharynx above, and with the lining membrane of the trachea below.

There are some peculiarities in the arrangement of the mucous membrane of the larynx worthy of remark. It is known that to the mucous membranes belong but a limited degree of extensibility, and yet they are often found lining cavities, as the stomach and intestines, for example, whose ordinary dimensions are subject to frequent enlargement. This difficulty, namely, a want of elasticity in the mucous membrane, is obviated by this tissue being laid in innumerable folds, or wrinkles, in these cavities. But in the larynx, whose calibre is likewise undergoing constant change in its dimensions, this disposition of the lining membrane would doubtless interfere seriously with the smoothness of the voice. Here the difficulty is met by another arrangement. As the mucous membrane is reflected from the base of the tongue to the anterior or lingual surface of the epiglottis, it forms, upon its front and outer part, three distinct folds, by which a free motion to the epiglottis is allowed, such as a perfect exercise of its functions requires. The membrane then passes downwards, adhering closely to and lining smoothly, the interior or laryngeal face of the epiglottis and the cricoid cartilage. When it reaches the ventricles of the larynx it adheres loosely to these cavities, but over the vocal ligaments it is thin

and adherent, thus presenting a smooth surface, whilst it allows freedom of motion in the expansion and contraction of these important parts of the vocal apparatus. With the exception of the vocal ligaments, the mucous membrane of the larynx is covered throughout by *ciliated epithelium.* It was discovered by Rheiner, and the

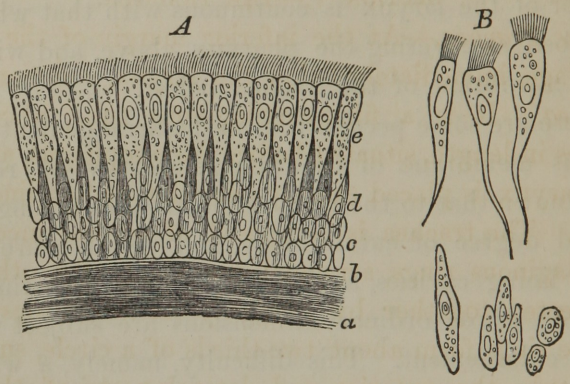

FIG. 3.

Ciliated epithelium from the human trachea, × 350 diam. *A*, *epithelium in situ ; a*, most external portion of the elastic longitudinal fibres; *b*, homogenous, most external layer of the mucous membrane ; *c*, deepest, rounded cells; *d*, middle elongated cells ; *e*, most superficial cells, supporting cilia. *B*, isolated cells from the various layers.

(*From* KÖLLIKER.)

discovery confirmed by Kölliker, that that portion of the membrane which covers the vocal ligaments is lined by a *squamose epithelium.*

The mucous membrane of the larynx is studded with a great number of minute *racemose glands.* On the posterior surface of the epiglottis, near the base, numerous *glandules* are often deeply imbedded in this cartilage. At the entrance of the larynx, in the front of the arytenoidal cartilages, where they form a large aggregate mass, in the ventricles of Morgagni, and also in the cavity of the larynx itself, mucous glandules abound. In catarrhal affections, the *glandulæ* of the

larynx, and of the mucous membrane of the air-passages generally, are not unfrequently greatly enlarged, their vessels becoming filled with minute rounded cells.

The *lymphatics* of the larynx are quite numerous, and their vessels communicate with the deep cervical glands.

SECTION V.—THE TRACHEA.

The Trachea.—At the inferior margin of the cricoid cartilage, immediately below the larynx, commences the *trachea.* It is a fibro-cartilaginous tube, about five inches in length, situated before the œsophagus, and, like the larynx, is placed exactly over the median line of the neck. The trachea is composed of several incomplete cartilaginous rings, arranged one above the other, and connected together by a highly elastic fibrous tissue. These rings form about two-thirds of a circle, surrounding only the anterior and lateral parts of the tube, whilst the open space in the rings, posteriorly, is occupied by a membrane composed of thin bands of muscular fibres.

As the trachea descends into the thorax, it bifurcates just opposite the third dorsal vertebra, sending one of the two branches, which here take the name of bronchi, into each of the lungs. The bronchi, as they penetrate the lungs, divide and sub-divide, very minutely, and transmit their ramifications into every part of the pulmonary tissue. The mucous membrane of the trachea, like that of the larynx, is covered with ciliated epithelium, and differs in no respect from the membrane of the former. Numerous glands exist in the mucous membrane of the trachea. They consist of two forms ; one variety of these glands belongs to the order of minute racemose glands. They are quite simple in their charac-

ter, and are furnished with a single bifurcated extremity. These glands have a very thin wall, which is lined by a columnar epithelium. They are very numerous, being found spread over the entire extent of the mucous membrane. The larger glands belong to the compound order of glands. These are found chiefly on the posterior wall of the trachea, and are more numerous towards the lower than at the upper part of the trachea. They are situated behind the muscular portion, or between the muscular and fibrous coats, and their tubes pass between the muscular fibres, and open on the surface of the mucous membrane.

Each gland is invested by a thin, fibrous sheath, and, according to Kölliker, they have their ducts lined with a columnar epithelium, whilst the gland itself possesses the tesselated pavement epithelium.

The Lymphatics.—The lymphatic vessels of the trachea are quite numerous. They have their origin in the tracheal mucous membrane, and all terminate in the deep cervical glands.

The Bronchi.—As the trachea descends into the thorax, it bifurcates just opposite the third dorsal vertebra, sending one of the two tubes, which here take the name of bronchi, into each lung. They are called respectively from their position and destination, right and left. Leaving the trachea at an obtuse angle, they both enter the lungs at their roots.

The Right Bronchus is the shorter one of the two, being about one inch in length. It takes a course obliquely outwards and downwards from its origin, and soon enters the root of its corresponding lung.

The Left Bronchus is nearly double the length of the right, and its calibre is considerably less than that of

the right bronchus. It takes a course obliquely downwards and outwards to enter the root of its lung. The capacity of the two bronchi taken together is greater than that of the trachea.

The mucous membrane of the bronchi is a continuation of that of the trachea, and in every respect resembles it.

Numerous glands are found in the bronchi, which resemble in every respect those of the trachea.

The Lymphatics.—In the bronchi, near the bifurcation, are found a great number of dark-colored lymphatic glands. They are larger in size than the mucous glandules, and they receive the superficial lymphatic vessels. These are called bronchial glands, but their function is unknown.

SECTION VI.—LUNGS.

Lungs.—The lungs, in their structure, do not differ essentially from the other *racemose glands.* Kölliker describes these as two large compound racemose glands, lobulated in their structure, and consisting of *fibrous* and *mucous membranes*, a secreting *parenchyma*, which is composed of the *bronchiæ*, with their terminations, the *air-cells*, and numerous *vessels* and *nerves*, and an *interstitial tissue* interposed between these parts.

The fibrous or pleural membrane of the lungs corresponds with the peritoneum, and consists of a connective tissue, with a tesselated epithelium.

The mucous membrane lining the bronchi, and their subdivisions, is a continuation of the same membrane that covers the trachea.

The Bronchiæ.—The *divisions* and *ramifications* of the bronchi, which take place after the bronchi that ter-

minate at the root of the lungs, plunge into the latter, are called *bronchiæ*, or bronchial tubes. The bronchiæ being the subdivisions of the bronchi, are in their structure quite like the latter. They are composed of a *fibrous* and a *mucous tissue*, with a smooth *muscular layer*. The *fibrous tissue*, constituted of connective tissue and elastic fibrils, contains the cartilaginous plates of the bronchiæ, and becoming thinner and thinner as it passes down, coalesces finally with the mucous membrane, and by its connective tissue unites the bronchial with the parenchyma of the lung.

The *mucous membrane* is intimately connected with the muscular layer. At first it is of the same thickness as in the trachea, but as it descends into the bronchial subdivisions it gradually becomes thinner, until the minute ramifications have an extremely delicate wall. Throughout the bronchiæ the membrane has a *ciliated* epithelium, which in the larger bronchial tubes is composed of several distinct laminæ, but which is gradually reduced to a single layer of ciliated cells.

SECTION VII.—THE ULTIMATE PULMONARY TISSUE.

That portion of the lung substance included under this head, and known as the ultimate pulmonary tissue, performs a part so important in the progress of the disease we are considering, that I propose to examine still further into its special histology.

The ultimate ramifications of the bronchiæ, or air-tubes, are generally known under the name of *air-cells* and air-vesicles, or pulmonary vesicles. Some recent histologists denominate the terminal vessels of the bronchial tubes, *air-sacs*.

The *air-cells*, then, are those vessels in which the

minute bronchial ramifications end. Not that every final bronchial twig terminates in a single vesicle, but each final division communicates with a whole group of air-cells. These terminations of the air-vessels extend through and into every part of the substance of the lung, and they constitute the ultimate and most important element of the air-passages.

Each single group or set of air-vesicles that radiates from the tip of a bronchial termination, constitutes, so to speak, an independent lung, which is denominated a "lobule," or "lobulette," and this lung in miniature represents the entire arrangement of the whole organ. The entire lung, therefore, is composed of innumerable lobules, aggregated together. The cells of each lobule are arranged side by side, and are to some extent confluent, so that all the vessels belonging to one lobule, in the opinion of Kölliker, Adriani, and several other histologists, communicate together by means of lateral orifices. On the other hand, Dr. Waters, in his late essay on the "Anatomy of the Lungs," affirms that the "air-sacs" are separated from each other by thin membranous walls, and that they do not communicate with each other, except through the medium of the dilated extremity of the bronchial tube, from which each group radiates; and in either view of the question Kölliker is justified in the declaration that *these groups of vesicles correspond to the smallest lobules of racemose glands*, and that "the structure of the lungs does not differ in the least, in any important respect, from the other racemose glands."

Structure of the Air-Cells. — Each air-cell is surrounded by a membranous wall, which is a continuation of the lining membrane of the bronchiæ, and which,

although greatly attenuated, consists of elastic tissue, a basement membrane, and an epithelial lining and numerous vessels.

Elastic Tissue.—The most important element which enters into the formation of the walls of the air-cells is a yellow elastic tissue, consisting of a homogenous matrix of connective tissue and elastic fibres. This elastic tissue is placed immediately beneath the basement membrane of the air-cells, and by its elastic membrane which surrounds the openings, and forms a net-work along their sides, tends to preserve the form of the air-cells, and to give strength and support to their walls. These elastic fibres indeed constitute a very important element in the air-cell. They serve to keep open its orifice, and when compressed to restore it promptly to its original shape, when the pressure is removed.

Basement Membrane.—Besides the elastic tissue just described, the air-cells are lined with a basement membrane, which is a prolongation of that which lines the bronchial tubes. The walls of the air-vessels are composed almost entirely of this membrane, and it is strengthened and kept in position, after entering the cells, by the intervening arches of the elastic fibrous tissue.

Alveoli.—Although the walls of which the air-vesicles are composed are exceedingly thin and delicate, the interior of the cell presents a number of minute cup-like depressions, with membranous walls, slightly raised, which project into the interior of the cell. These shallow cup-like depressions are the *alveoli* of histologists. Rossignol, who first gave to them the term "*alveoli*," states that each air-cell contains from ten to twenty alveoli.

Epithelium.—The lining membrane of the air-cells is covered with a tesselated epithelium; the epithelia of the air-vesicles are small flattened bodies, thin, and almost transparent, with an imperfectly defined nucleus. Resting upon the basement membrane, they form a complete coating to the walls of the air-cells and alveoli.

The epithelial cells in man, according to Kölliker, are readily detached, and they are then found lying free in the air-cells, and in the finest ramifications of the bronchiæ; and in some diseases of the air-passages their elements may become mixed with the bronchial mucus. But it is in tubercular disease of the lungs in which the epithelia of the air-vesicles, as we shall find, perform the most important part.

Blood-Vessels.—The bronchiæ are supplied by one set of blood-vessels, and the ultimate pulmonary tissue receives its nutrition from another vascular system.

The Bronchial Arteries, which are derived from the aorta, or one of its branches, supply the entire structure of the bronchial tubes, and the connective tissue of the lungs.

After supplying the muscular and fibrous coats of the larger bronchi, these vessels are distributed to the coats of the pulmonary arteries and veins, the nerves and lymphatics, and the mucous membrane, and areolar tissue of the lungs, terminating finally by anastomosing at their extremities with the vessels of the air-cells.

The Pulmonary Artery, taking its origin from the infundibulum, at the superior part of the right ventricle, soon divides into two branches, called the right and left pulmonary arteries. The branches of each pulmonary artery, after entering the lungs, divide and subdivide in a way to correspond with the bronchial tubes and

their divisions, so that every bronchial tube has its accompanying artery to its termination. On reaching the lobules, a twig is sent to each secondary lobule, and subdividing into still finer ramuscules, supplies each individual air-cell, terminating ultimately in the fine *capillary plexus*, from which the air-cells and their alveoli derive their nutrition.

Lymphatics.—The lungs are most abundantly supplied with lymphatic vessels. Virchow, in his "Cellular Pathology," says, not only are the lungs permeated by and covered with an unusually abundant network of lymphatics, but that these, with the bronchial glands, constitute almost the greatest accumulations of lymphatic gland substance possessed by any organs in the whole body.

According to Kölliker, the lymphatic vessels of the lungs are divided into two sets, the superficial and the deep-seated. The former running into the connective tissue beneath the pleura, form an angular network, which covers the entire superficies of the lung. Vessels of the superficial lymphatics penetrate the interstices between the larger and the smaller lobules, and, running round their margins, form a fine plexus, which is spread over the surface of the lobules. Branches which result from these meshes penetrate between the lobules, and, passing towards the inner edge and root of the lung, there unite with vessels of the deeper plexus.

The deeper lymphatics are found accompanying, for the most part, the bronchiæ and the ramifications of the pulmonary vessels, passing through the substance of the lung, and through some minute lymphatic glands towards the root of the lung, where they join the superficial set of vessels, with which, and the larger bronchial

glands, they ultimately communicate. Every portion, then, of the lungs, and of their ultimate tissue, is richly supplied with lymphatic vessels, and lymphatic glands. Some of the former, particularly the superficial lymphatics, are very large, larger than those of any other viscus. The lymphatic glands of the lungs are also numerous. They are found situated at the roots of the lungs, in the neighborhood of the bronchi, and also surrounding all the primary divisions of the bronchiæ. Numerous minute lymphatic glands (*glandulæ pulmonales*) are also found throughout the substance of the lung. The larger lymphatic glands receive the superficial lymphatic vessels; the others receive the deep-seated vessels, which accompany the bronchial tubes and the blood-vessels.

The lymphatics are found, with few exceptions, in all the tissues and organs which receive blood, and the lymphatic glands being composed of a network of finely divided lymphatic vessels, around and between which capillary blood-vessels are numerously ramified, the contents of the two systems of vessels are brought into very near relationship.

It is not without a purpose, that I have referred at some length to the special histology of the organs and tissues ordinarily involved in Pulmonary Consumption; since it becomes necessary to know the minute anatomy of an organ, if we would observe the *initial lesion*, or the primary pathological changes that may occur in the tissue of that organ. One of the most important objects in this inquiry, is to trace general tubercular dyscrasia up to its *origin*, and definitely to point, if possible, to the first *morphological change* that takes place; whether that initial lesion be in the tissue

of an organ, or in the primordial cell of that tissue, or in the molecular contents of the cell itself.

In our inquiries we have found the vessels of the lymphatic system to be intimately connected with all the tissues of the air-passages; and as we have proposed to go back of the *liquor sanguinis*, to look for the origin of tubercle, it may be well to refer to the nature of that fluid which is found in the lymphatics, and from which the nutrient materials of the blood are derived; and, in particular, to inquire what changes, if any, have been observed by pathologists, as being occasionally present in the contents of these vessels, in tubercular phthisis.

Lymph.—The fluid which this system of vessels contains is called lymph. It is a colorless or slightly milky fluid, the *resultant* of the processes of digestion and assimilation. The lymph is absorbed by the lymphatics from the tissues in which they originate; it is highly elaborated in numerous ways, but particularly by a vital process through the agency of the lymphatic glandular system.

Each lymphatic vessel as it enters a lymphatic gland divides into many extremely minute ramifications, which are called the *vasa afferentia;* whilst from the opposite side of the gland pass off other similar twigs, forming the *vasa efferentia;* but the precise method of communication between the two sets of vessels, the vasa afferentia and the vasa efferentia, has not been definitely ascertained. In the opinion of both Kölliker and Virchow, a perfect continuity of the lymphatic vessels throughout the glands does not exist. The opinion is generally adopted that the current of lymph is interrupted in the lymphatic gland, the afferent vessel

resolving itself into the parenchyma of the gland, and reconstructing itself out of it, thus forming, according to Virchow, "a kind of filtering apparatus, something like our ordinary sand or charcoal filterers."

But although no apparently free channel exists through these vessels, yet the current of lymph appears to percolate the pervious elements of which the gland is composed, and, trickling out, appears on the other side, in a more or less purified state. Hence, the opinion is now generally entertained by physiologists that the true function of the lymphatic glands is to perfect the organization of the lymph, as this fluid passes through them.

The lymph, whilst it conveys certain substances from the tissues to the blood, brings along with it, at the same time, the corpuscular elements, out of which the blood-cells continually recruit their numbers.

Inasmuch, therefore, as the liquor sanguinis is supplied with the materials for its renovation from the lymphatic fluid, the importance that the lymph should maintain a perfectly normal condition, if we would have the blood preserve its integrity, becomes at once apparent.

Let us now refer to the opinions of a few of the many pathologists, who at different ages have considered tuberculous affections as being more or less allied with changes in the lymphatic system.

The swelling and degeneration of the glands in scrofulous habits was attributed by *Hippocrates* to an excess of lymph, occurring in this disease, and since his time up to the present day, pathologists have occasionally been found who have regarded Consumption as being connected in some way with changes in the quality of the fluid of the lymphatic vessels.

Sydenham, who regarded phthisis as scrofula of the lungs, considered the disease to be dependent upon an acid humor coming from the salivary ducts and glands of the fauces, which being carried through the trachea into the lungs, formed there crude or putrid phlegm; whilst Richard Morton, who published his "Phthiscologia" in the seventeenth century, attributed Consumption to the presence of a vitiated lymphatic fluid capable of generating an unhealthy condition of the blood.

Boerhaave speaks of the chyle being converted into pus, as one of the causes of Consumption; and *Charmetton* supposed the juices of the lymphatic vessels to be vitiated by means of an earthy salt, of a bitter acid nature.

Baumes, as we have seen, believed that he had proved the existence of an acid principle of a phosphoric nature, which by thickening the fluid in the lymphatic vessels rendered it liable to concrete and ultimately to putrefy.

Broussais, who advocated the theory that tubercles are the result of a chronic phlogosis, or inflammation of the lungs, declared that "every pulmonary inflammation when prolonged may determine lymphatic inflammation," and affect thereby the development of tubercles.

Andral, as we have also seen, in the first part of this work, regarded Tubercular Consumption as a disease of the lymph, "simply the result of an alteration of the lymph itself, either spontaneous or caused by a morbid condition of the lymphatic vessels." Andral did not consider tuberculous lymph to be a deposit from the blood-vessels, but an accumulation in the glandular tubes of the morbidly coagulable or inspissated lymph.

Cruveilhier observed lymphatic vessels on the surface

of the lungs, passing on to lymphatic glands, apparently loaded with tubercular matter.

Prof. Hasse, in his "Pathological Anatomy," affirms that *tubercular matter* is very readily taken up, and conveyed by the lymphatic vessels to the nearest cluster of glands. In this process, he observes, "the lymphatic vessels are mere passive channels of conveyance, whilst the elaboration of the received substances would seem to take place within the glands." All heterologous products are endowed, in the opinion of Hasse, with the property of self-propagation, or reproduction, wherever they occur, and after passing through a certain number of changes, cause finally the degeneration and destruction of implicated textures. In this manner the lymphatic glands, he continues, are often seen to constitute an uninterrupted chain from a cancerous tumor. But when tubercle originates in the lymphatic glands, as he affirms sometimes happens, it never spreads, he believes, beyond the next series, as in the case of cancerous degeneration; a gland once engaged, and to a certain extent disorganized, offers a fresh starting-point, for the disease may then march on until the whole organism becomes its prey.

Again, *Prof. Shultz*, as we have seen, believes that ulcerations originate in an imperfect development of the chyle or lymph granules. These granules, which go to form the blood corpuscles, being defective, fail in the production of a healthy blood plasma; and this defective state of the liquor sanguinis vitiates the whole formative process, and gives rise ultimately to irritation and inflammation of the glands, or scrofula.

"Lymphatic vessels," says Ancell, "frequently contain tubercle, the tunics being apparently sound. The tuber-

cle may be conveyed into them by absorption with the lymph, or, according to some pathologists, it may be deposited from tuberculous lymph, without having been absorbed." And, finally, as Mr. Ancell affirms, tuberculosis in its essential nature has been regarded by a host of other authors as some peculiar modification of the lymph.

I shall allude to only one other author, who entertains these views of the nature of the disease. Dr. Wilkinson, in his "Treatise on Scrofula," being an address before the "British Provincial Medical and Surgical Association," in 1852, expresses the opinion, that the proximate cause of tuberculosis is a degeneration of the fluid in the lymphatic vessels.

Among other reasons adduced by the author in the above valuable paper, are the following: Tubercle is a protean compound, which in its chemical characteristics bears close resemblance to coagulable lymph. Dependent upon some abnormal condition of the circulating fluid, or of the tissues, the lymph which the absorbents take up in this disease is imperfect in its kind. The glands, moreover, in which the deposit has been found, present traces of increased vascularity. These reasons, among others, constitute circumstances, says the author, suggesting the inference, that scrofulous matter is a product of inflammation—degenerate lymph.

Many modern pathologists have remarked the striking similarity that exists between the contents of the tubercle granule and those of the lymphatic vessels. Virchow observes that if we compare the abnormal cells of the tubercle granules with some of the normal tissues of the body, we may observe the most complete correspondence between tubercle corpuscles (corpuscles

tuberculeuses) and the corpuscles of the *lymphatic glands*. And this, he remarks, is neither accidental nor unimportant, for was it not known, even of old, that lymphatic glands have an especial tendency to undergo the cheesy degeneracy?

I have now examined with some care and minuteness the special anatomy of the ultimate tissues, of which the respiratory organs and their appendages are composed, and have referred to the histology of the absorbent and lymphatic vessels of these organs, and to the nature of their contents, in order that we may be better prepared to *fix upon* and *identify* the primary lesion, or local manifestation of that dyscrasia, which we designate Pulmonary Tuberculosis.

CHAPTER III.

THESES.

I SHALL now proceed to announce certain *Propositions*, which are based upon views regarding the initiality, or the inceptive pathology of phthisis, and of its true nature. It is upon a decided conviction of the truth of these views—a conviction founded upon a large amount of experience, and of most extensive and careful observations on the histology of tubercular deposits—that the present work has been founded. Entertaining, therefore, the above views, as well as those expressed by Sir James Clark, namely, that "before we can hope to acquire an accurate knowledge of Consumption, we must carry our inquiries beyond the pulmonary disease, which is only a secondary affection;" and believing in the truth of the still more important declaration of Virchow, that "*every dyscrasia is dependent upon a permanent supply of noxious ingredients from certain sources*," I shall endeavor to establish the following important theses:

First, That in most cases of chronic phthisis there are present *preliminary manifestations*; or, in other words, that *a primary pathological condition of certain portions of the tissue system exists*, which is sufficiently obvious to enable the practitioner to detect the approach of the disease it foreshadows, before the occurrence of any tuberculous deposit in the lungs.

Second, That this inceptive pathological state, occurring in individuals having no hereditary taint, constitutes, ultimately, if persistent, the primary development of a scrofulous diathesis, which diathesis may thus become permanently established, and therefore be hereditarily transmitted to others.

Third, That being early possessed of the knowledge referred to in the first proposition, *the physician has it in his power, by the employment of known therapeutical measures, to arrest, in many cases, the further progress of the morbid action*, and thereby to avert the fatal tendency of the disease.

It is many years since the celebrated Abernethy published to the world his treatise, "On the Constitutional Origin of Local Diseases." His views have been pronounced enlightened and philosophical, and perhaps justly so. Certainly they were eminently suggestive, for they contributed more than those of any other writer of that period, to awaken among both surgeons and physicians a spirit of enlightened inquiry with regard to primary diseased action. But the time has arrived when the great work, needed by both branches of the profession more than that of any other, and which perhaps might be termed the converse of that of Mr. Abernethy, is one which shall embrace a full, enlightened, and philosophical history of the "Local Origin of Constitutional Diseases."

CHAPTER IV.

MORPHOLOGICAL CHANGES IN THE TISSUES.

PROPOSITION I.—"*As a continuous ingestion of injurious articles of food is capable of producing a permanently faulty composition of the blood, in like manner persistent disease in a definite organ is able to furnish the blood with a continual supply of morbid materials.*" (VIRCHOW.)

OUR first proposition in the preceding chapter is: That in most cases of Pulmonary Consumption there are present preliminary manifestations; or, in other words, a primary pathological condition of the system exists, which is sufficiently obvious to enable the practitioner to detect the approach of the disease it foreshadows, before the occurrence of any tuberculous deposit in the lungs.

It is more than fifteen years since I first called the attention of the profession to the nature of some of the local morbid processes of certain tissues and organs, and to the chronic dyscrasia effected by their persistence. Whilst occupying the chair of Theory and Practice of Medicine in the New York Medical College, during a period of ten years, namely, from 1850 to 1860, the doctrine of the local origin of certain constitutional impairments was constantly advocated by me before the classes of this Institution. Indeed, the substance of my lectures there delivered, together with a history of my experience during the above and subsequent years, on tubercular phthisis and its

treatment, will be found embodied in the present work.

During several of the first years of my practice in this disease, I, in common with most modern pathologists, regarded tuberculosis strictly as a blood disorder, and phthisis as a local manifestation of such morbid condition of the blood. I still believe that this dyscrasic condition of the liquor sanguinis is present in Consumption, after careful observations, made during many years of practice, in the treatment of many thousand cases of phthisis. I have had the conviction forced upon me, however, that the pathological change in the blood, which is characteristic of tuberculosis, does not have its origin in the liquor sanguinis itself, but that *the blood receives its contamination primarily from definite tissue elements, capable, from pre-existing local disease, of furnishing this fluid with a continual supply of morbid materials;* and of establishing ultimately, that tubercular dyscrasia of the system, denominated "*strumous diathesis*," or tuberculous constitution, or predisposition of the older pathologists.

In our examination of the mucous membrane which lines the oral cavity, the isthmus faucium, and the opening into the upper part of the air-passage, we have found that the entire membrane of these parts is most abundantly supplied with simple, compound, and aggregated *follicular glands.* Grouped together in large masses, these *glandules* form the tonsils; a dense layer of compound follicular glands stretches across from the mouth of one Eustachian tube to that of the other, in the posterior nares; they thickly stud the mucous membrane of the pharynx, on the posterior surface of the velum palati, and are moreover large and numerous in

the valleculæ, at the root of the tongue, on the lateral walls of the pharynx, and below the base of the epiglottis, down even into the *pyriform sinuses.*

It is, as we believe, in the cellular elements of these glandular follicles, which are found in such profusion at the opening, or superior part of the air-passages, and in the intercellular, or the so-called connective tissues of these organs, that *the primary morphological change takes place, in a large proportion of the cases of tubercular disease.*

We have seen that all normal animal tissues are built up, either exclusively of cells, lying in close contiguity, or of cells having more or less of connective tissue intervening. The *glands* of the animal economy are composed almost entirely of epithelial cells. All the really active elements of these organs are, according to Remak, essentially of an epithelial nature. The origin of all glands depends upon the process which histologists call *proliferation.* "At a certain point," says Virchow, "an epithelial cell begins to divide, and goes on dividing again and again, until by degrees a little process composed of cells grows inwards, and, spreading out laterally, gives rise to the development of a gland."* In this way originate the glandular structures of the aerial mucous membrane, and of the digestive tract.

It is, then, I repeat, to the active or epithelial elements of these *glandules*, to which I have referred, that we are to look for the initial lesion in chronic tuberculosis; or the definite point where the "retrograde metamorphosis" in this disease commences.†

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* Cellular Pathology, p. 39.

† Diseases of the Air-Passages.

With regard to the question of the relative vitality of the different cell constituents, or of the entire cell, or to the inquiry, where does action begin? histologists of the present day differ. As we have seen, Virchow and his adherents maintain the doctrine that the cell is really the ultimate morphological element in which there is any manifestation of life; that we must not transfer the seat of real action to any part beyond the cell; and that each cell, to a certain definite extent, rules over the surrounding district of intercellular substance. (Virchow, pp. 3–15. See Fig. 2.) On the other hand, Schleiden, Schwann, of the older writers, and Brown, Brücke, and Bennett, among the more recent histologists, recognise vital forces not only in individual cells, but in cell-contents, and even in molecules, independent of cell or nucleus. Indeed, Prof. Bennett, of Edinburgh, has recently advanced the theory, established on histological and physiological grounds, and supported, as he declares, "by all the known facts of disease and of morbid growth, that pathology, so far from being cellular, is in truth molecular."

Into this inquiry it is not my intention to enter, for, in my opinion, the result is the same, whether the epithelial cells, of which the glandular follicles are principally composed, are abnormally affected in their entirety, or whether the initial lesion takes place in the intracellular substance, or molecular granules. I shall endeavor to state my views with regard to the pathological changes which do take place in these organs, their nature and order, and to show how I have arrived at these views, with regard to the effects that follow in the progress of this local diseased action.

I. That there occur morphological changes in the

glandular follicles of the mucous membrane of the throat, larynx, and trachea, particularly in those composing the tonsillary glands, and in those occupying the pyriform sinuses, and that portion of the posterior wall of the larynx, denominated by some anatomists the posterior glottis—structural lesions, minute at first, but which persisting are productive of extended and important disease—I was able to demonstrate many years ago, in my work to which I have referred.* But I was not then aware, to its full extent, of the positive and important relation which exists, not only between the disease of these minute but numerous bodies, and the development of tubercles in the lung, but likewise between their abnormal secretion, and the dyscrasial condition of the blood, which is present in tuberculosis.

In the disease of the *glandules*, to which we refer, the first *apparent* lesion that takes place is a hypertrophy of the follicle. Not that kind of hypertrophy, or *hyperplasia*, in which enlargement takes place, from a normal increase of size in the individual cells; nor exactly that normal increase which occurs from a multiplication of tissue similar to that of the original part—a growth which histologists style numerical hypertrophy, but it is an *abnormal* hypertrophy, consisting of an increased activity in the process of proliferation on the part of the epithelial elements of the *glandules*, and which is characterized, at the same time, by a *degeneration*, or a retrograde morphological action, occurring in the new epithelial formation, by which *heteroplastic* process, this recently formed tissue is changed into material of an infectious or contagious nature, so far so, as

* Diseases of the Air-Passages.

to be capable not only of inducing the same diseased action in similar tissues in different and distant parts,* but of effecting ultimately, through "a continual supply of morbid materials," a dyscrasic condition in the fluids of the system.

This pathological metamorphosis in epithelial cell-contents, as it is well known, occurs in other diseases. Fatty degeneration of the epithelial cells, in the *tubuli uriniferi*, is constantly present in a certain stage of *Morbus Brightii.* Indeed, according to Virchow, the first thing which can be detected in a kidney affected by this disease is an abnormal enlargement of the individual epithelial cell. Those epithelial cells which are found occupying the interior of the uriniferous tubules not only enlarge, so as to fill up and distend the tubules, but they take on a *cloudy appearance*, become degenerated, and are found on examination to contain only a broken up, granular mass.

In other organs and tissues of the body this lesion of the cell occurs, and, moreover, pathologists of the present day are aware that a large majority of all morbid productions contain cells analogous to epithelial cells.

In the degeneration of the epithelium of the glandular follicles, I have said that the first indication of the abnormal change is a manifest hypertrophy of the glandulæ of the mucous membrane of the throat. Generally those follicles occupying the pharyngeal or posterior nasal membrane, or those composing the tonsils, are the ones primarily diseased.

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* This corresponds with the declaration of Hasse, that all heterologous products are endowed with the faculty of self-propagation, or reproduction, wherever they occur.

Dependent upon some abnormal increase in the vascularity of the parts, or, it may be, some chemical change, a rapid multiplication of the epithelial cells, by division, takes place, the follicle becomes *hypertrophied*, followed by a *pathological metamorphosis*, or degeneration of the cell-contents, which abnormity is probably brought about by a deficiency in the *quality* and *quantity* of the nutritive materials afforded to the cells.

The cause of this degeneration of the cell-contents is not well known. Morphological changes in cells, according to Schwann, may be effected by a difference of the growth in the cell-membrane, or by causes of a chemical nature. Inasmuch as this departure from a normal condition of the epithelia of the follicles occurs earliest, almost invariably, as we have seen, in those crypta which are most constantly exposed to external influences; as, for example, in the *glandulæ* of the post-pharyngeal membrane, in those of the posterior nerves, and in those composing the tonsils; atmospheric influences, or influences of a chemical or of an irritating nature, are manifestly foremost among the causes which are prominent in effecting this morbid change.

To whatever cause, however, this change or alteration in the elements of tissues may be referred, whether to the influences named, or to one of an inflammatory nature, as some believe, one result takes place—the follicles themselves become distended, by the abnormal prolification on the part of the epithelial elements. In some instances the distended follicles burst, but ordinarily they discharge their contents through their excretory ducts upon the surface of the mucous membrane; and in this way the diseased action is communicated from one follicle to another, until at length the glandu-

lar structures, found studding the lining membrane of the larynx and trachea, are affected; and in many cases those even of the entire bronchial tubes become involved in the diseased action. If, under these circumstances, the patient has been born of phthisical parents, or if he possesses in any degree hereditary tendency to the affection, or acquired tendency thereto, or other favoring circumstances are present, tuberculous disease of the lungs is quite sure to be developed early. But this local degeneration of the glandular organs of the mucous membrane, occurring in certain other cases, instead of phthisis being rapidly developed, we may have that condition of the system inaugurated to which I have alluded in my *Second Proposition*, namely:

"*This inceptive pathological state occurring in individuals having no hereditary taint, constitutes ultimately, if persistent, the primary development of a strumous diathesis. This diathesis, or dyscrasia, may thus become established, and be thereafter hereditarily transmitted to others.*"

Very wide, it is true, are the differences of opinion that are entertained by pathologists with regard to this most important question—that of hereditary transmission of tuberculosis. Whilst many deny hereditary transmission altogether, there are those who maintain that the disease is always hereditary. But, although statistical records on the subject are as yet limited and imperfect, the majority of pathologists maintain the opinion that an hereditary "proclivity," or a predisposition to the disease, may be transmitted from parent to offspring. "That the tuberculous constitution," says Sir James Clark, "is transmitted from parent to child is a fact not to be controverted." (P. 169.) Yet Dr. Clark

has frequently noticed, as he says, a strong disposition to scrofula in the children of those who enjoy what is usually termed good health, and in whose families no scrofulous taint can be traced. "Remarkable examples of this kind," observes the same high authority, "have come under my observation, where whole families have fallen victims to Tuberculous Consumption, while the parents themselves enjoyed good health to an advanced age, and were unable to trace the existence of the disease in their families for generations back." (P. 171.) Every observant and intelligent physician has repeatedly met with similar instances, where children at an early age have presented the characteristics of a strumous diathesis, whilst the parents were in the enjoyment of good health, apparently, and free from all appearances of tuberculous disease. And, still more, practitioners are constantly observing instances in families where the older children are quite healthy, and the younger are the subjects of tuberculous disease.

Where tuberculosis is once acquired by the individual from any cause, or its existence is established in families, the disease may be, and undoubtedly is, hereditarily transmitted from parent to offspring. The experience of most practitioners, and, so far as these go, all statistical records, are decidedly confirmatory of the presence in certain families of an hereditary proclivity to the disease. But there are individuals and families apparently exempt from this undue constitutional vulnerability. Yet in such as these we find tuberculosis occasionally developed. How are we to account for this, or for the frequent occurrence of such phenomena as those observed by Sir James Clark, and others we have named above?

Many such instances have come under my own observation, in which both parents have enjoyed an ordinary degree of health, in whose families no tuberculous taint was known to have existed through many previous generations, yet have the children of such parents presented unequivocal signs of a tubercular diathesis. In some such families as I have just described, all the children have been found to exhibit more or less of indications of struma ; in others only a part of the offspring would thus be affected, and that part ordinarily the younger members of the family. I have now the records of several hundred such cases, in all of which careful inquiries and observations have been made, and in every instance of these families it has been found that one or both parents had been the subjects of *chronic folliculitis*, during a portion or most of their lives, the abnormity being manifested in some instances by symptoms of a *catarrhal nature* only, or perhaps by the presence of an "irritation" more or less persistent, and located apparently in the posterior nares, in the pharyngo-laryngeal region, or in some other portion of the throat of the person affected.

In another class of cases, the diseased action progressing, the symptoms will appear altogether more pronounced, the patient showing positive signs of laryngeal or bronchial disease, and, in a less number of cases, those ultimately of tubercular degeneration ; although in a certain number of instances the tuberculous diathesis may not be fully developed until the third generation.

Having watched the progress of the morbid process to which I have alluded, in a very large number of cases, I have, for many years, been fully persuaded that it is after this manner that a tuberculous dyscrasia is

ultimately developed in many individuals, and finally established in families, with whom originally there existed no hereditary taint. An individual becomes the subject of chronic folliculitis; the vitiated excretion of those *glandulæ*, which are primarily diseased, is not only conveyed by continuity to other adjoining follicles, but the same *materies morbi* being poured out on the surface of the mucous membrane, are taken up by the absorbents, and are conveyed into the circulation by the lymphatic vessels, with which, as we have seen, the entire mucous membrane of the air-passages is abundantly supplied.

It is in this way, we believe, that the process begins, and is perpetuated, by which the liquor sanguinis is furnished with a *continual supply of morbid materials*, and that dyscrasia is finally established, which pathologists style the tuberculous constitution, or scrofulous diathesis—a dyscrasia, I repeat, not dependent upon a contamination originating in the blood, but one which, so far as this fluid is concerned, is secondary, and derived from definite points, in tissues or organs more or less remote.

Independent, therefore, of the above *imperfection* or degeneration, in cellular elements of the tissues, the positive evidences of the hereditary transmission of the actual scrofulous or tuberculous diathesis to offspring have been, in my experience, very few, and of a character not to be depended upon.*

It is a too general belief in the presence of an original

* M. Louis, who examined many patients, as he says, with "extreme care," in reference to the question of hereditary influence, declares thus: "It follows in reality that I have observed nothing decisive in favor of the hereditary character of phthisis."—(Researches on Phthisis, Syd. Ed., p. 483.)

change in the blood, of the former kind, that has rendered medical men, says Virchow, "most apt to console themselves, especially for the short-comings of the therapeutical results, with the reflection that they have to do with a deeply rooted and incurable dyscrasia." "Now, I demand for cellular pathology," says this author, "nothing more than that this view—which must be admitted to be true in the case of the larger secreting organs—be extended also to the smaller organs, and smaller elements; that, for example, they be admitted to possess the power of deriving from the vessels nearest to them (not always indeed directly, but often by transmission from a distance), in accordance with their several requirements, certain quantities of material; and, again, that after they have taken this material up, they be held to be capable of subjecting it to further changes within themselves, and this in such a manner that they either derive therefrom new matter for their own development, or that the substances accumulate in their interior, without their reaping any immediate benefit from it; or, finally, that after this imbibition of material, even decay may arise in their structure, and their dissolution ensue." (P. 129.)

CHAPTER V.

NATURE AND PROGRESS OF THE TUBERCULOUS DYSCRASIA.

Under the head of our third proposition we shall be able to adduce a multitude of facts, and recorded observations, tending not only to establish the truth of the local origin of the tuberculous dyscrasia, but also the doctrine that this inceptive pathological state, occurring in individuals having no hereditary taint, constitutes ultimately the primary development of a scrofulous diathesis — one which may become permanently established in the individual, and afterwards be hereditarily transmitted to the offspring.

But I shall now endeavor, in the first place, to delineate with more particularity the *nature* and *progress* of the tuberculous dyscrasia, which, as I claim, has its origin in the cellular elements of tissues.

In our examination into the special histology of the respiratory organs, it has been found—

I. That all the tissues of these parts are composed, like the other portions of the animal economy, of elementary cells; that the mucous membrane lining the air-passages is covered with a layer of epithelial cells, which in some parts, as in the trachea and in the larger bronchial tubes, is composed of several distinct laminæ; that the *glandulæ* which go to form the tonsillar glands, and those which are found studding numerously the entire membrane of the air-passages, are made up, to a

large extent, of epithelial cells; whilst in the finer bronchial ramifications, in the air-vessels and in the alveoli of the lungs, the epithelial element, in some of its forms, constitutes a complete coating to all their walls.

II. That intimately connected with the glandulæ, and with the whole mucous membrane of the air-passages, lymphatic vessels are found in great abundance. Commencing in the oral cavity, where the capsules and follicular glands themselves are said closely to resemble lymphatic vessels, the absorbents are found everywhere in connexion with the membrane and its glands.

In the larynx and trachea the lymphatics have their origin in the mucous membrane of these parts, and their vessels communicate with the deep cervical glands; whilst in the lungs their entire superficies are not only covered with an abundant network of lymphatics, but their vessels permeate every portion of the lung substance, penetrating, according to Kölliker, the interstices between the larger and smaller lobules, and, running round their margins, cover with a fine plexus the surface of the smallest lobule, so that every portion of the lung, and of its ultimate tissue, is supplied with lymphatic vessels.

III. Equally intimate is the connexion, through the capillaries, between the *vascular system* and the epithelia of the above tissues.

Minute blood-vessels pass through the fibrous coat of the follicular glands, and not only form a close network immediately upon the glandular membrane, but they penetrate the interior of the follicle, and form minute ramifications; and as numerous *efferent veins* are found to converge from points around the follicle (see Kölliker II., p. 30), we have a union exceedingly intricate

but perfect, between the interlacement of the transuding glandular membrane, on the one hand, and the capillary blood-vessels, on the other.

In the lungs, also, the pulmonary artery, after dividing and subdividing in a way that every bronchial tube has its accompanying artery to its termination, sends finally, on reaching the lobules, a twig to each secondary lobule, which subdividing into still finer ramuscle, supplies through a *fine capillary plexus* each individual air-cell, and its epithelia, with a circulation from which the air-cells and their alveoli derive their nutrition.

Thus we find that a most intimate relationship exists not only between diseased cellular elements of tissues, and the contents of lymphatic vessels, but between these and the circulation of the blood.

It will be seen, moreover, that we have a direct chain of connexion, or mode of conduction, between the "foci" of the disease (a disease which has its origin in cellular elements of tissues), and distant vital organs—a mode by which disintegrated elements, or their morbid juices, may be transferred from the original seat of the diseased action, and cause the infection not only of similar tissues of remote parts, but of the circulating fluid. It is in this way, I believe, that the blood in many cases becomes the apparent seat of a tuberculous dyscrasia. But it is only apparent, for the faulty composition *of the blood is dependent upon a long continued supply of noxious ingredients which are brought from certain definite tissues, remote from the sanguiferous circulation.*

But the most important channel or mode of communication is the one by which the morphological elements,

or the "ichrous juices" are conveyed, not only from one follicle to another, along the aerial mucous membrane, but by which, as we shall hereafter find, the epithelia of the air-vessels, and of their alveoli, are finally reached and infected.

In the way to which we refer, the conveyance of the morbid material is effected in the same manner that cancer-cells are transfused through lymphatic channels in the propagation of malignant disease. As, for instance, in cancerous disease of the mamma we find, after a time, the virulent matter being conveyed along the lymphatic vessels to the axillary glands, which also become cancerous; and still later, the group of glands next in succession, until at length the whole economy becomes infected, through the hurtful ingredients absorbed from the breast.*

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* That the blood should become contaminated through a persistent course of pathological exudation and absorption, even from a comparatively small portion of diseased tissue, we shall not be surprised, when we remember the large amount of fluids which daily find their way into the circulation through the normal processes of imbibition and exudation; or, as those processes are styled in modern physiology, *endosmosis* and *exosmosis*.

The following table, taken from Professor Dalton's late work on "Human Physiology," and calculated for an individual weighing one hundred and forty pounds, will show the activity with which the processes of absorption and exudation are constantly going on in the human body:

SECRETED AND RE-ABSORBED DURING TWENTY-FOUR HOURS.

Salvia, ...	20.164 grains, or	2.880 pounds.
Gastric Juice, . .	98.000 grains or,	14.000 pounds.
Bile, ...	16.940 grains, or	2.420 pounds.
Pancreatic Juice,	13.104 grains, or	1.872 pounds.
Lymph, . . .	27.048 grains, or	3.864 pounds.
		25.036.

"A little over twenty-five pounds, therefore, of animal fluids transude through the internal membranes, and are restored to the blood by re-absorption, in the course of a single day." But it is in the glandular organs of the system, pathologists

Although, as Mr. Ancell observes, the lymphatic temperament has been regarded from the earliest ages, sometimes as the first degree of tuberculosis (scrofula)—and at others as an unequivocal and very influential predisposing cause of scrofula and phthisis, yet we possess no accumulated table of observations or facts to prove conclusively that a morbid condition of lymph is constantly present in all or in any stage or variety of tuberculosis. Still, there are many facts in the history of tuberculosis, Mr. Ancell declares, "which bear upon the conclusion, that the *lymph must be unhealthy in every grade of the disease.*"

Indeed, eminent pathologists of almost every age, as we have shown, from the days of Hippocrates to the present time, have maintained the opinion that tuberculous affections are intimately allied with changes in the lymphatic system.

Numerous facts and recorded observations, which will be brought under notice in considering our next Proposition, will tend still further to establish the views I have advanced, namely: That *persistent disease, in the cellular elements of definite organs, is able to furnish the blood,*

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affirm, that the processes of absorption and transudation take place with the greatest rapidity. Bernard, as stated by Professor Dalton, in the above work, "injected a solution of iodide of potassium into the duct of the parotid gland, on the right side, in a living dog, and immediately afterwards found iodine to be present in the saliva of the corresponding gland on the opposite side." In an experiment instituted by Dr. Dalton, the parotid duct was exposed and opened, upon one side, in a living dog, and a canula inserted into it, and secured by ligature. The secretion of the parotid saliva was then excited, by introducing a little vinegar into the mouth of the animal, and the saliva thus obtained found to be entirely destitute of iodine. A solution of iodide of potassium being then injected into the jugular vein, and the parotid secretion again immediately excited by the introduction of the vinegar, as before, the saliva first discharged from the canula showed evident traces of iodine, by striking a blue color on the addition of starch and nitric acid.

through the lymphatics, with a continual supply of morbid materials, establishing ultimately thereby that morbid condition of the system, or dyscrasic constitution of the fluids, which pathologists are accustomed to comprehend under the term predisposition, or scrofulous diathesis.

CHAPTER VI.

EARLY SYMPTOMS OF CHRONIC PHTHISIS; OR, TUBERCULAR DYSCRASIA.

In the primary manifestation of the tubercular dyscrasia, commencing, as I believe it does, in a deterioration, or a degeneration of the epithelial element of the glandulæ of the aerial mucous membrane, the steps of the morbid process may be briefly summed up as these:

I. Dependent upon some chemical change, or perhaps upon an increased vascularity of the tissues involved, we have, in the first place, an abnormal increase in the number of those epithelial cells, which are found occupying the interior of the aerial mucous *glandules*. The individual cells themselves enlarge, producing a distension of the follicle; and they are found on examination to have assumed a *nebulous appearance*, which can be detected readily by the naked eye. Still later, upon microscopic examination, the cells are found to have become degenerated, or are broken up into a granular mass; and this disintegrated matter has assumed a character essentially contagious in its nature, for it is soon perceived that related cellular elements of neighboring parts have degenerated in the same way. That is, if the heteroplastic proliferation has commenced in the epithelia of follicles situated in the posterior nares, or on the posterior part of the pharyngeal membrane, parts most likely to be primarily affected, we shall find, sooner or later, that those follicles, of which the

tonsillar glands are composed, or those occupying the membrane lining the pyriform sinuses, or both, will become *similarly affected.* Now, if the pathological degeneration be not arrested in these localities, we then have, at a still later period, the follicles of the laryngeal and bronchial mucous membrane involved in the morbid action, and then there is established that most frequently recurring affection, denominated follicular bronchitis.

II. But not only do we have the infection transferred, in this way, from the original seat of the disease to the cellular elements of all these neighboring tissues, but through those channels, to which we have made frequent allusion, the anastomosing vascular capillaries, and absorbent or lymphatic capillaries, we now find that the blood is being furnished, from the persistently diseased numerous cellular elements, with a continual supply of morbid materials, *by which a permanently faulty composition, or a tuberculous dyscrasia of the liquor sanguinis, is positively effected.**

III. The dyscrasia thus established in an individual is not always followed, as I have intimated in a former chapter, by the development in the lungs of the individual of the tubercular disease. It may continue through many years as a chronic bronchial affection, particularly when the disease occurs in persons having no hereditary tendencies, or when occurring in those who have passed the middle period of life. In such it is

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* All this confirms the opinion of Prof. Hasse, who believes that all heterologous products are self-propagating; and that of Virchow also, who declares that all formations, which are the result of heterologous proliferations, have essentially a "contagious character." (P. 58.)

often attended through years with an abundant expectoration, and is a disease, moreover, from which recoveries sometimes take place. In much the larger proportion of cases, however, tubercles are sooner or later developed in the lungs, even in persons more or less advanced in years; for the older the individual may be, the less liable is he to have a deposition of tubercles take place. Nor is it strange if, under this condition of things, pulmonary tuberculosis should be developed; for, if the views we advocate be founded in true pathology, we not only have a permanent or chronic tuberculous dyscrasia of the blood, established through a long continued supply of morbid materials, furnished to this fluid, but we have the disease diffused ultimately through the lymphatic channels, as we have seen, to all the epithelia of the bronchi, and of their ramifications, and finally to those lining the air-cells, and their alveoli.

In all these cellular tissues, wherever the ichorous juice has been transferred from the original seat, the diffusion of the infectious material is followed, first, by a greatly increased proliferation of the epithelium, and finally by a disintegration of the epithelial element; involving, moreover, through anastomosing elements, the adjacent connective and other tissues, *and forming thereby the tubercular infiltration of Laennec, and other pathologists, and the tubercular corpuscles (corpuscules tuberculeux) of Lebert.**

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* On this subject Virchow remarks: "If the development of these (tubercle) corpuscles be investigated, it is easy to convince one's self that, wherever they occur, they arise out of previous organic, morphological elements, and that they are not, by any means, the first bungling product, unfortunate essays of organization, but that they were once well-grown elements, which by an unhappy change were early checked in their development, and early succumbed to a process of shrivelling. You may with certainty assume," he adds, "that where you meet

We must then conclude that the morbid deposit, or disintegrated matter, found in the lungs in phthisis, and known as *tubercle*, is not a new formation; nor is it derived from a specific formative fluid, secreted, as some pathologists suppose, from the capillary vessels of the lungs, but it is composed of the *disintegrated* matter, the *débris* of former, well-organized epithelial cellular elements of mucous membrane, and cells of other tissues.

Among the *Theses* I have announced in a former chapter of this work is the one which is laid down as our *Third Proposition*, namely:

"*That the physician, being early possessed of the knowledge referred to in the first proposition, has it in his power, by the employment of known therapeutic measures, to arrest in many cases the further progress of the morbid action, and thereby to avert the fatal tendency of the disease.*"

That knowledge, to which a reference is here made, consists in an acquaintance with those preliminary manifestations, or pathological conditions of the system, or of a part of the tissues of the system, which, I affirm, are present, and which precede, in many instances, the occurrence of any tubercular deposit in the lungs.

Let us, then, for a moment, inquire what are the universally admitted "EARLIEST SYMPTOMS OF TUBERCULOUS PHTHISIS," as understood by systematic writers?

Laennec, although he considers the disease under several different forms, or varieties, declares that the ordinary form, or "distinct and manifest phthisis, fre-

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with a largeish corpuscle of this description a cell has previously existed, and where you find a small one there once has been a nucleus, inclosed perhaps within a cell."

quently begins with a slight, dry cough, which might be readily mistaken for the effect of a dry catarrh." That kind of cough, he continues, which may last several months, or sometimes even several years, without any other accompanying symptom, but ordinarily a more or less abundant mucous expectoration, and a constant state of feverishness supervene.

Under the head of Diagnosis, in the first period of phthisis, Louis remarks that "in the majority of persons the *cough* originates without appreciable cause, while they still appear in the enjoyment of perfect health; and in a fair number of cases, one, two, three, four, five weeks, or more, elapse before it is attended with expectoration. The dryness of the cough, and the absence of appreciable cause for its existence—conditions so rare in essential pulmonary catarrh—are in themselves calculated to afford motive for suspicion as to the true nature of the affection.

"Whether *expectoration* occur at the outset of the cough, or at a more or less advanced period of the disease, the sputa are at first clear, frothy, and white, and retain these characters for a period of variable length."

"Percussion of the chest," he adds, "often gives natural results during part of the period under consideration. Whatever be the attention with which the process of percussion be conducted—and it always requires a very considerable amount of care in its performance—the chest is often found perfectly and equally sonorous under both clavicles. And this perfectly natural condition of the sound may continue for a long time, without justifying us in drawing from it any inference as to the non-existence of tubercles; for if these productions be slowly developed, if they be scattered over a considera-

ble surface, and to about the same extent in the right and left lungs, the chest will necessarily continue sonorous, and sonorous to the same degree under both clavicles, for a considerable length of time. But sooner or later the sonorousness under the clavicles diminishes. When the diminution is the same in amount under both clavicles—a rare condition of things—the reality of its existence may be considered ascertained, if percussion, practised one and a half or two inches below the clavicle, give a much clearer sound than immediately above. But, as I have this moment said, such a condition of things is by far the rarer of the two possible ones; the amount of sonorousness is commonly different under the two clavicles, and this difference, whatever be its degree, denotes of itself, quite independently of the symptoms so far considered, the existence of a morbid state of the apex of one of the lungs. Now, as it is in this situation that the development of tubercles commences, our first suspicions naturally turn to phthisis, as the source of the difference referred to.

"Unequal sonorousness of the infra-clavicular regions may be the result of old-standing pleurisy (which has entailed contraction of one of the sides of the chest), or of vesicular emphysema of one of the lungs. But comparison of the results of percussion and auscultation will remove all such doubts; for if emphysema exist, the respiratory murmur will be found feeble on the most sonorous side, whereas if the decrease of sonorousness depend on an old-standing pleurisy, with contraction of the walls of the chest, the diminished force of the respiratory murmur will be detected on the same side as the diminished sonorousness. And the feebleness of the respiratory murmur is uniform, or nearly so, in the lat-

ter case, which is not the fact when dulness of sound depends on the presence of tubercles."

"Auscultation, like percussion," he adds, "may be incapable of leading to any positive result, even in cases wherein the general symptoms, and those already enumerated, leave but little doubt as to the existence of tuberculous disease."

"With the more common or general form of Consumption," says Sir James Clark, "cough is generally the earliest symptom by which tuberculous disease of the lungs is indicated; but it is for some time so slight as scarcely to deserve the appellation, consisting of little more than one or two imperfect efforts to cough. It is first observed in the morning, after getting out of bed. After a longer or shorter period, it occurs occasionally during the day, especially after any exertion which hurries the breathing; and also at night, on getting into bed. By degrees the morning cough is accompanied with the expectoration of a transparent ropy fluid, resembling the saliva, and apparently originating in the posterior fauces."

The physical signs of this early stage of tuberculous disease are admitted by all pathologists to be very obscure.

"Unless," says the above author, "there is an obvious difference between the sounds heard in the relative situations on the opposite sides, the signs afforded by auscultation are not much to be depended on, at this early stage; and in many cases we have to form our opinion of the patient's condition from the local and constitutional symptoms only." Are we not, therefore, justified in the declaration, made in the early part of this work, that it is not till the antecedents have given place to the

consequent—not until the morbid product has to some extent blocked up the air-cells, that the physical signs which constitute the only positive evidence of the presence of tubercular disease of the lungs, are sufficiently evident to disclose to us the true nature of the malady?

"Hence it is," says a late writer on this disease,* "that if we wish to comprehend the nature of Pulmonary Consumption, as a first step to a rational in place of an empirical plan of treatment, we must acquaint ourselves with the origin, nature, and cause of the deposit in the lung; we must look at the lung, at its nearest remove from health, rather than when disorganized by months and years of disease; we must turn our attention to the first manifestation of the local disease, to the commencing atoms of tubercles, and the laws of their development, rather than to ravages which are disclosed by examination after death."

I have referred to these early symptoms of chronic phthisis—admitted to be such by most pathologists—for the purpose of showing that they are almost precisely those that we generally find to be present in the forming stage of that follicular degeneration of which we are treating. All our best and most experienced writers on the symptomatology of Consumption, therefore, are agreed in this, that the approach of this fearful malady is often so silent and insidious that the detection of the disease, in its forming stage, is frequently attended with the greatest difficulty, whilst there is no other in which early detection is of more importance. But we have declared, in our first proposition, that in

* Godwin.

most cases of chronic phthisis there are present preliminary manifestations which are sufficiently obvious to enable the practitioner to detect the approach of this disease *before* the occurrence of any tubercular deposit in the parenchyma of the lung; and consequently to enable him, in a large proportion of cases, to avert the deplorable result.

CHAPTER VII.

SECTION I.—PRIMARY SYMPTOMS OF TUBERCULOSIS.

In my work on "Diseases of the Air-Passages," under the head of Follicular Disease of the Pharyngo-Laryngeal Membrane, I have described briefly the primary symptoms which mark the commencement of deterioration in cellular elements of tissues and organs, the ultimate tendency of which is to establish, in the way which has been pointed out, the tubercular dyscrasia in the fluids of the system, and a deposit of a tubercular character in the lungs.

This peculiar affection *invariably* commences in the glandulæ of the superior portion of the aerial membrane. In the nearly ten thousand cases which in the last twenty-five or thirty years have come under my notice, I have observed not a single instance in which the evidences, if not in favor of, were against this declaration. With emphasis, then, would I repeat to the profession the assertion I have made, that the primary manifestation of this abnormity is not only sufficiently obvious to enable the practitioner to recognise its presence, but that the malady, in this its initial stage, is, in a large proportion of cases, positively amenable to appropriate therapeutic measures. In this connexion I will allude to another equally constant and equally interesting pathological fact. In nearly all cases of persistent disease of the glandular element of the mucous membrane, the follicles of which the tonsillar

bodies are composed become, sooner or later, as we have seen, involved in the cellular degeneration. In most cases, one of these bodies will become implicated before the other. Whichever one it may be that becomes primarily affected, whether the follicles of the right or of the left gland, if the affection continues until the lungs are reached, it occurs *invariably* that the lung *corresponding* with the affected gland is *the one in which tubercles are first deposited.* This pathological fact was observed and noted in cases coming under my observation, until upwards of one thousand examples were tabulated, in which this correspondence existed, when the record was omitted. And these, and the recurrence of many similar illustrations since, have led me to consider the presence of this consequent, as an established axiom in the pathology of the disease.

The appearance of the diseased follicles, and the symptoms presented by this complaint in its early stage, have been so often and so well described by other writers, since the publication of the work to which I have alluded, that it will be unnecessary here to give a very extended history of the primary manifestations of the diseased action. I shall, therefore, confine myself to a brief description of the morbid appearances at the onset of the affection.

So insidious frequently is the approach of the malady, and so gradual is its progress, that in many instances it will be found to have continued months, and even years, and to have made considerable advance before the appearance of any prominent local symptom will have called the attention of the patient to the existence of the affection. Not unfrequently the friends of the patient will be the first to notice the indications of irri-

tation in the throat, having observed his frequent attempts at "hemming and hawking," as if to clear the passage of phlegm; or there may be an effort made by the patient to overcome, by the act of deglutition, this sensation of "something sticking at the top of the windpipe."

In their normal state, the glandular structure of the fauces and larynx is not in an enlarged condition, at least not so much so as to become apparent to the sight, but sooner or later, after the mucous follicles have taken on this morbid action, of which I have spoken, the glandular follicles situated at the posterior part of the pharynx, appear hypertrophied, standing out in some instances on a slightly red or inflamed membrane, which often seems deprived of its epithelium—so as to appear quite prominent, those especially which are found at the sides, and those studding the upper and posterior part of the pharyngeal membrane. For it is in these last-named positions, or in the numerous large follicles in the posterior nares, where the disease ordinarily commences.

The uvula being abundantly supplied with mucous cryptæ, which are especially large and numerous towards its inferior extremity, seldom remains long unaffected in follicular disease of the throat. Hence, whenever the affection has existed for any considerable length of time, elongation or hypertrophy of the uvula, dependent primarily upon a diseased condition of its follicles, will be found to be present, to a greater or less degree, in a large majority of cases. This may form a complication which will often cause great inconvenience. Dr. Stokes, in his interesting work on "Diseases of the Chest," after enumerating various milder forms of symptoms, which he has observed to result

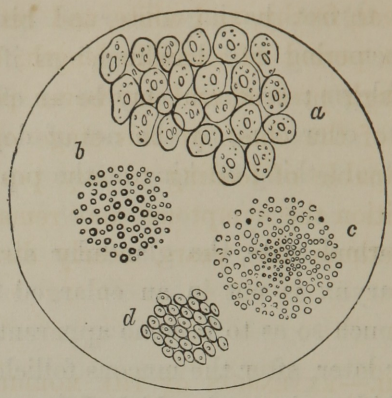

FIG. 4.

From diseased follicles of posterior nares, in the commencement of follicular degeneration; contents composed of nuclei, nucleoli, oil-globules, and granules grouped. *a*, Nuclei, greatly magnified; *b*, Oil-Globules; *c*, Granules, or Molecules; *d*, Nucleoli.

from this chronic, organic lesion, declares, moreover, that he has seen cases presenting all the usual symptoms of phthisis, except the physical signs, such as cough, puriform and bloody expectorations, hectic emaciation, and quick pulse, which were produced by relaxation and elongation of the uvula, and in the treatment of which the ordinary means either altogether failed or were but partially successful.

After a time there is observed, in some cases, an alteration in the quality or timbre of the voice; there is experienced in the vocal organs a loss of power, and a harshness is present which at first is hardly perceived in the morning, or after a full meal; but which is increased towards evening, and after speaking, singing, or reading louder than usual. The mucous secretion, which in a healthy condition of the glands is bland and transparent, becomes viscid, opaque, and adherent; or it may appear, as Louis describes the sputa to be, in early

phthisis, "clear, frothy, and white, and retain these characters for a period of variable length, but seldom is there any cough present, and, moreover, percussion and auscultation of the chest, at this stage of the disease, may be incapable of leading to any positive results." In this condition the symptoms may remain for a long period, sometimes for years, nearly disappearing at times.

SECTION II.—EXTENSION OF THE MORBID PROCESS.

As the morbid process extends along the trachea, and into the bronchia, and their ramifications, the same symptoms as those enumerated as indicative of follicular disease of the throat, but of an exaggerated character, are likewise present. If a cough has existed before, it is now generally much increased, and is attended by an expectoration of transparent adhesive mucus, an expectoration which is characterized by the presence of opaque and albuminous matter, commingled with the more transparent liquid mucus. The constant presence of this latter heterogenous or muco-purulent expectoration is the test which Andral has given of the existence of chronic inflammation of the mucous lining of the bronchial tubes.

After the occurrence of ulceration in the glandular structures of the trachea and bronchi, in follicular bronchitis, the expectoration will be found on microscopical examination to be loaded with corpuscles having a cellular origin, and although not purulent, as M. Andral supposes, is, however, as Virchow remarked with regard to tubercle, "most nearly related to pus, inasmuch as it has the smallest nuclei, and relatively the smallest

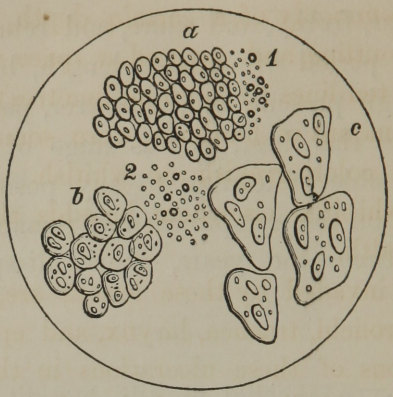

FIG. 5.

Expectoration from the trachea, in chronic folliculitis. *a*, Numerous nucleoli, with some fat globules (1) and granules (2); *b*, a few nucleoli; *c*, swollen epithelial cells.

cells," differing in these respects from all the more highly organized functions.

I have in many instances examined with the greatest care this substance expectorated in bronchial follicular disease, and found it to be perfectly analogous to the secretion from the diseased follicles of the tonsils.

These ulcerations of the mucous membrane of the aerial passages, in tubercular phthisis, are noticed with great care by M. Louis. He attributes the occurrence of these lesions to an irritation or inflammation caused by the continual passage over the mucous membrane of the contents of cavities; and he regarded, as he declares, "ulcerations of the larynx, more especially those of the trachea and epiglottis, as lesions proper to phthisis." And when occurring, as supervening in all cases on tubercular disorganization, Louis represents the ulcerations of the epiglottis and larynx as differing in structure from those of the tracheal membrane, being rarely superficial, "looking as if made with a punch;"

they were commonly of a certain depth, more or less irregular in outline, and covered a space varying from about one to ten lines (2 to 20 millimetres); their edges varying in amount of hardness, were sometimes lardaceous; their color greyish or whitish. The mucous membrane exhibited elsewhere, he adds, the characters of perfect health.

The parts invaded by these lesions are, as we have stated, the bronchi, trachea, larynx, and epiglottis; but the proportions of these ulcerations in these different localities vary according to their location. Louis found that they "increase in frequency from the epiglottis to the lungs."*

These lesions were observed by Louis, principally in subjects dead of tuberculous disease of the lungs; they were, therefore, considered by him "as supervening in all cases upon tubercular disorganization."

In all cases of chronic phthisis, however, the ulcerations of the mucous glands along the trachea and bronchi precede, in my opinion, the development of tubercles in the lungs. We have not only detected their presence repeatedly in the larynx and trachea, particularly during the summer season, and then again being greatly aggravated by vicissitudes of temperature, increased exercise of the vocal organs, and by various other morbific causes.

As the disease advances, the follicles in some become indurated, or they may ulcerate, and after discharging their contents will partially disappear, particularly those on the post-pharyngeal membrane.

In other instances, the follicles located in the above

* Ibidem, p. 44.

position become atrophied, and finally disappear altogether, leaving the pharyngeal membrane of the back of the throat looking paler, smoother, and dryer than in health, whilst the degeneration in the glandular structures, situated in the sub-tonsillar fossæ, and those lining the laryngo-tracheal and bronchial passages, may be still going on.

This has been observed frequently in both bronchial and pulmonary diseases, in cases in which these affections have resulted from long-continued chronic inflammation and degeneration of the follicles of the pharyngo-laryngeal membrane; the *glandulæ* of the mucous tissue of these parts may have disappeared; the tonsillar glands may be found to be, in some instances, entirely *emasculated;* whilst the diseased action, in the meantime, has been communicated to the epithelia of all the respiratory organs, and the tubercular dyscrasia; and tubercular disease perhaps may have been fully established. These are of the class of cases which have been frequently cited by medical men as proving that follicular degeneration had had no connexion with the disease, either in its precursory or present stage.

In cases, therefore, presenting these characters, with respect to the glandular structures of the fauces and pharynx, it is far from being conclusive evidence, that the characteristic degeneration did not have its origin in the *glandules* of these parts; for we frequently find in advanced phthisis that these structures have all disappeared, although the patient may not have complained of the presence of any prominent disease of the throat.

CHAPTER VIII.

SECTION I.—SECOND STAGE.

After the morbid action has reached the follicles of the epiglottis, larynx, and trachea, there is frequently slight hoarseness of the voice, or the voice may be somewhat weaker, and in some instances a dry hacking cough is present, symptoms of which are often readily attributed to bronchial or pulmonary disease, although the most careful exploration will fail often to detect any abnormal condition of these portions of the respiratory organs. Should the follicles become ulcerated at the top of the larynx, about the root of the epiglottis, or along the aryteno-epiglottic folds, an irritating cough is often present, although, as I have stated in a former work,* I have met with cases repeatedly where the affection has advanced until the symptoms present indicated extensive disease of the follicles of the larynx and of the membrane covering the vocal ligaments; until the ulceration of these glands, situated at the root of the epiglottis, could be felt upon the laryngeal surface, and yet the patient would remain free, or nearly free, from a cough, notwithstanding an abundant acrid secretion, poured out by the diseased follicles, would occasion an incessant hawking, to clear the upper part of the windpipe and the pharynx of this tenacious mucus, while the lungs were yet normal; and, moreover, I have

* See author's work on "Diseases of the Air-Passages."

positively arrested their progress, in both these localities, while the "contents of cavities" were yet passing constantly over these parts.

If these ulcerations result from the passage of tuberculous matter over the membrane, and in all cases supervene upon tubercular disorganization, as M. Louis supposes, why are the lesions so circumscribed in their appearance, "looking as if made with a punch," and why, especially, do we find the mucous membrane exhibiting elsewhere the characters of perfect health?

This abnormity—the occurrence of tubercular ulcerations in the glandulæ of the mucous membrane of the air-passages—was pointed out by the author many years ago, in a paper published in the New York "Medical Journal," in 1846, and also in his work on "Diseases of the Air-Passages." They have been observed also by many other pathologists; they are termed by Professor Hasse, "*real tubercular ulcers.*" "Louis, indeed," remarks Hasse, "disputes their tubercular nature. Nevertheless, the generally well-marked tubercular granulations within these ulcers, and the determinate character of their microscopic elements, remove all doubt as to their true origin." "The opportunity for observing these ulcers, at the outset," he adds, "is rare; they would, however, appear to originate in various ways. Tubercle commonly accumulates within the capsules of the mucíparous glands, elevating the latter into little eminences, and ultimately, when the softening process is completed, leaving corresponding ulcers in their stead. In many instances, again, tubercles form, in the first instance, within the mucous membrane, the process being probably as follows: Instead of normal cells, tubercle cells form beneath the epithelium cells, crowd together, in

part reach the surface, and are shed, in part irritate the contiguous textures, producing, first, loss of substance, and afterwards ulcers. In other cases, again, tubercle is from the outset deposited within textures still more deeply seated.*

Dr. Gibb, in his recent work to which I have alluded, says in regard to these ulcers, that "he has demonstrated histologically the presence of real tubercle in their structure (I leave out of course their naked eye appearances). This I have determined by the aid of the microscope, on many occasions, and its seat seems to be especially the sub-mucous tissues. Perfectly analogous is the condition of the ulceration of the smaller intestines in phthisis, which if examined in a similar manner, will be found loaded with true tuberculous deposits."†

Mr. Ancell, who admits the presence of the lesions in the air-passages, says: "It is now generally conceded that tubercles occur in many of those parts which were formerly believed to be exempt." In his opinion, tubercle, in a great number of cases, is first deposited in the lungs, yet ulceration in the larynx and trachea, he admits, sometimes exists simultaneously with the deposit in the lungs. When under such circumstances, however, these lesions occur, they cannot be the result of inflammation, due to the continual passage of contents of cavities. The truth is, the follicular glands of the membrane are themselves the seat of the peculiar abnormity, and this deterioration in the glandulæ of the

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* An Anatomical Description of the Diseases of the Organs of Circulation and Respiration, by Charles Ewald Hasse, M.D., etc., pp., 358–9.

† Op. citat., p. 39.

respiratory passages begins, and often continues for a variable length of time, before the lungs are invaded.

Ulcerations of the mucous membrane of these parts may, and doubtless do, occur, in connexion with tuberculosis; and lesions of the follicles of the membrane take place frequently, as I have had occasion to show, independently of phthisis.*

SECTION II.—CONDITION OF THE SYSTEM.

Accompanying this deteriorating process of the glandular structures of the mucous linings of the fauces, trachea, bronchiæ, and their numerous subdivisions, we have developed, in the meantime, as the result of long-continued heterologous proliferation, and the diffusion of the morbid juices, that "diminished formative energy of the cells and tissues" of the parts, and that "low vitality of the blood," to which Addison and other pathologists allude, as that condition of the system which always precedes and attends the full development of tuberculosis—exactly that condition of the fluids of the economy which may be, and often is, acquired from an original taint of constitution. Hence we often have manifested, at this stage of the disease, that peculiar anæmia which, with many of the older symptomatologists, was regarded as characteristic of that state of the blood which at the present day is considered as constituting tuberculosis.

This anæmic condition, which differs from simple anæmia, "frequently exists," says Ancell, "for a long time before tuberculosis is recognised as a disease." The appearance presented by the skin, more particularly by

* See Author's work cited.

the complexion, is that of a pallid, sallow, or dingy character. The face varies according to the temperament of the individual. In persons with a dark skin and dark hair, the countenance presents a permanent leaden paleness; in those with light skin and hair, the visage is of a more decidedly sallow, or of a "tallow-white," relieved during excitement, in both varieties of complexion, either by a brownish red, or by transient red flushes. The lips and gums gradually assume the anæmic character, and the *sclerotica* acquires a distinct pearly hue, while the mucous membrane often becomes pale, and apparently bloodless, although the blood-vessels are not found so empty as in simple anæmia. Yet the blood itself becomes impoverished; there is a diminution of the red corpuscles of this fluid, and consequently a loss of its vital properties; a condition of the liquor sanguinis, which is regarded by pathologists as predisposing to tuberculosis.

This condition of the glandular structures of the air-passages, which we have described, and this abnormal state of the general system, manifested in various degrees of severity, may exist for a long period, often through years, presenting many of the *rational* signs of tuberculosis; whilst a careful physical exploration will fail to reveal positive evidence of any tubercular deposit in the lungs—a period that may be very properly denominated the *second stage of the disease.*

It is during the first and second stages of the disease, namely, that period between the commencement of the heterologous proliferation in the epithelium of the glandular structures, found in the upper portion of the aerial membrane, and the beginning of the same abnormity in the epithelial cells of the air-vesicles of the lungs—a

deterioration which constitutes true pulmonary tubercles —that the therapeutic measures, which will hereafter be detailed, have been the most successful in arresting the progress of this tubercular dyscrasia.

CHAPTER IX.

SECTION I.—THIRD, OR TUBERCULAR STAGE.

We have seen that the air-tubes, after entering the interior of the lungs, further divide and subdivide, until at length entering the lobules, and attaining a great degree of minuteness, they finally terminate in closed extremities—the air-cells. These air-spaces, consisting, as we have seen, of a basement membrane, connective tissue, and elastic fibre, greatly attenuated, have their interior everywhere covered with flat epithelial cells; "of which," says Schræder Van der Kolk, "some are smaller and appear like only nuclei; others are larger, and all have a nucleus, with more or less granular matter."

Now, as the disease we have been endeavoring to delineate, in its progressive stage, from the oral cavity, through the air-passages down to the parenchymatous structure of the lungs, has its primary manifestation in the cellular elements of these parts, so its more important development, in the ultimate pulmonary tissue, arises, we repeat, not from any new formative element, or in "exudation corpuscles," but in "metamorphosed pre-existing tissue elements." That is, the deteriorating process we have been considering as taking place in the epithelial element of the air-passages, remaining unarrested; sooner or later there will arise, in the epithelium of the air-cells of the lungs, the same heteroplastic process, or cell proliferation, involving ultimately in its degenerative action, not only the corpuscles of the con-

nective tissue, but of all the elements of which the walls of the air-cells consist.

This endogenous formation is at first *intra-vesicular*, never primarily *inter-vesicular*, because, not being in any sense an exudate, but arising out of "previous organic morphological elements," the disintegrated epithelia of the air-cells, it is necessarily in the commencement *intra-vesicular*. But ultimately the air-spaces and their alveoli become distended by the accumulated cell proliferations, the vessels are compressed and destroyed, a disruption of the cell-walls occurs, and we then have an accumulation of the adventitious material, taking place among the surrounding tissues (interstitial), constituting the "tubercular infiltration of Laennec, and the tubercle granule," or "tubercle knot" (Knitchen), of Virchow. The tubercular formation may invade the whole, or only a portion of the parenchyma. They may remain in this state unchanged for an indefinite period, for the whole mass, being made up each one of more or less imperfect cells, or portions of cells (uni-nucleated cells"), they possess some degrees of vitality, and are, as Virchow affirms, not unfrequently, from the very commencement, pervaded by vessels, which for a time are capable of exercising, to a limited extent, the functions of nutrition. But, generally, quite early the manifold nuclear elements "throng so closely together that the vessels gradually become completely impervious," and the final disintegration. or *softening*, commences.

SECTION II.—SOFTENING.

Different opinions with regard to the exact nature of the process of softening have been entertained by pathologists. Laennec, Louis, and Rokitansky believed

that the process of *softening* commences in the centre of the tubercular mass, advancing from the apex to the

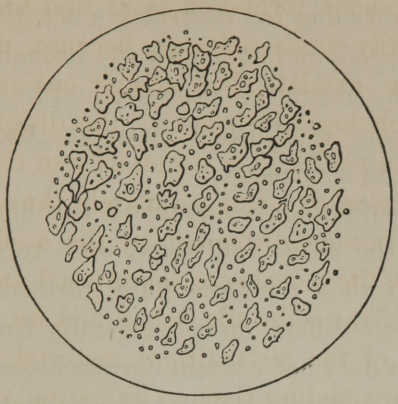


FIG. 6.

Tubercular matter from the lungs of a patient dead of tubercular phthisis.

base of the lung. Andral, Carswell, and others, taught that the ulcerative process begins externally, and is the result of inflammatory action set up around the deposit. Generally, says Virchow, "fatty degeneration sets in very early in the centre of the knot (granule), where the oldest cells lie, but usually does not become complete." Then every trace of fluid disappears, the corpuscles begin to shrivel, the centre becomes yellow and opaque, and a yellowish spot is seen in the middle of the grey translucent granule. This is the commencement of the cheesy metamorphosis, which subsequently characterizes the tubercle. This change advances from cell to cell, farther and farther outwards, and it not unfrequently happens that the whole granule is gradually involved in it;* we then have remaining a mass of "shrunken, disintegrated, cheesy material." When a

* Op. citat., p. 477.

small tubercular mass softens, the cavity contains only the débris of the disintegrated granule. But as the progress of softening is a destructive act, the excavation becomes enlarged, and at length the bronchial tubes are involved in the ulcerative process; and in this way connexions become established between the tubercular cavities and the air-passages.

When the softening has reached the highest degree, says Wedl, "the tissue infiltrated with tubercular matter liquefies into a puriform fluid, termed 'tubercular pus,' but which differs morphologically from true pus, inasmuch as it does not contain corpuscles, corresponding with those of perfectly developed pus, but mostly solitary molecules, masses of flat globules, *nuclei*, and incomplete cell-formations."*

The ordinary sequence of the liquefaction of the tubercular matter is the elimination or discharge of the liquid by ulceration. In some instances other changes follow; the tissues involved in the tubercular deposits, says Mr. Paget, "soften, are disintegrated and discharged with them. The tissues bordering a cavity, if these are not tuberculous, may become infiltrated with organizable inflammatory lymph, which in its development may form a tough boundary to the cavity or ulcer, and if fresh tuberculous matter be not deposited in it, may lead to complete healing."

REMARKS.

When the attention of the profession was first called to this subject—the connexion of glandular degeneration with affections of the respiratory organs—in the

* Rudiments of Pathological Histology, by Carl Wedl, M.D., p. 315.

writings of the author, his views were considered as being so entirely at variance with the doctrines ordinarily taught as to meet with a vigorous opposition from some; whilst the idea of this local abnormity bearing any relation to the precursory stage of tuberculosis, was regarded by many as being altogether mythical.

But there are now many pathologists, both in his own country and in Europe, who are beginning to regard these early changes in the cellular tissues of organs "as bearing such a relation to other and more profound lesions as to impart to them a character of primary importance in the precursory stage of phthisis."

Among these is my friend Professor Lawson, of Cincinnati, who, in his late and valuable "Treatise on Phthisis Pulmonalis," under the head of "*symptoms and signs of the precursory stage of phthisis*," observes: "The condition of the mucous membrane and the glandular structure of the fauces and larynx presents an exceedingly important feature of the symptomatology of the precursory stage of phthisis." * * * "I am fully satisfied that in a large majority of cases, passing into Consumption, the pharyngo-laryngeal structures become early and permanently diseased." * * * "Dr. Horace Green, of New York, has drawn attention to these affections, and especially to the diseased state of the tonsils. He is led to regard the tonsils as in some sense the analogue of the lungs, and that the glandular disease very constantly precedes the pulmonary affection." "The constancy," continues Dr. Lawson, "with which this throat affection is manifested, its persistence and gradual increase, indicate that it sustains an intimate relation to the precursory stage of tuberculosis, at least in a certain class of cases. I do not pretend to assert

that it is always a precursor of tuberculous deposits in the lungs, for there are cases in which the disease is ushered in with a rapid deposition of tubercles, without the usual preliminary stage; but, on the other hand, there is a large class of examples in which this condition occurs as one of the earliest signs, and evidently precedes most other manifestations of disease. Nor will I go so far as to maintain that the pharyngo-laryngeal disease can be regarded as a cause of the local deposits; still it is by no means certain that this condition is not a primary local lesion, incident to the tuberculous state, and which, impeding and otherwise modifying the respiratory process, at least hastens the pulmonary affection." "It has appeared to me," he adds, "that in persons predisposed to Tuberculous Consumption, the throat-affection was usually early and prominently developed, and that in proportion as this morbid action increased or persisted in duration, would be the probabilities of deposits in the lungs; and, furthermore, that when this primary lesion was early and promptly subdued, the organic affection of the lungs was either prevented or delayed. It has occurred to me so frequently to observe the fact, that all the precursory signs of impending Consumption have been modified or removed by remedies applied to the throat, I can no longer resist the conclusion, that the lesion in question is, in a certain class of cases, closely allied to local pulmonary disease."*

In an exceedingly well written and judicious work, on "Diseases of the Throat, Epiglottis, and Wind-Pipe," recently published by Dr. George D. Gibbs, of London, the author has given in the first chapter of his work a

* Op. citat., p. 321.

most excellent description of follicular disease of the throat and air-passages—a disease, says the author, "the most important with which we have to deal." "As the seat of this malady," he continues, "is located in the fauces and upper part of the respiratory apparatus, the expressive appellation of *follicular disease of the pharyngo-laryngeal membrane*, as chosen by Dr. Green, is exceedingly appropriate and convenient, and it is adopted here, because the essence of the disease consists, as has been pointed out, in a morbid action in the glandular follicles of the mucous membrane of these parts, and commences primarily in those situated in the fauces and pharynx, extending in many cases to the larynx and trachea, and even to the œsophagus itself. Although the disease is generally chronic, and seldom seen at the onset from the insidious character of its invasion, yet it is not until many months or years afterwards that we notice some of the lesions which it produces." In the chapter on "Consumption and Bronchitis, in Connexion with Disease of the Throat and Wind-Pipe," Dr. Gibbs remarks: "When *active* disease is present in the throat and upper part of the wind-pipe, its importance becomes of such a nature as to call for our solicitude and utmost attention. If, however, besides the throat affection we have the complication of disease of the bronchial tubes and proper structure of the lungs themselves to deal with, then is the mischief of still greater importance; the general symptoms become aggravated, giving rise to much inconvenience, and oftentimes will baffle our efforts at affording relief. The throat disease may either extend to the lungs, as occurs in the follicular inflammation of the mucous membrane, and chronic lesions of the wind-pipe; or else the disease may begin primarily in

the lungs, and pass upwards to the wind-pipe, constituting perhaps a Consumption of the lungs and wind-pipe together."

"From some peculiar cause," Dr. Gibbs adds, "as yet unexplained, but most probably from the sympathetic irritation of Consumption, the follicles of the mucous membrane of the upper air-passages take on the same kind of diseased action as in the lungs themselves."

To these latter views of the pathology of the disease, I shall again refer, only remarking here that of the many thousand cases of follicular disease, which have fallen under my observation, I have not observed an instance where the disease, beginning "primarily in the lungs, appeared to have passed upwards to the wind-pipe."

I would not, of course, assert that this never occurs, but, as I have before stated, in all of the large number of examples which have been observed by me, the evidence in regard to the origin and progress of the disease has been in favor of the reverse of this—its course being from above downwards.*

I could refer to many other writers of the present day, who have long been impressed with the truth of the positive connexion which exists between disease of "different portions of the mucous membrane of the air-passages," as Sir James Clark remarks, the glandular

* Perhaps I should except the disease in the *glandulæ* of the membrane, in the *posterior nares;* which, taking place, in some instances, apparently *after* the occurrence of the affection in the glands of the pharyngeal membrane, would seem to have passed, so far as these parts are concerned, "from below upwards." In such cases the disease in the two localities has occurred, probably, simultaneously; or the morbid change may have existed in the follicles of the nares without having been of such severity as to have called the attention of the patient to its presence, until after those of the pharynx were involved.

structures of mucous and other tissues, and tubercular disease of the lungs, but I will only allude to one or two more of these pathologists.

"In some persons," says the last-named autnor, "the larynx is first affected, the irritation gradually extending to the trachea and the bronchi. In this case, the patient is subject to frequent attacks of laryngeal irritation, which are usually excited by exposure to cold, humid atmosphere. There is a sensation of uneasiness about the larynx, shortly followed by an increased secretion of mucus, with frequent hawking to remove it; generally, also, there is more or less hoarseness, and some degree of cough. In other cases the person has repeated attacks of inflammation of the internal fauces, whence the disease extends to the larynx."

In the fifth chapter of Dr. Bennett's work on "Pulmonary Consumption," the author has recorded the history of many cases, denominated by him cases of tubercular ulceration of the glottis or larynx, in which "pharyngeal, laryngeal, bronchial, and nasal diseases were frequently mistaken for, or associated with, Pulmonary Consumption." "Cases," the author adds, "which convinced me that certain symptoms which have hitherto been considered as indicative of phthisis, might have their origin entirely in the fauces, pharynx, and upper part of the larynx." (P. 194.) But valuable and truthful as are the views of this eminent pathologist on the nature of tuberculosis, as recorded in the work to which I have referred, he has advanced much nearer its true pathology, in my opinion, in his investigations, published in a recent paper, in the "London Lancet," on the "Molecular Theory of Organization," a paper to which I have alluded on a former page.

PART III.

CHAPTER I.

SECTION I.—TREATMENT OF THE PRÆ-TUBERCULAR STAGE OF CHRONIC PHTHISIS.

To the preceding views of different medical writers, I have referred, in order to show that there is present, among experienced and observant pathologists, a growing conviction, that a most important connexion exists, not only between a morbid condition of the glandular structures, of "different portions of the mucous membrane of the air-passages, and a tubercular dyscrasia," but also between that morbid change to which we have alluded, in epithelial cells in the air-vesicles; and the repletion of these vesicles with *tubercle corpuscles.*

SECTION II.—CASE OF INHERITED TUBERCULAR DYSCRASIA.

In the Second Proposition advanced in this work, it is maintained that diseased action of the glandular follicles of the aerial membrane, occurring in an individual having no hereditary taint, may result ultimately, if persistent, in the development in that individual of a tubercular dyscrasia, or strumous diathesis, capable thereafter of being transmitted to offspring. I cannot better illustrate this proposition than by giving the following history of a family, every one of whom, even to the third generation, came more or less under my own observation.

The father and mother of the family to which I refer, were descended from families, on both sides of which no case of Consumption was known to have occurred for generations back. Both, at the time of their marriage, were apparently in good health, and they continued to enjoy a more than ordinary degree of health till old age. The mother, however, though strong and apparently robust, was of a leuco-phlegmatic temperament; and during the middle and latter periods of her life, was the subject of "*chronic catarrh*," that affected principally the posterior nares and the pharyngeal membrane; yet which never, to any extent, was sufficient to interrupt the discharge of her duties to her family—a family numbering eight children, four sons and four daughters. She died at the age of eighty-two. The father's death occurred in his sixty-eighth year. Both came more or less under my observation during many of the latter years of their lives. Neither father nor mother, however, exhibited any symptoms of pulmonary disease. But all of the eight children began in early life to manifest symptoms, more prominent in some than in others, of catarrhal irritation. All, however, lived to marry, and, with the exception of one of the sons, to have children of their own. Yet five out of the eight children died subsequently, at different ages, of chronic phthisis, the disease passing regularly through its different stages of pharyngo-laryngeal, tracheal, and pulmonary degeneration. Although all the children of this family gave early evidence of a strumous diathesis, yet their deaths occurred at different ages. The oldest, a son, and himself a physician, died at the age of sixty-nine, after an illness of many years; the second, a daughter, at the age of fifty-eight; the third, also a

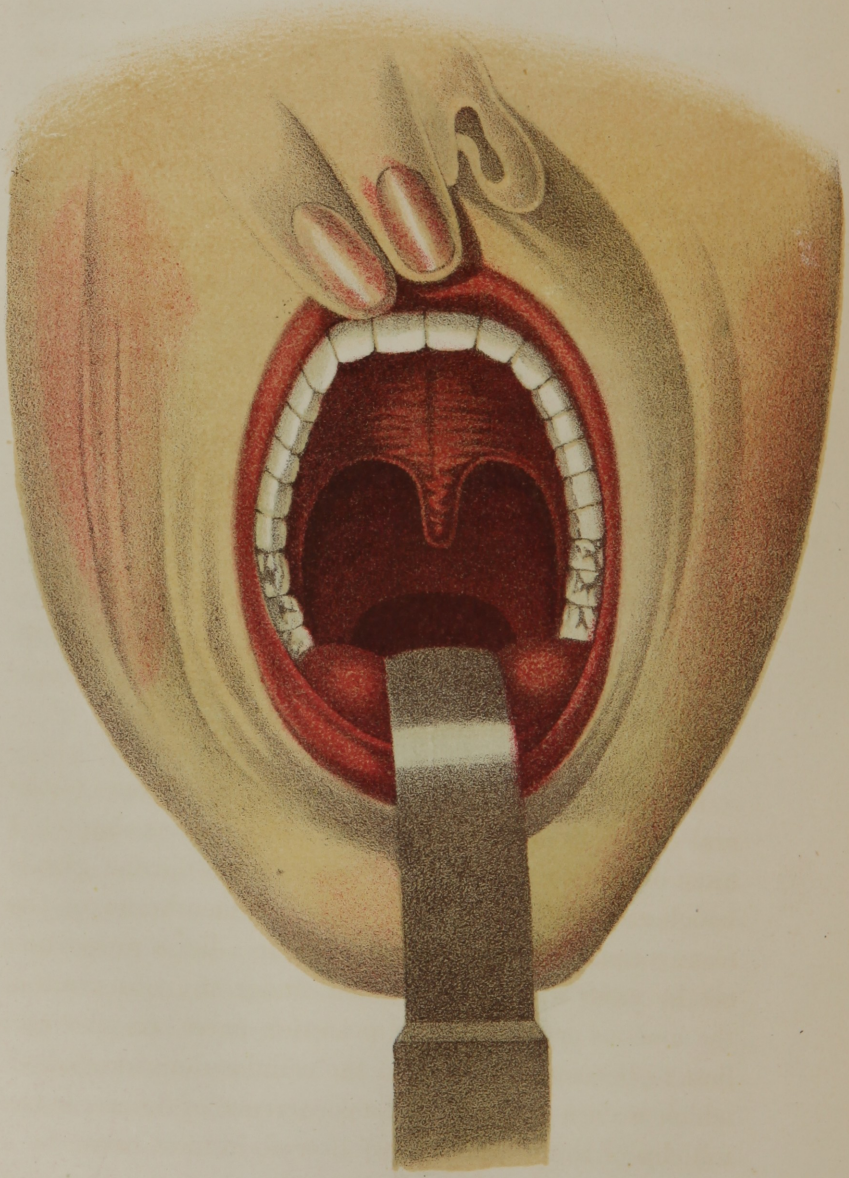
daughter, in the thirty-ninth year of her age; the fourth, a daughter, at thirty-one years of age. Of the three remaining ones, sons, all of whom were also affected in early life with catarrhal symptoms, two died at the respective ages of thirty-eight and thirty-nine—one of typhus fever and the other of pneumonitis. The third, the youngest of the family, and the only one of the eight children who received the treatment recommended in this work, is still alive. As each one of those five other instances, whose history we have briefly sketched, was laboring under the preliminary manifestations of the disease for many years before any tubercular deposit took place in the pulmonary tissue, the same treatment, we maintain, would in all probability have saved, or greatly prolonged their lives. But, although all these cases were seen by the writer, yet at this early period of his professional life topical measures were not understood or employed by him.

But the cases of the next generation of the children of this family, namely, of the grand-children of the parent who, although manifesting to some extent through life a strumous diathesis, lived to an age exceeding four score years, are of still greater interest, and tend, so far as they go, to establish most conclusively the proposition, that the above pathological condition occurring in an individual, having himself no hereditary taint, may nevertheless ultimately develop a scrofulous diathesis, that will be subsequently transmitted to others. The five children of this strumous mother, all of whom died, after middle life, of tuberculosis, left twenty-one children, fourteen of whom exhibited early symptoms of strumous constitutions, and *nine* of this fourteen died in early life, of fully developed tubercular disease; and, although

five of the latter number are still living, yet they all exhibit unmistakably symptoms of the presence of a scrofulous diathesis.

I could add from my book of recorded cases, if necessary, a very large number of well attested cases, as marked as the foregoing, illustrative of the preceding propositions, but it is the author's intention not to encumber the pages of his work with a repetition of "cases," only so far as it may be necessary to prove and to illustrate the propositions he shall announce. Every physician of experience can at once recall cases, in his own practice, confirmatory of the views here adduced, *with regard to the source and progress of the tuberculous dyscrasia;* cases, we mean, where individuals have labored under the symptoms of *threatened* phthisis, perhaps through many years, and whose children have died of Consumption, and who themselves, after ten, fifteen, or even twenty years, have fallen at length victims to fully developed tubercular phthisis.

Plate XIII.



Healthy Throat.

CHAPTER II.

PRIMARY LESIONS.

Those glandular elements of the upper portion of the aerial membrane, in which lesions of these parts are most likely to occur, and to prove persistent and troublesome, are those of the *fossæ nasales*, the *tonsillar glands*, the *pyriform sinuses*, the *epiglottis*, and those of the *larynx* and *trachea*.

Hence we have the following lesions which may require special attention, namely:

1. Lesions of the fossæ nasales.
2. Lesions of the tonsillar glands.
3. Lesions of the pyriform sinuses.
4. Lesions of the epiglottis.
5. Lesions of the larynx and trachea.

SECTION I.—LESIONS OF THE FOSSÆ NASALES.

In the special anatomy of the lining membrane of the oral cavity, which has been given in a former chapter, I have described minutely the numerous follicular glands which are found studding the lining membrane of the fossæ nasales. Frequently, indeed, in a large proportion of the cases which have fallen under my observation, the mucous cryptæ, in the posterior nares, are the earliest to become involved in the cellular deterioration of which we are treating. The occurrence of disease in the follicles of the fossæ is soon followed, in most cases, by a constant dropping down into the throat of an unhealthy

mucus from the cavity, which causes a frequent desire in the patient to clear the fauces of the offensive secretion.

Case I.—In the preceding history of the *strumous family* of eight children, it is stated that the youngest member of that family is the only one now living, and that he is the only one of the eight who has been treated on the plan advocated in this work; and as a history of his case will illustrate, to some extent, the pathological history of the disease we are considering, I shall here record it. From his early childhood he was affected, like his mother, with a *catarrhal irritation* of the mucous membrane of the posterior nares and fauces, which, causing an increased secretion of mucus in that region, occasioned an almost incessant desire to clear the back part of the throat, by a kind of *screatus*, or "hem," which at times became very annoying to himself and family. Colds were contracted very readily, on the slightest exposure, or from vicissitudes of weather.

As he advanced in life, it was found that a cold taken at the commencement of the inclement season would at once increase the chronic irritation in the nasal and faucial region, and would be followed by a cough that would be continued through the entire winter, or until the return of warm weather. This occurred year after year, until it was greatly feared by himself and friends that the same disease that had taken off so many of his family would be awakened in his case.

Early in the winter of 1842, he had one of his accustomed attacks, followed by a cough of such unusual severity and obstinacy as to alarm himself and his friends about the result. Having adopted, in my prac-

tice several years previously, topical measures in the treatment of similar cases, I at once, on being called to treat his case, applied a strong solution of nitrate of silver to the fauces and posterior nares. A mild alterative was likewise administered for several weeks; the topical measures were repeated daily, or every second day, for the same length of time, being carried down during the last week into the pyriform sinuses, and to the opening of the glottis. By this treatment the cough was entirely arrested, and the patient had no return of his accustomed severe cough that winter. But for several years, either in the fall or at the commencement of winter, he was sure to have a return of the catarrhal irritation, followed in a few days, after contracting the cold, by the accustomed cough. Yet a few applications of the silver never failed to arrest the cough, and if the remedy was promptly employed, when the cold was first taken, a single application often would entirely arrest it, and prevent the occurrence of the cough. Therefore, for more than ten years past this patient has been in the practice of calling on me immediately after contracting a cold, to have an application of the local remedy made to the parts affected; experience having taught him, as it has many others, that nothing is so effectual in arresting that irritation or inflammation of the mucous membrane of the throat and fauces, which is caused by what is commonly called "taking cold."* This gentleman, being now in his

* Connected with the topical treatment of follicular disease, in my experience, are two facts of much practical worth, which the profession may be interested to know. Among the many hundreds of patients in this city, who have been treated for diseases of the air-passages, a very large number have learned from experience this truth, that, in the first place, they do not take cold as frequently or as

sixty-first year, and in the enjoyment of good health, has every appearance of escaping the fatal malady with which he seems to have been threatened through so many years, and of which so large a portion of his family have perished.

In all our systematic writers on tuberculosis, we find cases recorded where the early symptoms of the disease not only completely corroborate the view we have taken in respect to the mode in which the tubercular dyscrasia commences, but which illustrate the proposition I have advanced, namely, that in most cases of chronic phthisis there are present preliminary manifestations, which are sufficiently obvious to enable the practitioner to detect the approach of the disease they foreshadow, *before the occurrence of any tubercular deposit in the lungs.*

I will select one case, abridged from the work of a recent writer.

Case II.—Some years ago, Dr. Addison was consulted respecting the health of a young lady, aged eighteen. The mother who brought her daughter—her only child—to the doctor, had lost several members of her family from Consumption. She was, therefore, tremblingly alive to the horrors of the disease. The general appearance of the patient did not denote any illness. Her

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easily on exposure after as before treatment; and, secondly, that when they take cold the effects are greatly abbreviated, or entirely arrested, by a free application of the local remedy to the upper portion of the aerial membrane.

When folliculitis is present the patient takes cold on the slightest exposure. This is the testimony of all. But not so after topical treatment has been employed.

An interesting fact took place in this city some years ago. During the occurrence of the influenza, which prevailed at the time as an epidemic, more than fifty of my former patients called in the course of the winter to say to me, that "whilst all the families in their neighborhood, and every member of their own household, had suffered from an attack of the 'grip' (la gripe), *they* had entirely escaped."

pulse were only seventy, soft and regular. The respiratory sounds were normal, tongue clean; no feverish heat, bowels, etc., regular. Percussion gave a clear and uniform sound on each side of the chest; her appetite and sleep were good, and there was no pain anywhere. "But," said the mother, "my daughter has frequently *a hem!* it is not a cough, but only a hem; take that dreadful hem away, and she was never better in her life." Six years before, the young lady had had measles, and for many months after them she was poorly, subject to a relaxed throat and colds, and *it was at that period a hem was first noticed.* Simple remedies were prescribed by Dr. Addison, and after two or three interviews the visits were discontinued, and he saw nothing more of the patient until three years after, when he was called again to the young lady. Now he found her laboring under a more serious class of symptoms. She had had whooping-cough, with symptoms of pleuritis, and other inflammatory complications; had been bled, leeched, and blistered, was emaciated, her hair had fallen off, and the pulse was more frequent and irregular. A little blood had been two or three times observed in the expectoration, and the paroxysms of coughing were distressing. Percussion and the stethoscope amply confirmed the inferences drawn from the general symptoms; and it was clear that Consumption was now in active progress. The temperament, naturally docile and patient, was now much disturbed with a train of fretful and hysterical symptoms. All lowering measures of treatment were now abandoned, and everything done to calm the emotions, lessen the spasmodic paroxysms of cough, and invigorate the constitutional power.

But all efforts were unavailing; the case terminated fatally, and the post-mortem examination proved the existence of extensive scrofulous degeneration of the pulmonary parenchyma, extending its inflammatory complications to the air-tubes and the pleura.

The presence of scrofulous diathesis in this case, Dr. Addison says, was presumable from the statement of the mother, that members of her family had previously died of Consumption—a presumption strengthened by the health of the patient remaining so long delicate, by the relaxed condition of the throat, the catarrhs, and "hem" after measles.

If the patient's throat had been examined, at the time the doctor first saw the above case, the glandular follicles of the nasal and faucial membranes would have been found diseased at that period, in my opinion; and had this local deterioration been arrested, and the constitutional powers been persistently invigorated, the "scrofulous diathesis" would have been in all probability, I believe, entirely eradicated.

In the treatment of about ten thousand cases which have come under my observation, there have been brought to me a large number of similar instances—children attended by their parents, who would state "that all the other members of their families had died of Consumption; that they had come to consult me with respect to their last and only child, who was going, they feared, the same way!" Frequently, on a careful examination of such cases, no prominent indications, either rational or physiological, would exhibit cause for so much alarm. On inquiring of the parents the reason for such anxiety, the reply has often been: "Our son," or daughter, as the case may have been, "is yet in very good health, but

for several months, or a year past, he has manifested *the same symptoms that the others did;* he does not complain of pain or being ill; but, although he does not cough, he is frequently 'hemming or clearing his throat,' in the same manner as his brothers and sisters did, all of whom died of Consumption, and we believe he will have the disease!" In such cases I have never failed to find, on examination, the commencement of follicular degeneration in the glandular structures of the superior portion of the aerial membrane; nor have I failed, for many years, in cases thus early presented, of preventing, by appropriate treatment, the dreaded result.

ELONGATION OF THE UVULA.

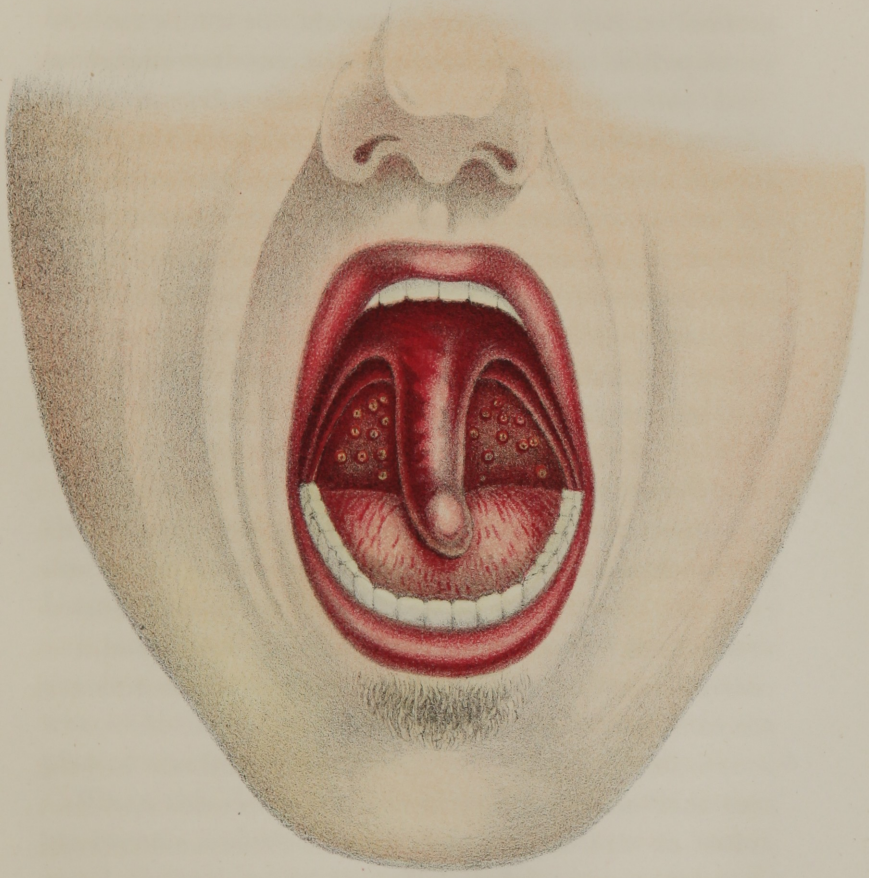
Elongation of the uvula is a frequent complication in follicular disease of the posterior nares. It will be remembered that the uvula is abundantly supplied with mucous cryptæ. In follicular disease of the throat the glands of the uvula seldom remain long unaffected. Hence, whenever the affection has existed for any considerable period of time, elongation, or hypertrophy of the uvula, dependent primarily upon a diseased condition of its follicles, will be found to be present to a greater or less degree, in a large majority of the cases. The result of this morbid action may be either a simple prolongation of the mucous and cellular tissues, which invest the uvula; or an elongation or hypertrophy of its muscular substance. In the former alteration, the tissues being extended beyond the muscular portion of the uvula, form at its extremity a kind of sac, into which an effusion of serous matter takes place, causing simple elongation of this organ. In the latter morbid

condition there is an infiltration of serous or fibrinous matter, in the cellular tissue, by which the uvula is gradually enlarged, and in some instances elongated to such an extent as to produce most serious irritation about the epiglottis, and upper portion of the respiratory tube.

Case III.—The captain of one of our river steamboats had suffered for several years under disease of the throat, which, besides affecting unfavorably his general health, had so changed the character of his voice as greatly to interfere with and at times to interrupt altogether the discharge of his duties as commander of his vessel. Besides the hoarseness with which he was affected, there was present a constant soreness and irritation of the throat, symptoms that were often increased by the exposures to which he was subjected by his profession. But what alarmed him more than all this was the frequent occurrence of a sense of suffocation which would suddenly seize upon him, when lying in a horizontal position, causing him to spring quickly to an erect posture, by which alone he was relieved from a sense of immediate suffocation. Alarmed by these symptoms, and unable to divine the cause, he was induced to seek for medical assistance.

On inspecting the fauces, I found the throat exhibiting that cavernous and granulated appearance which is often present in those cases where follicular disease has burrowed for a long period about the pillars of the fauces, and in the tissues of the pharynx. But what gave me the most surprise was the enormously large and elongated uvula, which was hanging in the captain's throat, with its extremity lying on the back of the tongue. It was over two inches in length, and its

Plate. XXI.



Elongated Uvula & commencement of Follicular Disease.

largest diameter nearly half an inch in thickness. The cause of the patient's most distressing symptom was now apparent. When lying upon his back, the elongated uvula would hang before the opening of the glottis, and in the act of inspiration its extremity would occasionally be drawn into the aperture, producing that suffocating sensation with which the patient had been so frequently annoyed. (See Plate.)

The operation for the removal of this morbid growth was immediately performed. This was followed by the exhibition of topical and general remedies, as in the preceding case of disease of the fossæ nasales, under the employment of which the cough, the irritation about the throat, and every other symptom of laryngeal disease rapidly disappeared, and the captain, in a few weeks, was enabled to resume, and ever since has been occupied in the discharge of his official duties.

Frequently, in my opinion, have the declarations of Dr. Stokes, recorded in a former chapter, with regard to the effects produced by a relaxed or elongated uvula, been corroborated.

I have been called upon frequently by physicians to examine such cases occurring in their own practice, where the lesion existed, and to decide in regard to the plan of treatment indicated.

When this elongation has existed for some time, having become a chronic lesion, I do not hesitate to recommend an excision of the elongated portion. It never fails to afford relief; and I have not been aware, in a single instance, of this operation being followed by any injury to vocalization. Only a few months since, a distinguished physician of this city called to consult me on the subject of a difficulty under which he had labored

for more than a year. He had during the time been subject to violent paroxysms of coughing, which for several months previous to his seeking my advice had so increased in violence and frequency as to cause great alarm to him and his friends; for he had on several occasions suffered from such severe fits of spasmodic coughing, and threatened suffocation, as to induce the belief that he was actually dying!

I found, on examination, indications of folliculitis being present, although the disease had not extended into the trachea, with very great elongation of the uvula. This organ was over three inches in length, and was correspondingly enlarged. Its excision was followed by entire relief from the attacks of suffocation, and a few applications of the sponge-probang to the faucial region completely arrested the cough.

SECTION II.—LESIONS OF THE TONSILLAR GLANDS.

In the chapter on the Special Histology of the Respiratory Organs, I have spoken of the anatomy of the *tonsillar glands.* These bodies are composed of an aggregation of compound follicular *glandules*, which bodies are closely united and bound together by a fibrous investment, consisting of connective tissue and elastic fibres; whilst certain muscular fibres, coming from the superior constrictor of the pharynx, help to invest and bind together the different portions of the tonsil, into a large hemispherical globe. The epithelial portion of the membrane, which covers the oral cavity, enters into the separate divisions of the tonsil, and completely lines all the secondary cavities of the gland. The soft fibrous tissue that connects the follicles of the tonsil, consists, as we have said, of connective tissue

with elastic fibres, and contains numerous vessels; and although these follicles do not exhibit such a complex arrangement, as we find in a lymphatic gland, yet, as Virchow declares, they possess a similar structure, and are analogous to the individual follicles of the Peyerian glands, only in the intestine the follicles lie spread out in an even surface, whilst in the tonsil the surface is inverted, and the individual follicles lie around the involuted membrane.

With respect to the nature of the *secretion* from the human tonsil, histologists are not entirely uniform in their views.

Rokitansky is of the opinion that persons of scrofulous diathesis are disposed to a peculiar blennorrhœa of the tonsils, and to the formation of "tubercular or cheesy plugs," or secretions of a tuberculous character. Kölliker observes that the secretion of the tonsils is a greyish white mucous substance, which, so far as he has been able to observe, contains no mucus, but is composed either of cast off epithelial cells alone, or of a mixture of these, with cells and nuclei. *That in man this secretion is very generally abnormal;** that when diseased the contents of the follicles of the tonsil appear to alter, the follicles themselves becoming distended, and finally bursting yield a purulent or caseous mass; which secretion is frequently found accumulated in the large cavities of the tonsil. This secretion, observes

* It is a singular but interesting pathological fact, that among the mammalia man is the only one in which we find any change or deterioration in the follicles of the tonsils. I have made the examination in many instances, especially in those of the calf, sheep, and other animals, without finding disease in the follicular cells, or in their secretions. The engraving on the next page represents the mucous or epithelial cells from the tonsils of the calf.

Wedl, has heretofore frequently been regarded as crude tubercles. They have, he adds, "occasionally been hawked up from the *trachea* and *bronchiæ*, by both

FIG. 7.

Cells taken from the tonsils of the calf, greatly enlarged.

healthy and diseased individuals, and have heretofore frequently been regarded as crude tubercles;" but they have been found by Höfle to be constituted mostly of masses of *epithelium*, derived from the mucous follicles of the tonsils.

I have for many years given most careful and minute attention to the abnormal changes that occur in the human tonsil. Having long been led to believe that the tonsillar follicles, the lingual follicles, and those of the pyriform sinuses, but especially those of the former, are ordinarily the *foci* from which emanates the dyscrasial process, whose course we have endeavored to trace, I have continued through a period of years to make almost daily most careful microscopic examinations of the tonsils, which have come from time to time under my observation.

By repeated examinations of a very large number of

cases, made through a series of years, I have been fully confirmed in my views, namely, that with *many* adults, and with *most* children of *lymphatic temperament*, the secretion from the tonsillar glands is generally *abnormal*, in health as well as in disease. It does not always present the same degree of deterioration, but, like the changes of the epithelial degeneration in the air-cells of the lungs, the tonsillar secretion undergoes several metamorphoses in the progress of diseased action. Indeed, we may regard the tonsil as the *analogue* of the lung, inasmuch as the abnormal changes which occur in it very nearly simulate those that take place in tubercular disease of the lung. Proliferation occurs in the epithelia of the follicles, they finally burst, and pour out masses of secretion into the cavities of the tonsil, which, on microscopic examination, are found to be composed at first, as Kölliker has observed, of "cast off epithelial plates, cells, and nuclei." These are the masses which, when further degenerated, constitute the "tubercular cheesy plugs" of Rokitansky, and other pathologists. "I have," says Professor Lawson, "carefully examined this substance with the microscope. * * * Upon the whole, it appears to me that this cheesy substance is of a tubercular character, and that it may undergo the cretaceous transformation, as tubercles do in the lungs." The blennorrhœa, then, mentioned by Rokitansky, or the abnormal secretion found so often accumulated in the cavities of the tonsil, is a degeneration commencing in the cellular elements of the tonsillary follicles, and is composed, as we have stated, when first discharged into the cavities, of deteriorated epithelial plates, nuclei and nucleoli. (See Fig. 8.) After a time further changes take place in the secreted mass, for we find, on micro-

scopic examination, the matter greatly disintegrated, and composed of broken up epithelial cells, granules, and *oil-globules*, some nucleoli, but no nuclei; and ultimately a granular, homogenous mass, with oil-globules, but showing neither nuclei nor nucleoli (see Fig. 9), and filling, in many instances, large cavities in the tonsil, with caseous masses of "cheesy" matter.

In some way, as we shall find, this pathological condition of the tonsil has great influence in determining disease of the lung! How, I do not attempt to explain; but a large experience has fully established the fact, as before announced, for of several thousand cases that have come under my observation, where tubercular disease of the lungs had followed apparently the development of follicular disease, and one tonsillar gland only has been found involved, it has been proved *universally*

FIG. 8.

Two cases of hypertrophied and diseased tonsils, removed from patients laboring under chronic folliculitis. Both present the *excised* surfaces. The one on the right side, from a patient most diseased, the cavity large and filled with disintegrated or "cheesy" matter, which under the microscope exhibited diseased, shrunken cells, with some granules and oil-globules. The one on the left much less diseased, the nuclei or cells larger, and no granules.

that the diseased tonsil and the diseased lung *were both on the same side!*

Again, we find, where both tonsils are involved—which is the case in many instances—and the degeneration has reached the cellular elements of the bronchial

membrane, or those lining the air-vesicles of the lungs, then it will appear that *both* lungs are more or less implicated in the morbid process.

To these points I desire to call the special attention of the profession, for it is in the power of every practitioner to substantiate or to disprove these assertions, namely, that in all cases when we examine a patient laboring under chronic follicular disease, and we find one tonsil only—which is frequently the case—involved in the diseased action, we shall not fail to perceive, if the morbid process has continued until either the bronchiæ or the lungs are implicated, that it is invariably the bronchiæ, or the lung of the side which corresponds with the diseased gland; and, on the other hand, where both tonsils have long been involved in the ulcerative process, we are quite sure to find the bronchiæ, or the

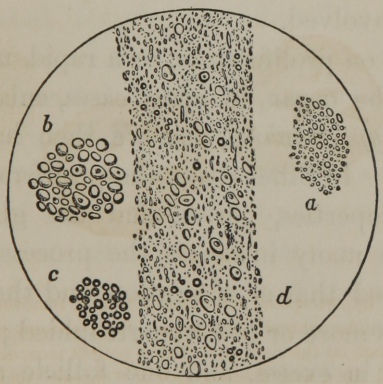


FIG. 9.

Disintegrated matter taken from the cavity of a tonsillary gland, greatly diseased. *d*, Cheesy matter, to which a drop of water has been added, causing a current, and showing a homogenous mass flowing along, in which nucleoli, oil-globules, molecules, or granules, are plainly seen; *a*, Molecules, or Granules, isolated; *b*, Nucleoli, isolated; *c*, Oil-globules, isolated.

parenchyma of both sides, more or less involved in the diseased action.

The pathological change in the cellular elements of the tonsil, or that degeneration which constitutes the primary alteration in this dyscrasic process, does not always begin in the same portion of the organ. In some cases, the follicles occupying the superior portion of the tonsil are the first to deteriorate. In other instances, those on its anterior surface are primarily involved. But not unfrequently the morbid action commences in the follicles occupying the interior or central portion of the gland. (Vide Case VII.) But whether the deterioration commences in the epithelia of the follicles occupying the superior portion of the gland, or in those upon its surface, or in those in the interior of the gland, the deterioration is communicated to the surrounding elementary tissues, until all the follicles of the tonsil, together with the connective and fibrous tissues, are more or less involved.

Consequent on proliferation, or a rapid multiplication of the cells, the organ, in many cases, enlarges at first, or becomes *hypertrophied*, and we then have the "enlarged tonsil." In other cases, the proliferated cells lose their vital properties, perish, and the gland becomes *atrophied*. In many instances the process of proliferation will exceed that of ulceration, and the organs will continue to be more or less hypertrophied; or the ulceration may be in excess, and one follicle after another disappear, until the gland is in part or altogether wasted away. In the mean time, as we must not forget, from the period proliferation begins, the exudation from the diseased glands becomes completely abnormal, and it is here that the *local* dyscrasia commences; and through the absorbents, the numerous glandular elements of the aerial membrane, are diseased, and ultimately through

these and the lymphatic vessels, as we have shown, the lymphatic fluid and the blood itself become deteriorated; and that general dyscrasia, of which we have spoken, is finally established.

The following case will illustrate some of these points.

Case II.—William L. H., son of a merchant of New York, aged seventeen, was brought for treatment to my office, by his parents, Dec. 4th, 1861. He had been ill, his parents said, "over two years, having had more or less cough during that time." He had been under the treatment of an excellent physician, who resided some twenty miles from New York, near the country seat of his parents. The family, on the mother's side, were predisposed to Consumption—several members had died of the disease. Twelve years before, his mother, then residing in the city of New York, came under my care, and was treated for chronic folliculitis. She had enlarged and diseased tonsils, cough, and follicular bronchitis, and presented many of the early *rational* signs of tuberculosis. The hypertrophied tonsils were excised, topical and general treatment was employed, during several weeks, followed by an entire restoration to health, which after fifteen years is still continued. Three years previous to the visit of the son, whose case we are now considering, an older brother, then of the same age (seventeen), began to decline; debility and a cough supervened. He was treated with great care, taken to a southern clime during the cold season, and every attention that friends and wealth could bestow was rendered. But all was of no avail; he died the year before of confirmed phthisis. His case I did not see.

At about the same age, William began to manifest the same unfavorable symptoms which his elder bro-

ther, who died, exhibited. Eight years before his visit to me, his mother stated, "William began to hem or to clear his throat, and for the last two years had had more or less cough, grew feeble, lost his appetite and his activity, and was losing his flesh."

At the request of his parents, and their physician, who advised him to visit me, I made a careful examination of his chest. On percussion, neither side sounded entirely normal, but there was decided dulness beneath the collar-bone on the left side, and dry râles were distinctly audible on this side. Expiration was considerably prolonged; the expiratory murmur was louder than the inspiratory. Expiration on the right side was also slightly prolonged, skin dry and heated, and the pulse ninety.

The mucous follicles on the posterior and lateral part of the pharyngeal membrane were found enlarged, and much inflamed. The tonsils on both sides were considerably hypertrophied, the left much the largest, and appearing the most diseased. Its surface near its upper portion presented several small openings, from which, on pressure with the finger, "cheesy matter" could be freely discharged.

The presence of chronic follicular disease, and the auscultatory signs revealed on examination, convinced me that a deposition of tubercles, following the development of continued follicular disease, had already taken place, especially in the left lung, and softening, I found, had already commenced. I therefore declined entering upon any plan of treatment until I had seen the physician who had attended the patient during the past two years, and I asked the parents to request him to be present with their son at his next visit.

Dec. 12th.—The patient called, and his physician, Dr. W., with him, from whom I received a more minute history of his case. Dr. W. pronounced the case to be "decidedly one of incipient phthisis." This opinion, together with a careful re-examination of the patient at this time with Dr. W., confirmed me in my first opinion of his case. I proposed, by the employment of topical and general measures, to attempt to arrest the morbid process, and to restore the depraved state of the system to a healthy condition.

The enlarged and diseased portion of both tonsils was removed by excision. The enlarged follicles in the posterior nares, and on the lateral portion of the pharyngeal membrane, were fully cauterized with a solution of argent. nitrat.

He was recommended to live in the country, to take horseback exercise freely, in good weather, and to live on generous diet. The topical application with the sponge-probang was continued every other day until the first of January, 1862, carrying the probang, saturated with a solution of nitrate of silver (40 grs. to the ounce), after the first week, down through the larynx into the trachea. On the first of January, the elastic tube was introduced into the trachea, and a drachm of the solution (10 grs. to ℥j), injected into the right bronchia, and this operation was repeated about twice a week, alternating with the use of the probang, through the months of January and February.

After the patient had continued the use of the alterative (No. 16) through the first six weeks, he was put upon a decidedly tonic and invigorating course. From half to ʒj of mixture No. 10 was taken twice, and subsequently thrice a day, until early in March, when,

on examination, the follicular disease of the throat had almost entirely disappeared; but little cough was present, pulse seventy-eight in a minute, respiration was stronger on both sides, expiration was still slightly prolonged on the left side. Here, also, was some degree of dulness, but less distinct than at first. The patient was much stronger, and during the three months of treatment had gained several pounds of flesh. As the breaking up of winter, during the months of March and April, is in this climate more likely than at any other season of the year to affect injuriously persons laboring under thoracic disease, he was advised to spend these months in the milder climate of the West Indies, and he and his mother sailed for Nassau, N. P., the last of February, with directions to continue the general invigorating treatment during his absence. Arriving at Nassau early in March, he remained there nearly three weeks. But the climate, as he and his mother thought, did not agree with him, his cough increased, and his strength diminished. And Mrs. H., alarmed at these results, took the returning steamer, and came back to New York.

March 24th.—He called on me; I found him in about the same condition as when he left home. The returning voyage appeared to be of service to him, as his cough, aggravated apparently by his visit to Nassau, was, on his arrival home, better than when he left Nassau. Still he coughed and expectorated moderately every day. An examination of his chest revealed some dulness on the right side, with indistinct bronchial râles on auscultating the same side. The applications of the solution of silver were resumed, by the use of the probang twice and the tube once a week, and two weeks, and these

measures, together with supporting agents—quinine and Fowler's solution — through the summer months, and into September.

During the latter part of the spring and all the summer months, H. had continued slowly but constantly to improve. He had become robust and quite strong, had lost his cough, and had gained some fifteen pounds in flesh.

In October, I made a careful examination of his chest, without discovering an abnormal sound, save a very slight dulness under the left clavicle, and a moderately diminished respiratory murmur on the same side.

As the cold season of 1862 came on, I urged upon him great care in regard to exposure in unfavorable weather. He came almost every day by rail (twenty miles) to attend to his business in the city. On the 29th of December he called at my office, where there chanced to be present a distinguished auscultator, Dr. E., who at my request, without knowing anything whatever in regard to the patient and his treatment, made a careful examination of his chest, and pronounced it entirely free of any indication of disease.

Nearly four years have passed since W. H. first came under my care, and now, at this present time of writing, he is apparently in perfect health.

July 1, 1863.—On the day of the above date, W. H. called at my office, and I took the opportunity of repeating my examination. I could not discover any evidences of disease in the throat, or, from a careful examination of his chest, of any appearance of disease of the lungs. On the other hand, his case exhibits every appearance of one of *arrested* tuberculosis.

Oct. 3d, 1863.—His uncle informed me, to-day, that his nephew remains quite well.

REMARKS.

So important have I been led to consider the removal of an enlarged or hypertrophied tonsil by excision of *the abnormal portion*, where the follicles of the organ are involved, that when objections are interposed, which are not unfrequent for the past ten years, I have decidedly refused to take charge of any case, if this operation be prohibited! During the first few years of my employment of *topical treatment*, in diseases of this nature, I made frequent efforts, in those instances where one or both tonsils were involved, and strenuous objections were made by the parties interested to any "cutting operation," to overcome the ulcerated action by other methods of treatment—by the use of solid caustic, by the employment of the different preparations of iodine, or of zinc, or of the acids, but each and all of them entirely failed to arrest permanently the deterioration; whilst the use of every one of these agents proved more or less remedial for a time, yet all failed of entire success; for patients thus treated were sure to return, at the end of a few months, as bad or worse than ever, or I would hear of such cases being sick, or dying of lung disease! I therefore relinquished the palliative course, and adopted the radical and more certain method, namely, excision of the diseased gland; and ultimate success, in the treatment of these cases, has been altogether more certain.

Case III.—December 5th, 1861, Rev. J. S. K., aged twenty-six, called for treatment. Two years before, in 1859, he had visited me for the same purpose, in company with several of his friends. With a predisposition to phthisis, Rev. Mr. K. had been in ill health

for several years, and he had been obliged on this account to relinquish his official duties about eighteen months before. His mother, who for many years was very feeble, and had frequent hæmorrhages, died apparently (judging from the history given by the family) of tuberculosis. For several years previous to his first visit to me, Mr. K. had manifested a strong tendency to the disease. He had complained of much irritation of his throat. It was occasionally "ulcerated," and his voice was hoarse. He was sallow, but not pale, being more inclined to a flushed countenance, with some cough, and increased expectoration.

An examination of his chest revealed slight flatness and increased *expiration* on the left side—normal under the right clavicle. Both tonsils were enlarged; the left organ much more hypertrophied than the one on the right side. Pressure on the left gland brought out much diseased secretion, a discharge which was constantly percolating through the openings on its surface. The right tonsil was also changed in size, but not to the extent of the organ on the left side. The enlarged and inflamed follicles, on the pharyngeal mucous membrane, were numerous, extending down as far as could be seen by depressing the tongue, showing that the disease was spreading by continuity along the aerial membrane.

I proposed as treatment, excision of the diseased portion of the tonsillar glands, followed by topical and general treatment. Decided objections to any "cutting" were made at once, not by the patient himself, but by his friends. The young clergyman had married the daughter of a wealthy gentleman of the city, who protested decidedly against the performance of any "cutting operation," in the case of his son-in-law. I

decided that I could not treat the patient, except in my own way, and the party left.

During the two years that followed his first visit to me, this patient had been treated by several practitioners, but with one exception, I am unable to speak of the treatment which he received. Early in 1861, he was several weeks under the treatment of Dr. D., of this city, an excellent practitioner, who at once detected the nature of his disease, and recommended the excision of the diseased tonsils, and topical treatment. But this first operation was promptly refused again by the patient and his friends, but with this exception, the physician was requested to carry out his plan of treatment. The doctor consented, and commenced the local applications of *argent. nitrat.* to the fauces and upper portion of the respiratory mucous membrane. This, together with the general treatment indicated, was continued through several months, under which Mr. K. improved decidedly in health and appearance; and for a time he and his friends indulged a hope that he would quite recover. But this amendment did not long continue. The contraction of a cold was followed by ulceration of the throat, an increase of the cough, and expectoration. A change of climate was now recommended, and accompanied by his wife, and his wife's parents, all sailed for Cuba, and passed the winter and spring in that island, returning home early in the summer of 1862. His residence in a milder climate improved apparently Mr. K.'s health, but he came back not altogether restored, as he had still a weak voice, cough and expectoration, symptoms that remained about the same during the summer; but as the inclement season of 1862 came on, his health was again greatly impaired, and early in

December he came and placed himself once more under my care, without *proposing any conditions of treatment.* I examined the case a second time. The tonsillar glands were more enlarged, and the left one more diseased than it was two years before; several openings of considerable size and quite deep were observed in the upper third of the organ, apparently full of caseous matter. The follicles of the pharynx were large, red, and rugous. Examination of the lungs revealed increased dulness, on the left side. Expiration was prolonged, crepitation and harsh respiration were manifest on the same side. He appeared much more anæmic and debilitated, and his cough and expectoration more than they were two years before.

I commenced the treatment by removing at once the enlarged and abnormal tonsils, drawing out with the double tenaculum the left gland, and excising as much of the diseased organ as I well could in the operation. The right gland was removed in the same way. The follicles of the fauces and pharyngeal membrane, down into the pyriform sinuses, were then freely cauterized.

The iodide of potassium, with the proto-iodide hydr. (Form. No. 19), was prescribed, together with the following ointment (Formula No. 32), to be applied with friction, night and morning, to the chest.

When the throat had healed from the *cutting* operation, the topical applications were renewed, and were carried down into the pyriform sinuses, as well as into the trachea, in order to get the solution of silver into the bronchial ramifications. The applications were continued at proper intervals through the winter months, and tonics and good living prescribed.

On the twenty-first of January, I examined, with

great care, the chest of Mr. K. Under the clavicle, on the left side, slight dulness and vocal resonance were still perceptible, but no crepitation could be discovered. All other sounds appeared perfectly normal, the throat presented a smoother and healthier appearance; he had no cough, his general health had much improved, and his weight and health had greatly increased.

The supporting plan of treatment, with an occasional recourse to the topical applications, was continued through the subsequent six months. It is now nearly three years since the commencement of *local treatment* in Mr. K.'s case. He has had no cough for the last twelve months, no weakness or tenderness of the throat, but he has a clear and strong voice, and has regained an entirely robust and healthy appearance, being now able to discharge perfectly his official duties.

We are quite aware of the importance of not deciding too hastily, with regard to the permanent arrestment of disease, in cases in which tuberculosis has been positively detected. But in the treatment of so large a number of instances, now amounting to many hundreds, in which positive indications, both physical and rational, have been diagnosticated, not only by myself, but also by experienced auscultators—cases which have for years since being treated, enjoyed perfect health, I do not hesitate to declare my firm conviction that, in many of these cases of incipient tuberculosis, dependent originally upon cellular degeneration, positive and permanent cures have been effected by the treatment I advocate.

Case IV.—Mrs. William S., the wife of Judge S., aged twenty-two years, formerly of Boston, came to

receive medical treatment, Nov. 25th, 1848. Mrs. S. was strongly predisposed to Consumption; the family had mostly died of the disease before reaching the age of thirty. The year before her visit to me, she had lost her last and only brother by the disease. She herself had been troubled with a cough, with irritation of the throat, about two years. Had had several attacks of hæmoptysis during the previous half year. Her countenance was sallow and anæmic. Her emaciation, feebleness, quick pulse, together with the physical signs revealed by auscultation and percussion, gave unmistakable indications of the presence of incipient tuberculosis.

On an examination of the throat of Mrs. S., both tonsils were found hypertrophied and ulcerated, and all the lining membrane in sight studded with inflamed prominent follicles.

After thoroughly examining the case, I explained to Mrs. S. and the Judge the plan of treatment I should adopt, if she came under my care, expressing at the same time my doubts with regard to the permanent arrestment of the disease. It was the request of both that the plan of treatment I proposed should be adopted.

Nov. 27th, 1848.—The enlarged and diseased tonsils were removed. On the second day after their excision, a strong solution of *argent. nitrat.* was applied to all the inflamed follicles in sight, and the alterative mixture (No. 16) was directed to be taken in drachm doses twice daily. On each alternate day, through the month of December, the topical medicament was applied, first to the superior part of the throat, then into the glottis, and still later, down to the tracheal bifurcation and

bronchi. Invigorating treatment was persistently employed, and with the topical measures (employed at longer intervals) was continued through January and February, until March 3d, at which time I examined with care the chest of Mrs. S., and found most decided improvement in regard to any abnormal symptoms.

During the three or four months in which she had been under treatment, Mrs. S. had improved greatly in strength, and was several pounds heavier than when she first came under my care. Respiration was nearly normal, and her cough and expectoration occurring only occasionally. Fearing the effects of the vicissitudes of a Northern climate during the spring months, she was advised to pass that season in one of the Southern States. Accordingly Mrs. S. went to Savannah, Georgia, and passed several months in that region. Early in the summer she returned to New York, apparently in robust health. She had no cough or expectoration, and the sounds of her lungs were found to be entirely normal.

It is now fifteen years since Mrs. S. was under my care; she is strong and robust, and presents at this hour the appearance of being in excellent health. "Indeed ever since her treatment," she has been, as she says, "perfectly well."

The question is frequently asked, by medical men, if in chronic follicular disease, with enlarged or slightly enlarged tonsillar glands, *excision* is always necessary? Most generally it is, but not always. If, on examination, the organ presents no abnormity, except *hypertrophy*, it may not be absolutely necessary.

The topical application of proper medicaments to

both single and compound, or aggregated, diseased follicles, together with the internal exhibition of alterative medicines, will in some cases succeed in arresting the local dyscrasiæ. But as all adventitious growths take an irritable or diseased action much more readily than naturally organized parts, these enlargements are quite liable to become violently irritated from causes of a slight nature; and therefore experience has shown that in folliculitis, attended with hypertrophied tonsils, the excision of the morbid growth is always the safest expedient.

But we have shown that the increase of the gland, in follicular disease, depends upon proliferation of the epithelial element, and therefore the removal of the degenerated portion aids essentially in diminishing the amount of the damaging secretions which proceed ultimately from these localities.

This operation for excision of the tonsillary glands was opposed for many years by many members of the profession. Unless the glands were so enlarged as to present a physical obstruction, interfering with deglutition or with the voice, or causing a cough, the operation, it was declared by many, is not required. An experience in the treatment of a very large number of cases, one which has extended through many years, has convinced me that *this* is the most important operation in the successful treatment of these cases.

Case V.—A lady with her husband came from the country for medical treatment. She was emaciated, had a cough, was pale, and during the last year had complained of a constant sore throat.

Examination of her case revealed hypertrophied follicles on the pharyngeal membrane, with slightly enlarged

and diseased tonsils. Her lungs appeared normal. I advised the excision of the diseased portion of the glands, to be followed by the topical application of the silver solution. Some objections to an operation were made, and she and her husband left, promising to return in a day or two. I saw nothing more of them, and had forgotten altogether the circumstance of their visit to me. *Eleven months* after this visit, a patient was brought to my office, apparently in an advanced stage of tuberculosis. I did not recognise her at all as one I had ever seen before. She was greatly emaciated, her voice aphonic, cough and expectoration almost constant. On examining the case, particularly the lungs, they appeared to be much affected, but whether it was altogether bronchial, or whether a deposit had ocurred in the parenchyma of the lungs (such was the amount of the bronchial râles), I was, at first, at a loss to decide. Inspecting the throat, I expressed the opinion that the numerous and enlarged follicles, and the greatly diseased glands, showed conclusively, that diseased action had long been at work in those parts, and I remarked that the enlarged and diseased tonsils should have been excised long before, as all the indications proved the disease to have commenced in the upper region of the air-passages. The lady and her husband then remarked that I had expressed that opinion nearly a year before! They then gave me a history of her case, after the first visit to me; and, as much notoriety was given to this case (for it was published in the *Medical Journals* at the time to my injury), and as it illustrates the point now under observation, I shall here give it. After receiving my opinion, about the necessity of an operation, they consulted an eminent surgeon in the city, who, on examination of the case, declared that such

an operation was entirely unnecessary, that the case was one that had its origin in the stomach, and required a very different plan of treatment from the one I had advised. As this opinion was confirmed by several other physicians who were invited to examine the case, and confirm the diagnosis of the surgeon, it was deemed a most favorable case to disprove the doctrine I had advanced, and consequently the history of the case was published, as above stated, in the *Medical Journal* of the city. The lady thus advised returned to her home, and again placed herself under the treatment of her family physician. Still her symptoms did not improve, and after a few weeks, a consulting physician, living in the neighborhood, was called in; and the course of treatment, slightly varied, was continued. The patient getting constantly worse, a third physician (after several months) from an adjacent town was called in, in consultation upon the case. Fortunately this last gentleman had spent a day or two a short time before at my office, and having seen some similar cases, and my method of treating them, had changed his views on this subject.

Having heard the history of, and examined this case, he declared that the opinion given by myself was correct, and that the patient could not recover unless the operation and the treatment I had proposed were carried out. Here were opinions brought at once in collision. "Was not the attending physician right, and had he not been sustained in his opinion by the distinguished surgeon of New York?" said the attending physicians.

In short the doctors could not agree, and the husband of the lady, learning this, dismissed them all, and taking his wife to the boat, brought her down to the city, and placed her under my care. This same operation, excision

of the tonsils—an operation which should have been performed a twelvemonth before, was now adopted, followed by topical medication, and an invigorating plan of general treatment, and in six weeks' time the patient was restored to robust health. After a period of twelve or fifteen years, she is still living, and in good health.

As we have before stated, in a large number of instances, the children of parents, one or both of whom have died of phthisis, as well as most members of their families, have been brought to me for treatment, presenting positive indications of the presence of incipient tuberculosis, with whom all indications of diseased action have disappeared under treatment.

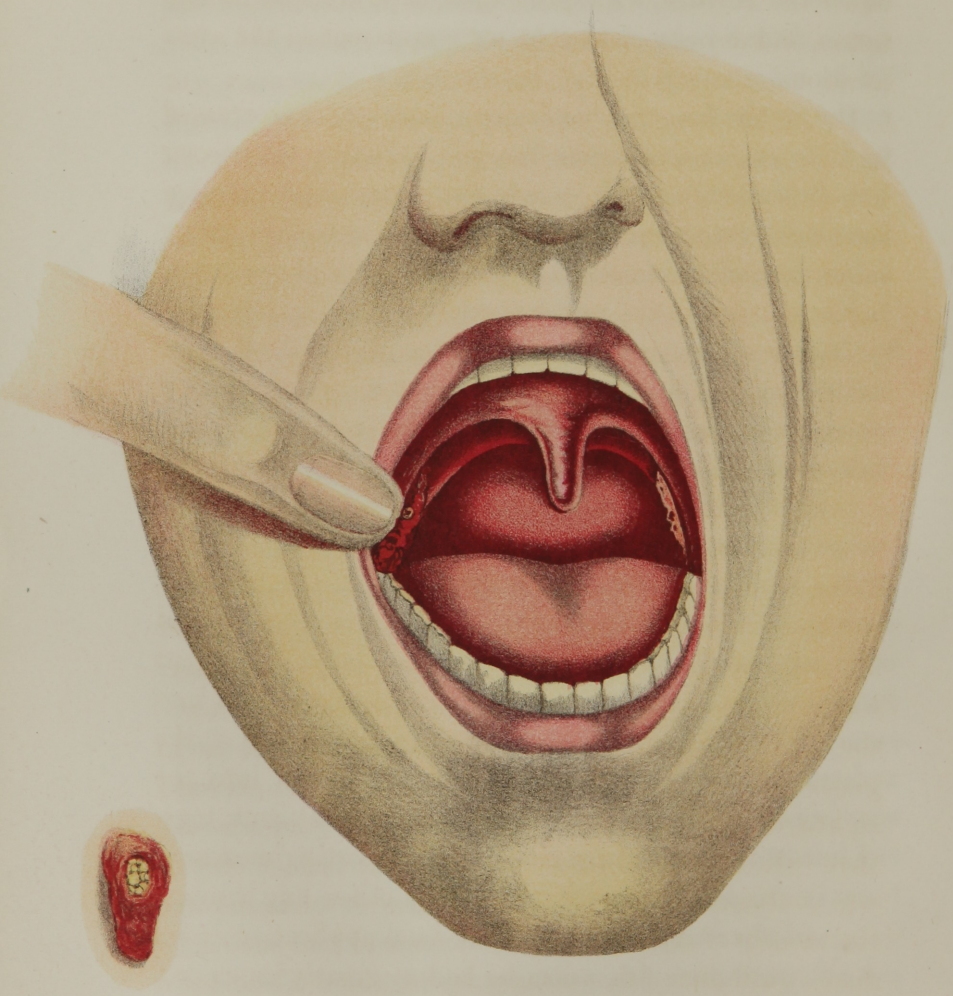
The question with me, in such cases, is—Has *softening* commenced, and to what extent has this deterioration progressed? If it has not begun, or has not advanced much, I enter upon the treatment of such cases with much confidence of ultimate success.

Case VI.—H. B. T., a young gentleman of Newport, R. I., æt. 17, was brought to me by his mother, April 15, 1861. Eight years before, his father had died of Consumption. He had also lost two sisters and an older brother, of the same disease, and an uncle on his father's side, and several cousins had died of phthisis. Two years before, when fifteen years of age, he commenced to clear his throat, just as his brother and sister had done, who died of Consumption. This alarmed the mother, and her physician was called. But his treatment, of which I have no knowledge, failed to arrest his complaint.

I found him exhibiting unfavorable symptoms; he was pale, emaciated, with cough and expectoration, and frequent pulse. The follicles on the pharyngeal membrane, and those in the posterior nares, were enlarged and

PATHOLOGY OF THE DISEASE

Fig. XI.



Tonsils slightly enlarged not showing much external disease.

Ulcerated portion on cut surface, as seen after excision cavity filled with disintegrated, or "cheesy" matter.

inflamed, and both tonsils hypertrophied and diseased. The right gland considerably more diseased than the left one. This lung was also decidedly more affected than the other; percussion on the right side evinced dulness under the clavicle, with prolonged expiration on auscultation, and dry crepitant râles were apparent in the same location.

In the left lung the respiratory murmur was increased in strength, but otherwise normal. Taking the strong hereditary tendency, the age of the patient, and the physical signs into consideration, no doubt remained in my mind that an adventitious deposit had already occurred in the air-sacs, at the upper portion of the right lung.

Both tonsils were removed. In the right several large cavities existed, filled with "cheesy matter" or degenerated epithelium (see Appendix), while the contents of the left were much less changed.

April 16th.—A preparation of crystallized nitrate of silver dissolved in glycerine was freely applied to the lining membrance of the pharynx, and of the posterior nares, and the mixture (Form. No. 17) was administered in drachm doses, twice daily. This local therapeutic agent was continued, and in a few days was carried down into the pyriform sinus, on each side of the opening of the glottis, and subsequently into the glottis, and into the right *tracheal bifurcation.* The topical treatment, together with appropriate general and supporting measures, was continued. Every day or every other day through the months of April and May the local applications were made, until June 8th, when he had so greatly improved, that it was deemed advisable to send him for a change of climate to St. Paul, in Minnesota. To this place he went, and remained six weeks or two months, then

returned to New York with his health greatly improved. He had no cough, his lungs appeared normal; the sounds were equal on both sides; he had increased in weight and strength, and manifested in every respect the appearance of having confirmed health.

In December, 1862, Mr. T. called at my office, and at my request had his throat and chest re-examined by myself and Dr. Richards. The enlarged follicles had disappeared, the membrane had become smooth, and presented a healthy appearance

More than two years have passed since Mr. T. came under my care. He has been, during that time, pursuing his collegiate studies, has enjoyed good health, and has lost all appearance of the strumous diathesis, which, at the age of seventeen, was so manifest in his case.

I could enumerate many hundreds of cases, which during the last twelve or fifteen years have been treated in a way to arrest the epithelial degeneration that originates in the cellular elements of the superior portion of the air-passages; and have thereby succeeded in preventing the full development of a general pathological dyscrasia—one that is sure to end in confirmed phthisis.

Case VII.—Mrs. P. came to me, at the suggestion of medical men in Boston twelve years ago. She had been the subject of follicular disease for several years, during a part of which time Dr. W. of Boston had employed topical measures in treating her throat, without arresting a constant and harassing cough, under which she had labored two or three years. The hypertrophied follicles had disappeared under the local treatment, the pharyngeal membrane became smooth, and presented a healthy appearance. Dr. W., her attending physician, and Dr. J., one of the best auscultators

of Boston, had repeatedly examined her lungs, and pronounced them free of all diseased action. At length these medical gentlemen said to her husband, "You must take your wife to Dr. Green, and see if he can ascertain the cause of her incessant cough." In accordance with this advice, she came to New York.

On examining the throat of Mrs. P., it presented a perfectly healthy appearance; the tonsils were concealed by the anterior limbs of the columnal arch.

I then examined the epiglottis by depressing the tongue, having found that erosions or ulcerations of this organ would cause a cough constantly, despite of every remedy, while these lesions remained. But it appeared quite healthy. Lastly, I made a careful examination of the lungs, and found them entirely normal. On putting the point of my index finger into Mrs. P.'s mouth (see Plate XI), and pressing back the anterior column, I observed the gland to be slightly enlarged, and on its smooth surface several small openings through which, on pressure, purulent matter exuded! This showed conclusively that the central follicles of the gland were diseased, and that the *ichorous* secretion, percolating from the abnormal glandules, kept up a constant irritation below, and caused the cough! And I decided that their excision would be necessary to arrest the disease.

Passing the double hook into their centre, I drew them out, and amputated them directly through the centre of the gland (see Plate), cutting through a single large ulceration, situated in the centre of the organ, which was lined by an adventitious membrane, and formed a perpetual sinus. The repeated application of nitrate of silver by Dr. W. had brought and kept

the surface of the gland in a healthy state, without affecting the ulcerated cavity.

I applied the solid crystal to, and destroyed the false membrane that lined the half cavity remaining in the gland, which in a few days healed up, and her cough and all other unfavorable symptoms disappeared, and she entirely regained her health.

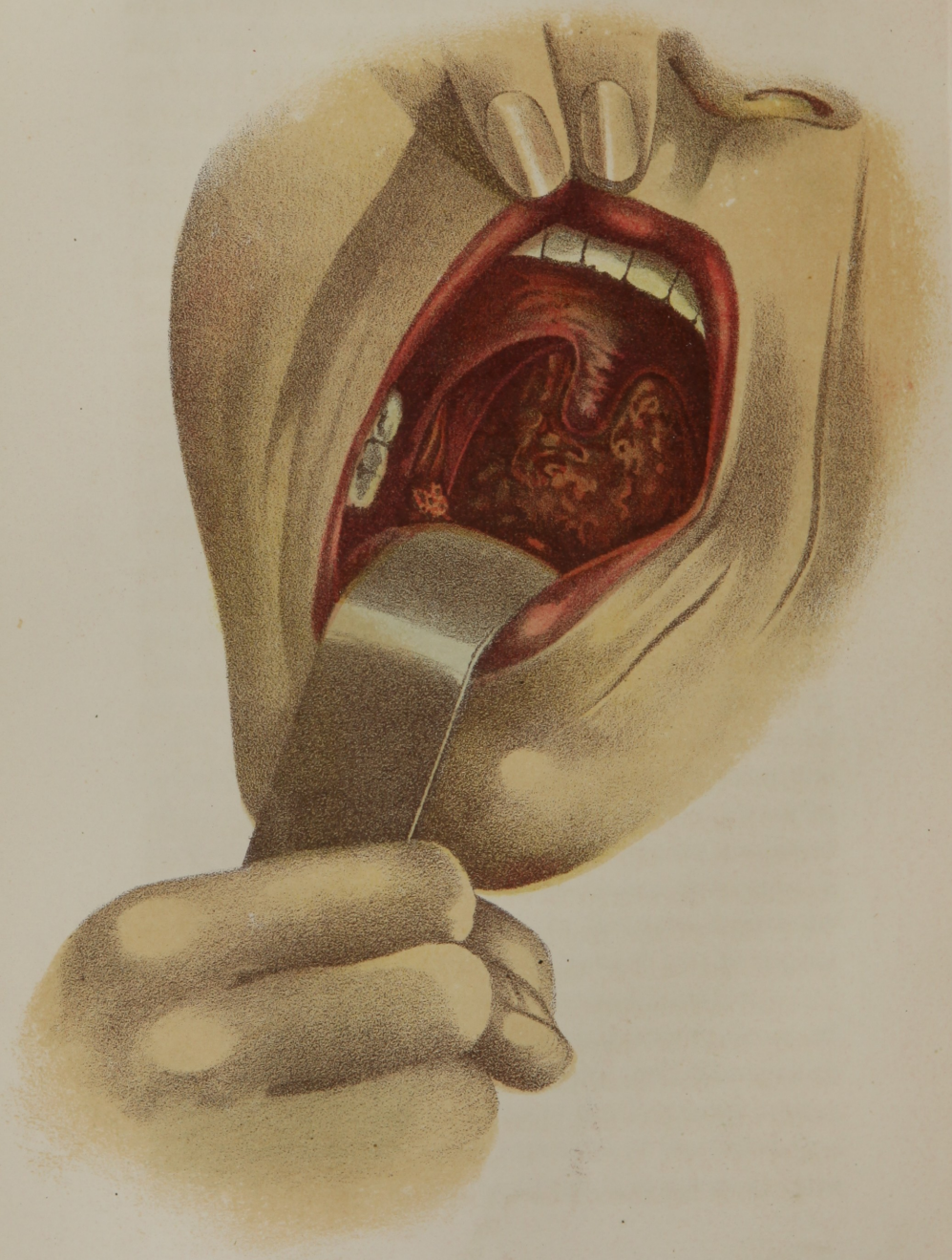
SECTION III.— LESIONS OF THE PYRIFORM SINUSES.

We have seen that the numerous large follicles which occupy the subtonsillar fossæ, or pyriform sinuses at the sides and roots of the tongue, being situated directly under the tonsillary glands, are quite sure to be affected by the diseased secretion that may exude from these bodies.

Ulcerations or granulations in this position are often productive of much mischief, and from their position they are very likely to, and frequently do, escape detection. The author was engaged in treating cases of chronic folliculitis constantly, during several years, before the diseased *glandulæ* in this locality were readily detected. Unless great pains are taken to draw the whole mass of the tongue downwards and forwards, their situation will not be observed. Being protected by the abasement of the tongue, unless this organ is drawn forward and depressed, in the manner just described, they are not ordinarily reached by the topical application in the attempt to cauterize the throat.

The symptoms which characterize the presence of these lesions do not differ essentially from those which indicate the existence of ulcers in the laryngeal cavity; they are soreness on one or both sides of the throat, just under the cornua of the os hyoides; hoarseness, often

Plate XIV.



Ulceration of Pyriform Sinus.

with more or less cough, and expectoration of an opaque secretion—sometimes free—which seems to come from the opening of the windpipe or very near the top of the throat. This expectoration is frequently increased after eating, and is sometimes tinged with blood; or small masses of dark, almost coagulated blood, will be mingled with the sputum.

The following cases will illustrate the nature and symptoms of these lesions. A clergyman who had suffered several years from laryngeal disease, and whose official duties had long been interrupted by the effect produced upon his voice, came under my care for medical treatment. The measures employed—which were such as have been enumerated in other cases—were so successful, that his voice improved, and he was enabled to return to his official public duties. But still this gentleman returned to my office again and again, complaining of great soreness in the upper part of the throat, back of the os hyoides; and yet at this time no disease whatever could be detected in the fauces or laryngeal cavity; nor were the above symptoms in the least degree relieved by applications to these parts.

At length, with considerable difficulty, by placing the patient in a full light, and depressing the base of his tongue, I discovered in the fossæ or pyriform sinus on each side of the root of this organ, deep and ragged ulcerations, which, until this moment, had altogether escaped my observation. These were now freely cauterized, and by repeating the topical measure occasionally, were healed at length, when the soreness and irritation which had been complained of, subsided entirely.

In some instances I have found ulcerations of the folli-

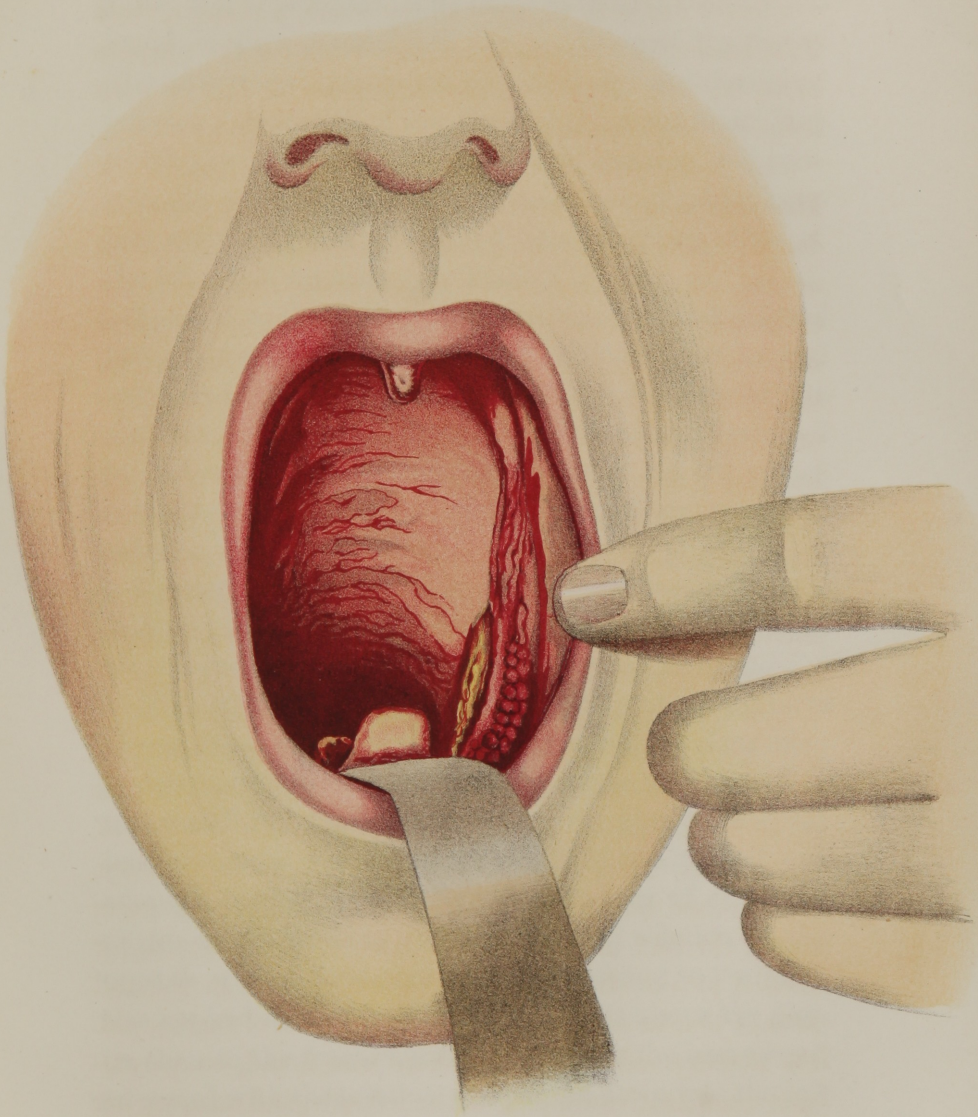
cles situated in the pyriform sinus very obstinate, and from their peculiar position difficult to heal.

Case VIII.—F. C., aged thirty years, a planter, from Tallahassee, Florida, came to New York for the purpose of seeing me. But after arriving here he fell in with some friends, who advised him to consult *their* physician, "who being one of the physicians of the New York Hospital, would understand and treat his case successfully." Accordingly he placed himself under the care of Dr. M., who employed appropriate means in the treatment of his case, in the form of local and general measures, during a period of several months. At first his health improved, and he was encouraged by the hope of ultimately recovering. But as the cold season came one, his unfavorable symptoms increased. His cough and expectoration were aggravated, and his physician recommended him to return to Florida, and spend the winter. Before returning home, however, he called at my office, and requested me to examine his case, without acquainting me with the above facts.

It was not until he had been some time under my care, that I was aware that he had been under treatment in the city. The following is the history of the case, as given by himself. In 1848 he had follicular disease of the throat. He was treated by Dr. ——, of Tallahassee, who excised both tonsils and employed topical measures to the throat. After which he was in better health for several years. In 1855 he was hoarse, and in the fall of that year he came to New York in search of further aid. On coming under my care, there was found, on percussion, comparative dulness on the left side, and on applying the stethoscope to this side, the act of respiration was found to be prolonged, and dry crepitant râles were heard.

PATHOLOGY OF THE DISEASE

Fig. XII



Disease and Ulceration in Pyriform Linus

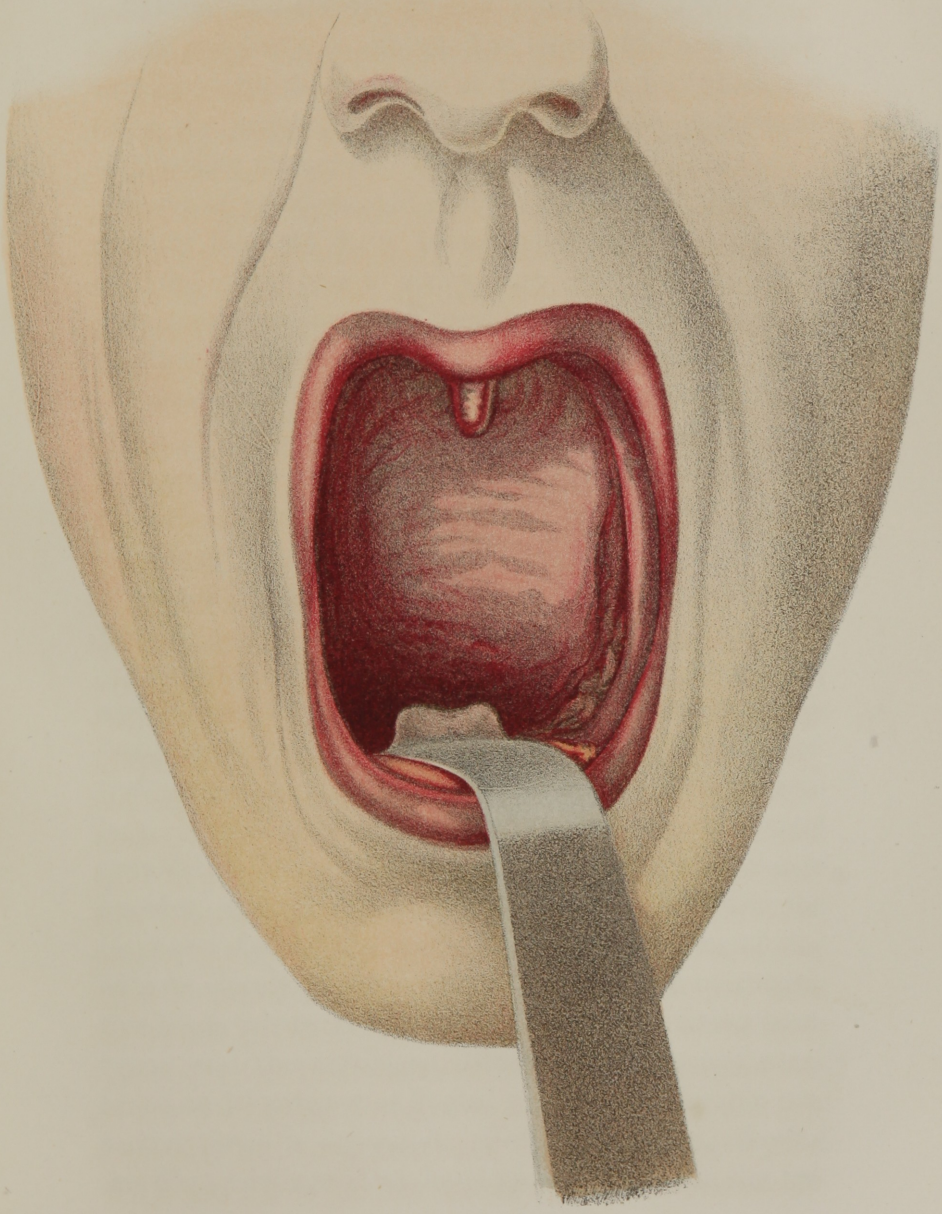
On the right side, the lung appeared nearly normal; the respiratory murmur was distinct and puerile; he was pallid and emaciated. The cause of these difficulties was found, in part certainly, in the condition of the throat. The pharyngeal membrane appeared dry and devoid of follicles. A portion of the diseased gland was found from which the ichorous excretion was still exuding, and commencing near the base of the tonsil was an old ulceration extending down into, and occupying the whole of the left pyriform sinus (see Plate XII).

I stated to the patient the condition in which I found the left lung; but as I could not ascertain that he had any hereditary tendencies to phthisis, I encouraged him with the hope that his disease might in time be arrested by appropriate measures. He decided not to return home immediately, but to remain, and attempt to obtain relief.

I removed the remaining part of the diseased tonsil, January 5th, 1856. With the solid crystal I cauterized the ulceration from the base of the gland down to the bottom of the pyriform sinus. The alterative mixtures (Form. No. 19 and 31) were exhibited night and morning in drachm doses. An invigorating course with regard to tonics and diet was advised; and every plan that would tend to improve the general health of the patient was adopted. After one or two applications of the solid nitrate to the diseased sinuses, a strong solution of the crystals was adopted, and a sponge-probang wet with it, was applied at first to the diseased parts above the glottis, then to the trachea, and subsequently the instrument, saturated with the solution, was carried down into the left tracheal bifurcation, every other day through the months of January and February, when, as the disagreeable

spring months were coming on, he was advised to go to a milder climate. But before he left he was examined, and his symptoms found to be greatly improved. I sent for the same artist, who sketched No. XII, and had another drawing of C.'s throat taken. The ulceration had healed, his cough had greatly diminished, although every morning he still had some expectoration; the crepitation had ceased in the left lung, yet some degree of dulness remained. He returned to Florida, with the understanding that early in the summer he would return to this city and continue the treatment. But I saw nothing more of him until the 5th of September following, when he returned in nearly the same condition he was in when he left for home. Certainly he was no worse, and the treatment was renewed, and was continued through the fall and winter, until February 4th, 1858, the topical application being made twice, and a part of the time three times a week during the above period, during which time the patient, although exposed to a rigorous climate, continued constantly to improve. He had no cough, and his lungs on the 4th of February gave, on examination, no signs of disease. The respiration, although feeble, was otherwise normal. He had regained his usual weight, and was strong and robust. His health remained very good until the spring of 1859, when he took a severe cold which was attended with soreness of throat, and followed with a cough. Being alarmed, he came early in June to New York. I found him on the 18th of June with an ulcerated throat, but his lungs were healthy. A few applications to the upper portion of the air-passages relieved his throat, and his cough soon subsided. The next year the Rebellion broke out, and I have known nothing of his case since.

Plate XX.



[illegible] of the Pyriform Sinus healed

SECTION IV.—LESIONS OF THE EPIGLOTTIC CARTILAGE.

The epiglottis is subjected to lesions which not only interfere with the functions of this organ, but which are often the exciting cause of general disease—sometimes of a serious character.

Some of these morbid changes occur much more frequently than we have been accustomed to suppose; and the symptoms to which they give rise are often erroneously attributed to organic disease of the lungs, or to other structural changes which may not exist.

Anatomically viewed, the epiglottis is a fibro-cartilage of an ovoid form, and of a tissue very elastic. It is covered by a mucous membrane which consists of a ciliated epithelium externally, and beneath this a basement layer which is the true membrane, and a quantity of connective tissue, all abundantly supplied with blood-vessels.

Scattered over the surface of this lining membrane, and situated in the sub-mucous tissue, are numerous follicular glandules, many of which have the openings of their excretory tubes on the laryngeal face of this cartilage. One of these glands, which is composed of several granules, is located between the epiglottis and the os hyoides, and is called the *epiglottic gland.* On the laryngeal face of the epiglottis, the mucous membrane adheres closely to the cartilage; there being no connective tissue whatever interposed between the lining membrane and the cartilage. Beneath the mucous membrane on its anterior or lingual surface, considerable connective tissue is deposited. Disease, therefore, affecting this fibro-cartilage must have its seat, either in the mu-

cous membrane or its follicles, or in the subjacent connective tissue. We find, accordingly, the principal lesions of the epiglottis to be:—

1st. *Erosions* or *abrasions* of its mucous membrane.

2d. *Ulcerations* of the membrane and of its glands.

3d. *Œdema*, or *infiltration* of its connective tissue.

These alterations of structure occur, with regard to frequency, in the order in which they are named.

Some of the erosions and ulcerations of the epiglottis to which I propose to call attention, (a portion of them) are entirely independent of those described by M. Louis as lesions proper to phthisis, which he found were present in about one-sixth of his patients who died of this disease; and were caused, in the opinion of M. Louis, by the constant passage of pus over the mucous membrane.

In many instances I have found these structural alterations to occur as primary and independent affections, so far as tubercular disease is concerned. In other cases they are not only complicated with similar lesions of the tonsils, fauces, and pharynx, but are often associated with tuberculosis.

1. *Erosions of the mucous membrane of the Epiglottis.*

Prof. Hasse, who describes quite minutely those erosions of the mucous membrane of the air-passages, first pointed out by Louis, as alterations peculiar to phthisis, says that these lesions always remain superficial; the upper layer of the mucous membrane, probably the epithelium, being alone engaged. They are seen in certain localities, as the inferior surface of the epiglottis, the posterior surface of the trachea, and occupying the mucous membrane of the two main bronchi.

"These erosions," continues Prof. Hasse, "are obviously the sequence of superficial irritation of the mucous mem-

brane; and as they are principally met with in parts which come in contact with tuberculous matter expectorated from the lung, they not improbably owe their existence to this source."*

M. Trousseau entertains a similar opinion; for, in speaking of these lesions as described by M. Louis, he remarks: "We have never found erosions except in patients attacked with pulmonary phthisis, which observation would seem to justify the opinion of M. Louis, that these erosions are owing to the contact of pus which is constantly passing over the mucous membrane of the larynx and bronchi."† The same opinion with regard to the origin of these lesions is expressed by Andral and Cruveilhier; and more recently by Ryland and Gellerstedt. Indeed, most writers on the pathology of "diseases of the air-passages," since the promulgation of this doctrine by M. Louis, have adopted, and have copied into their writings—some of them, apparently, without any personal investigation—these views of the origin of erosions and ulcerations of the epiglottis and larynx.

Both Hasse and Rokitansky describe another form of superficial erosions which occur in certain cases of *typhus fever*, and are found seated "on the posterior wall of the larynx; on the lateral edges, and on the inferior surface of the epiglottis," where they present at first a roundish or lenticular form, with black or discolored edges; and which, often, change gradually into dirty eating ulcers.

During the past few years a large number of cases of erosions of the epiglottis have been noticed among my patients, occurring under circumstances altogether different

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* Pathological Anatomy, pp. 357–8.

† Treatise on Laryngeal Phthisis, &c. By Trousseau & Belloe. p. 20.

from those under which they were observed by the above pathologists. They have generally been noticed as being complicated, either with follicular inflammation, or associated with catarrhal irritation of the mucous membrane of the respiratory passages, but in a large majority of cases entirely independent of tubercular disease.

During the Winter and Spring of 1856,* especially, a much larger number of cases occurred, of erosions and ulcerations of the epiglottis, than had been observed during any previous season.

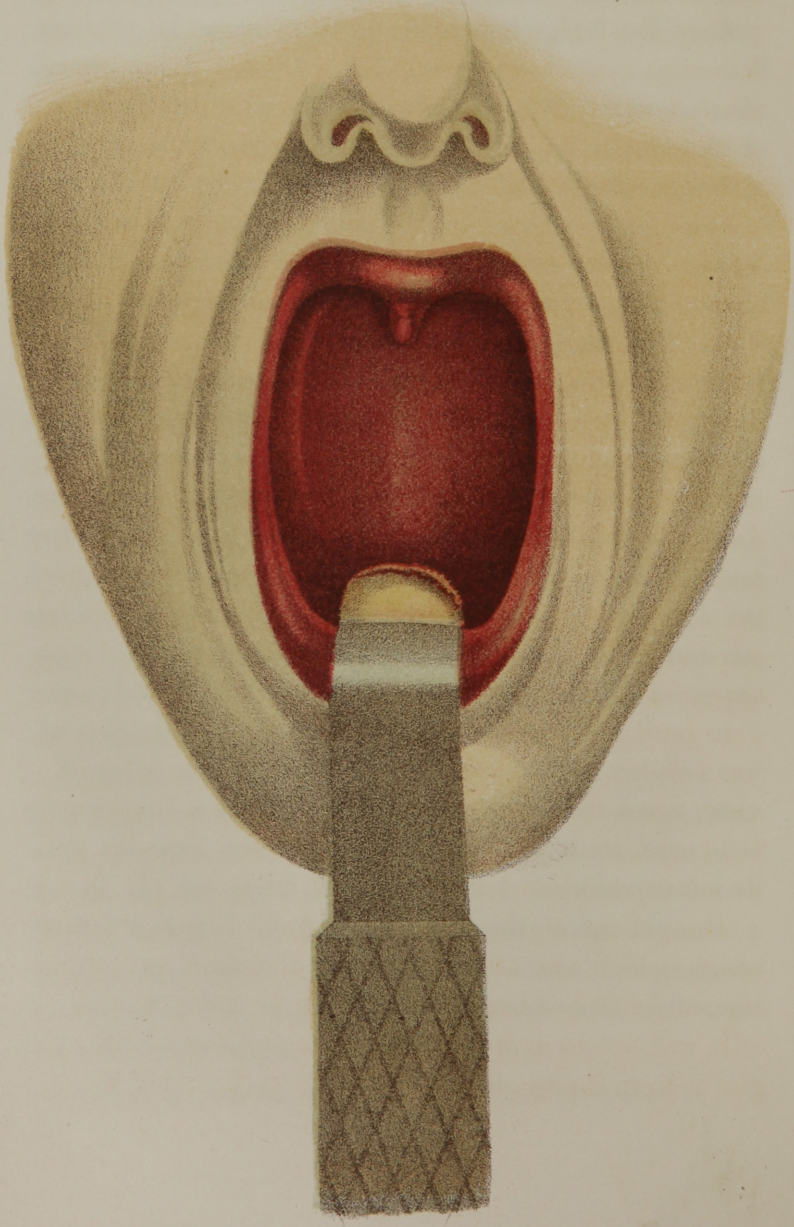
These instances, for the most part, were found occurring in those cases, in which a persistent, teazing cough following chronic follicular disease, or common catarrhal inflammation, obstinately resisted all the ordinary measures for its arrestment.

On depressing the tongue in such cases, by means of the ordinary bent spatula, or "tongue depressor," so as to bring the epiglottis into view, this cartilage was found frequently inflamed, vascular, and its superior border marked, at one or more points, by distinct erosions. In much the largest proportion of cases, these erosions make their first appearance on the left superior edge of the epiglottis.

Next in frequency they will be found occupying its centre; and occasionally, but very rarely, in comparison with the two preceding locations, they have been observed on its right border. These erosions are not readily detected, at first, by the inattentive observer; as they are quite small, are only slightly depressed, with a pallid base, sometimes a little reddened, and with whitish, linear edges.

* During these seasons influenza and colds were more prevalent than usual.

Plate. XV.



Erosion of the left side of the Epiglottis

The surrounding mucous membrane is generally inflamed, its delicate network of superficial vessels is red and injected, and the epiglottis itself more or less thickened. The appearance and effects of these erosions may be still further illustrated by the following case:—

Case I.—I. H., a lawyer, from Virginia, and late State's Attorney, consulted me, May 28th, 1856. He had been affected nearly two years with chronic follicular disease of the throat, for which he had received both topical and general treatment, and had been greatly relieved.

Some six weeks or two months before his visit to New York, a severe cough came on, and was, after a time, attended by a free (apparently) bronchial expectoration, a cough which resisted all the ordinary means employed for its relief. His chest, which was remarkably well developed, was carefully examined, without detecting any signs of pulmonary or bronchial lesions. On examination, the throat revealed some remains of the follicular disease, but nothing sufficient to account for the symptoms present. Indeed, as no cough had existed when the throat was in its worst condition, it could not be attributed to the presence of follicular disease, which appeared to be confined to the upper part of the throat.

In pursuing the investigation, the tongue of the patient was forcibly depressed so as to bring the epiglottis into view, when this cartilage was found to be inflamed and thickened, its mucous membrane red and vascular, and its left superior border covered with erosions. (Pl. XV.)

The patient at this time was harassed by a constant cough, which was attended by an abundant expectoration, and this had been his condition for many weeks.

It will not be supposed that these erosions of the epiglottis were the whole cause of this cough, and of the ex-

pectoration. I had seen at this time, and have since seen frequently, cases with these erosions present, unattended by any great amount of cough; but a cough once established, from any cause, and these lesions supervening, I have never seen a case in which this symptom did not obstinately resist all ordinary measures, so long as the *erosions* continued. These means having been fully employed in this case, the indication seemed to be to check the irritation caused by the erosions. To accomplish this, the tongue was depressed so as to bring the epiglottis into view, and with an instrument prepared for this purpose, the erosions were touched with the solid nitrate of silver, whilst the body of the cartilage was freely sponged with a strong solution of the same remedy. This was done on the 28th of May, and the operation was repeated two days afterwards, and was followed by a most happy result. The cough was greatly diminished by the first application; and on the 31st, the day after the second application, the patient called, and reported himself almost entirely free from cough and expectoration. A few more applications of the solution were made to the affected parts, in the course of the subsequent week, and Mr. H. returned to his home, apparently entirely free from the unfavorable symptoms with which he came.

I have stated that some lesions of the epiglottis occur with much greater frequency than the profession have been accustomed to suppose. This is certainly true with regard to these erosions. Within a few months quite a number of physicians have brought or sent their patients to my office for examination, who were suffering from a severe cough, and were apparently laboring under bronchial or laryngeal disease, for the treatment of which

both general and topical measures had been unavailingly employed by these practitioners. In many of these instances the persistent cough was found to have been kept up by the presence of undetected erosions of the epiglottis; for in nearly all such cases, the arrestment of these lesions was found efficient in promptly relieving the cough.

Several most interesting cases have come under my notice, in which the disease has occurred among physicians themselves.

In one instance a young physician was brought to my office by his friend, an older physician of this city, under whose care and treatment the patient had been for several weeks before I saw him. But inasmuch as a severe and obstinate cough, attended with free expectoration and with pains in the chest, continued to harass him, further aid was sought by both patient and attendant.

On examining the chest and finding no evidence of lesions there, sufficient to account for the symptoms, the throat was inspected, and the patient's epiglottis was found to be twice its natural thickness, was highly vascular, and its entire superior border covered with erosions.

In this case, the principal erosion occupied the *right* superior lateral border of the cartilage, and the doctor was constantly referring to the right side of his throat as the seat of the greatest amount of irritation. His cough had been very severe for nearly two months, and was attended with much expectoration and with more or less pain in the chest. He had consequently suffered much anxiety about the safety of his lungs.

Cauterizations of the border of the epiglottis, with the solid crystal of the nitrate of silver, gave almost imme-

diate relief. The cough and expectoration began to subside, as soon as this remedy was employed. After a few applications of the solid nitrate, a strong solution was employed, and was applied every few days, for several weeks, not only to the border of the epiglottis, but also to the whole body of the cartilage. Under this treatment, the patient recovered perfectly.

Although, in almost all cases, lesions of this nature are promptly relieved by cauterizations, yet, in some instances, I have observed a marked tendency in the disease to return, whenever the patient was exposed to the ordinary causes of catarrh. In July, 1855, Dr. Bowen, of Jeffersontown, Virginia, brought his sister, a young lady, to New York, for medical treatment. Miss B. had many of the early symptoms of phthisis, for the treatment of which the ordinary remedies had been long employed by her brother. Complicated with chronic follicular disease, erosion of the epiglottis was found present, and this lesion proved to have been the principal exciting cause of a long continued cough; for, after a few applications to the diseased parts the erosions disappeared, and the cough ceased altogether. On taking cold a few weeks after, the cough returned, with nearly as much severity as at first; and when the epiglottis was examined, it was found to be again eroded. The topical applications were once more successful in affording prompt relief. Miss B. remained three or four months in this city, and during that period, she had several severe attacks of cough, and in every instance erosions of the epiglottic cartilage were ascertained to exist, and these were always removed, and the cough arrested, by topical medication. She, however, ultimately, quite recovered.

Under the head of erosions, I will allude to only one other instance of this affection. It is a case of much interest, as it occurred in an elderly physician of this city —a member of the Academy, and a gentleman well known to most of its fellows.

This physician came to me early in the Winter of 1856, expressing much anxiety about his case. He had had an obstinate cough for several months; had employed in his own case, he said, all the ordinary means which he had been accustomed to use with his patients; but had found no permanent relief. He had only slight expectoration, but a harassing dry cough. Sometimes the cough would occur in paroxysms, and with great severity.

The Doctor was confident the irritation was seated in the larynx, and as he had himself applied topical remedies to his own throat for some time, he desired that the sponge-probang should be carried down to the superior portion of the larynx.

This was done, on several occasions, and was followed by considerable relief; but still the cough continued, and was always greatly aggravated by exposure to cold, and by the vicissitudes of the weather.

In the meantime, the Doctor's epiglottis had not been examined, because attention having been called so directly to the larynx, as the seat of the disease, this organ had been overlooked. It was now inspected, and found in an inflamed and thickened condition; its delicate network of vessels was red, and highly injected, and its border eroded.

Applications made to this organ, as in the preceding cases, gave prompt relief, and for a time Dr. M. thought his disease was removed. But he soon found that on

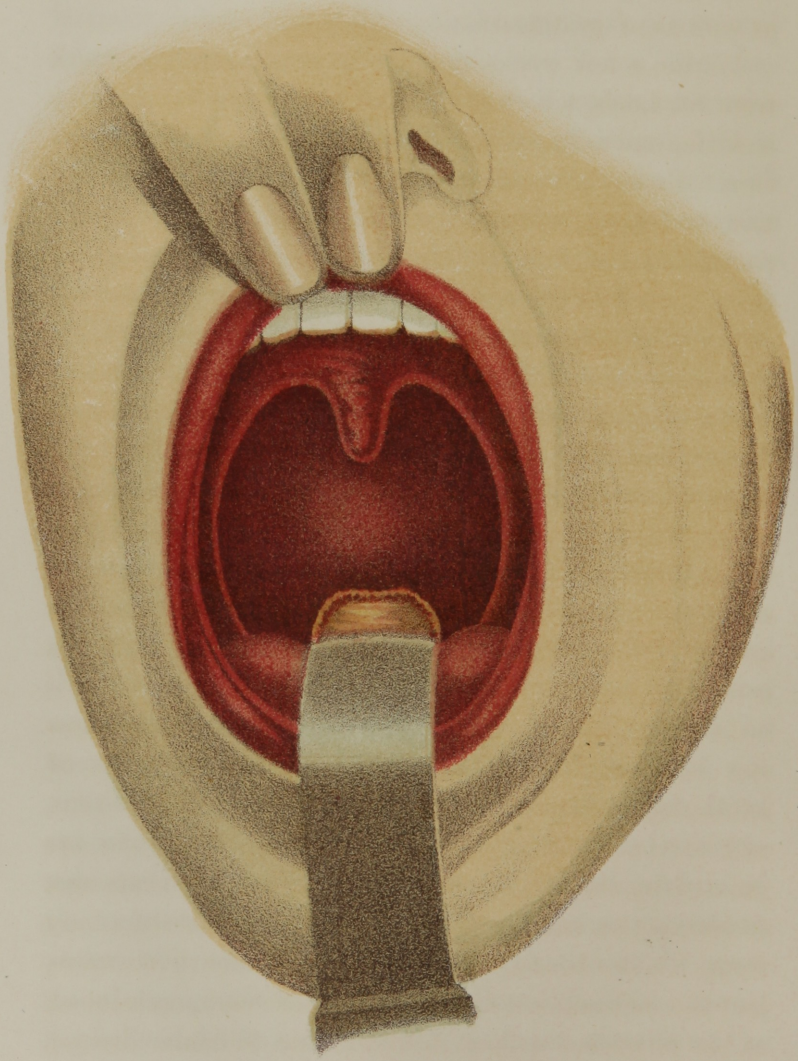
every slight exposure to cold, his cough was sure to return, and that too, after the epiglottis appeared to be in nearly a healthful state. As the applications now only afforded temporary relief, they were for a time suspended. Irritation in the throat soon became more harassing than ever; and on the 20th of March, Dr. M. called and declared that for several days and nights his cough had been almost unbearable—that he had coughed every five minutes night and day, and that neither expectorants nor anodynes gave him any relief.

The Doctor had given much attention to his own case, and he expressed the opinion that the same irritation that affected the epiglottis had extended along its lateral border, to the aryteno-epiglottic folds, and that erosions or ulcerations in this location were causing the incessant cough.

This opinion could not be confirmed by inspection, as in the case of erosions of the border of the epiglottis, for these epiglottic folds are concealed from view, behind this cartilage; they can be reached, however, by topical applications, and at the patient's request, I applied, by means of a small sponge-probang, a strong solution (50 grains to the oz. of water) to the membranous folds, extending from the base of the epiglottis to the arytenoid cartilage, which folds form the lateral borders of the aperture of the glottis. The relief was immediate. Before this application, the great irritation at the opening of the glottis had caused an almost incessant cough, for forty-eight hours. For several hours succeeding the operation, the Doctor declared that he did not cough once, and the following night with him was one of quiet sleep.

The prompt relief which a single application of the

Plate XVIII.



Erosions of the entire edge of the Epiglottis

caustic to an irritated and eroded epiglottis will sometimes afford, has often been with me a matter of great surprise, as well as of gratification.

Within a few weeks, a gentleman came to New York from St. Louis, who had been treated several months by a skilful and eminent physician for chronic follicular disease. Frequent applications of the nitrate of silver solution had been made to the fauces and pharynx of the patient, and with much benefit, so far as the disease of these parts was concerned. Still the patient complained of great irritation at the top of the wind-pipe; and, following the advice of his physician, he consulted me.

An examination of his case revealed an epiglottis inflamed, and considerably thickened at its apex, with an erosion directly in its centre. A single free application of the solid nitrate of silver at this point gave, for a time, entire relief, and these applications being repeated daily for a few days, removed permanently a tickling and an irritation that had continued, and had caused a cough for many months.

In some instances the erosion will occupy all the superior edge of the epiglottis. I had an opportunity of exhibiting a case of this nature to Dr. A. H. Stevens, and to the chairman of that committee which was appointed by the Academy of Medicine, a few years ago, to visit me on another subject. It was the case of a lady from Rhode Island, who, for a twelvemonth or more, had labored under a severe spasmodic cough, occasioned, as her physician supposed, by chronic follicular disease. In this instance the entire superior border of the epiglottis was covered by a linear erosion. It was a well-marked instance of this lesion, and these gentlemen may remember the case.

So far as my observation goes, these erosions are of rare occurrence in very young persons. To one such instance, however, I will briefly allude, as it is a case of much interest. See No. "4."

Some time ago, Mr. H. Hurlburt, a merchant of this city, brought one morning to my office his young daughter, a child some five or six years of age, who, as the father stated, had had a cough for several weeks, for which the family physician, who is an experienced practitioner and a member of the Academy, had prescribed many of the ordinary remedies. Still her cough increased, and for several days preceding her visit to my office, had harassed her night and day, until the child was nearly worn out with the increasing irritation—an irritation which the patient constantly referred to the throat. Suspecting the nature and locality of the irritation, I attempted to examine the throat; the fauces and pharynx were inflamed, and although it was difficult to bring the epiglottis into view, so as to decide positively that erosions were present in that location, yet the symptoms were so like those which had occurred in other cases where erosions of this cartilage were found, that I ventured to make a free application of a strong solution of the nitrate of silver to the epiglottis. The result confirmed the diagnosis; the cough ceased immediately after this single cauterization; nor was there any return whatever of this symptom thereafter. This occurred many months ago, and within the present week Mr. Hurlburt assured me that his daughter "had not coughed since that visit to my office."

The announcement of the great frequency with which these lesions which we have been considering occur, will, I doubt not, surprise the profession.

Since my attention has been called to their existence, I confess I have been amazed, not only at the number of cases in which they have been found, but at the occasional severity of the symptoms caused by these apparently insignificant lesions, and the frequency with which these symptoms have been attributed to other causes.

I am indebted to my assistant, Dr. Richards, who has kept a careful record of these cases, for an account of the number of instances in which, during the last twelve months, erosions of the epiglottis have been observed.

Of four hundred and two patients affected with some form of disease of the respiratory passages, who were examined and treated between the 1st of May, 1856, and the 30th of April, 1857, there were found thirty-four instances of well marked *erosions* of the epiglottis. Of this number twenty-one cases occurred in males, and thirteen in females. In upwards of twenty of the above cases, these lesions existed entirely independent of tubercular disease.

SECTION V.—ULCERATIONS OF THE MUCOUS MEMBRANE, OR OF THE GLANDS OF THE EPIGLOTTIS.

It is important to understand the pathological differences, if any exist, between erosions and ulcerations of the mucous membrane. M. Louis, in describing the lesions of the mucous membrane of the epiglottis and larynx, in phthisis, to which I have alluded in a former chapter, caused by the contact of tuberculous matter, speaks only of *ulcerations*. He undoubtedly considered *erosions* as but the first degree of ulceration, for he remarks that some of these ulcerations escape notice on account of the flattening of their edges, and "their pinkish color," and that "in two cases only did the

superficial ulcerations of the epiglottis reach the fibro-cartilage beneath."

Prof. Hasse declares that tuberculous erosions are limited to the epithelial covering, and "hence they are not always detected at first sight, but that true ulceration of the mucous membrane in phthisis presents a notable difference from the above."*

I have watched these lesions with great care, and, however long continued, have found them always remaining superficial.

I have never observed an erosion to degenerate into a true ulceration. They commence with, and are confined to the epithelium of the membrane.

Primary ulcerations of the epiglottis—many instances of which I have observed to exist entirely independent of tuberculous disease—differ essentially, in their anatomical characters, from the erosions of the same organ.

According to Hasse, the tuberculous ulcer, or the ulcer peculiar to phthisis, occurs most frequently in the larynx, but they are found in many instances, observes Hasse, on the posterior face of the epiglottis, and they appear to originate in various ways.

"Tubercle commonly," says he, "accumulates within the capsules of the muciparous glands, elevating the latter into little eminences, and ultimately, when the softening process is completed, leaving corresponding ulcers in their stead."† In other cases, again, tubercle cells, instead of normal cells, form beneath the epithelial covering, and irritating the contiguous textures, produce first, loss of substance, and finally ulcers.

So far as I have been able to notice the inception of primary ulcers of the epiglottis, they have seemed to ori

* Op. citat. pp. 357–8.

† Op. citat. p. 359.

ginate in the follicles of the membrane, and not to be the result of erosions.

At first, an enlarged or pimple-like follicle appears on the border of the epiglottis, surrounded by an inflamed and highly injected portion of mucous membrane. Soon the follicle softens, and degenerates into an ulcer, with irregular edges and an inflamed and reddened circumference.

In many instances these ulcers remain for some time superficial, destroying only the mucous membrane; in others, they penetrate deep into the fibro-cartilage, and occasionally they result in the total destruction of the epiglottis. Two such instances have been observed by me in which the epiglottic cartilage was completely destroyed by ulceration. To these cases I may allude hereafter.

To the first case of primary ulceration of the epiglottis, which I have on record, my attention was accidentally called. I had no preconceived opinion of any lesions of this nature, except such as Louis, Cruveilhier, and other pathologists, had described, as being peculiar to, and complicated with, tuberculosis—lesions, in short, which have only claimed the attention of the practitioner *after* the death of his patient; and not such as are the efficient cause of disease, and whose removal will effectually arrest diseased action.

The following is the case to which I refer:—

Several years ago, Mr. E. Bulkley, a shipping merchant, of this city, aged about twenty-five years, applied to me on account of a cough under which he had labored for several weeks. It came on gradually, at first, but latterly had much increased in severity. A careful examination was made to ascertain the cause of the cough.

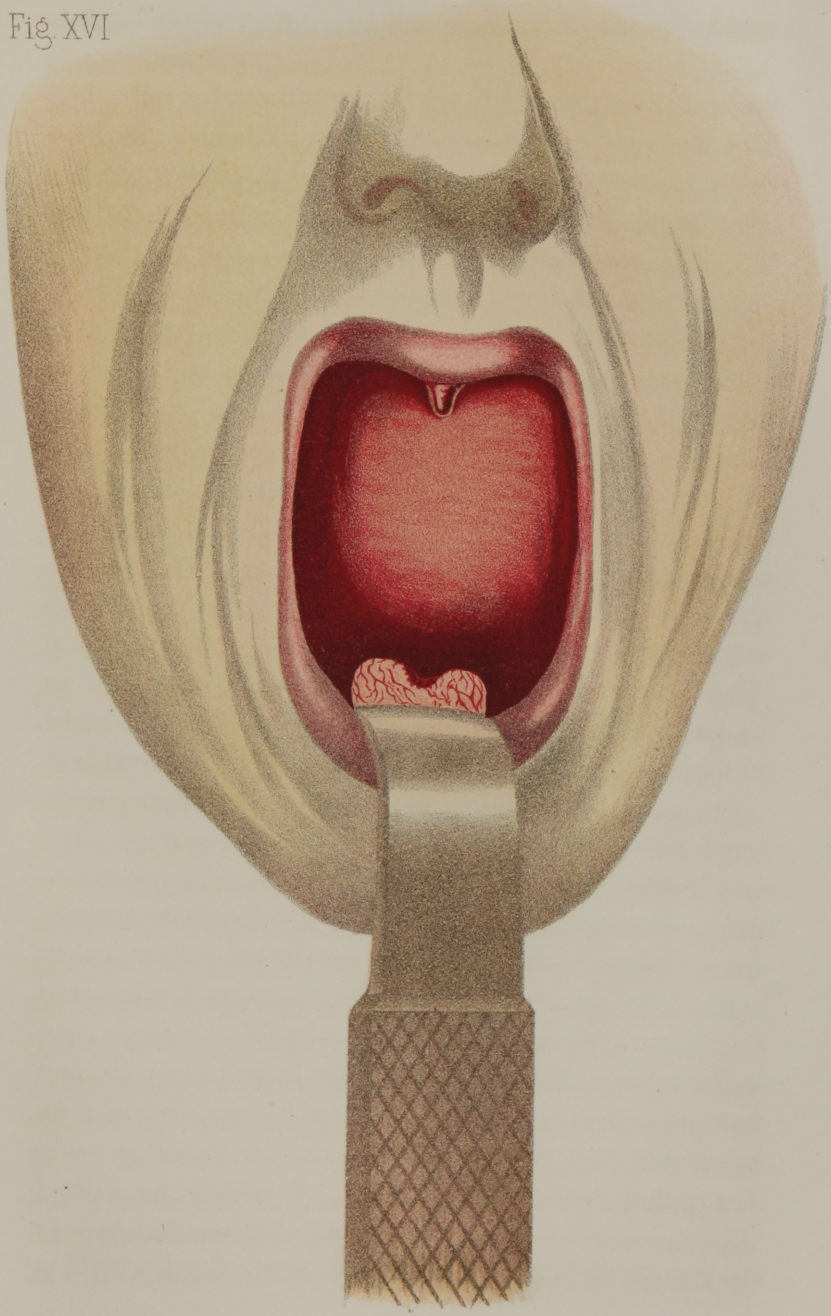
Slight redness was observed about the fauces, but not sufficient to account for the severity and persistence of the most prominent symptom. Not the slightest indication of disease could be found about the chest of the patient. The epiglottis was not inspected, because at this time we were not accustomed to examine this organ for pathological revelations. Indeed, at this period, large numbers of the profession had never seen a *living* epiglottis!*

General measures were adopted in the treatment of this case, and for several weeks alteratives, followed by anodynes, expectorants, sedatives, and various other means, were employed to relieve the cough, without producing any permanently beneficial effect. On the contrary, at the end of the third week this symptom was much augmented; and was attended, moreover, with a free expectoration. The patient was daily losing flesh, and he now began to complain of erratic pains in his chest.

These symptoms alarmed both himself and his friends; and, urged by the latter, he determined on taking a sea voyage. To inform me of this, his intention, he called about four weeks after he first came under treatment. At this visit I again examined his chest, without discovering any evidence of thoracic disease. His throat, too, was more thoroughly inspected than at any former time. On exposing the epiglottis to view, I was surprised to find the upper border near the centre of this organ occupied by a large ulcer, which had destroyed a considerable

* This present season (1863), a physician of extensive practice, and of many years' experience, called on me, to see my practice, to whom I exhibited a *diseased* epiglottis; who declared that he had "never before seen the *living* epiglottis"—an admission frequently made by physicians.

Fig. XVI



Ulceration of the centre of the Epiglottis.

part of the superior central portion of this cartilage. (See Plate XVI.)

I informed my patient of the discovery, and proposed immediate cauterization. The ulcer was touched with the solid nitrate of silver without producing any pain or irritation whatever! Mr. B. has since frequently declared that his "cough ceased from that hour."

It was not altogether arrested by this single application; but the relief was remarkable. He coughed but little for the next twenty-four hours; and two or three similar applications subsequently made, were effectual in entirely arresting the cough; and my patient regained, rapidly and permanently, his health.

It cannot be doubted, I think, had this local source of irritation been continued, that disease of the lungs, in this case, would have been ultimately developed; and it is equally probable that an ulcer of the epiglottis, discovered after the fatal termination in such a case, would be considered not the *antecedent* and exciting cause of the general disease, but as the *sequent*, and would be classed among the tuberculous ulcers of M. Louis.

In several instances, all the prominent rational signs, with some of the earlier physical manifestations of pulmonary disease, have been observed to follow long-continued ulceration of the epiglottis, all of which symptoms have been seen to disappear after these lesions have been healed. Within the last five or six years I have treated several medical men with erosions or ulcerations of this cartilage, whose symptoms were such as to have given them much anxiety about the safety of their lungs. I will here give briefly the case of a physician well known to the profession of New Jersey.

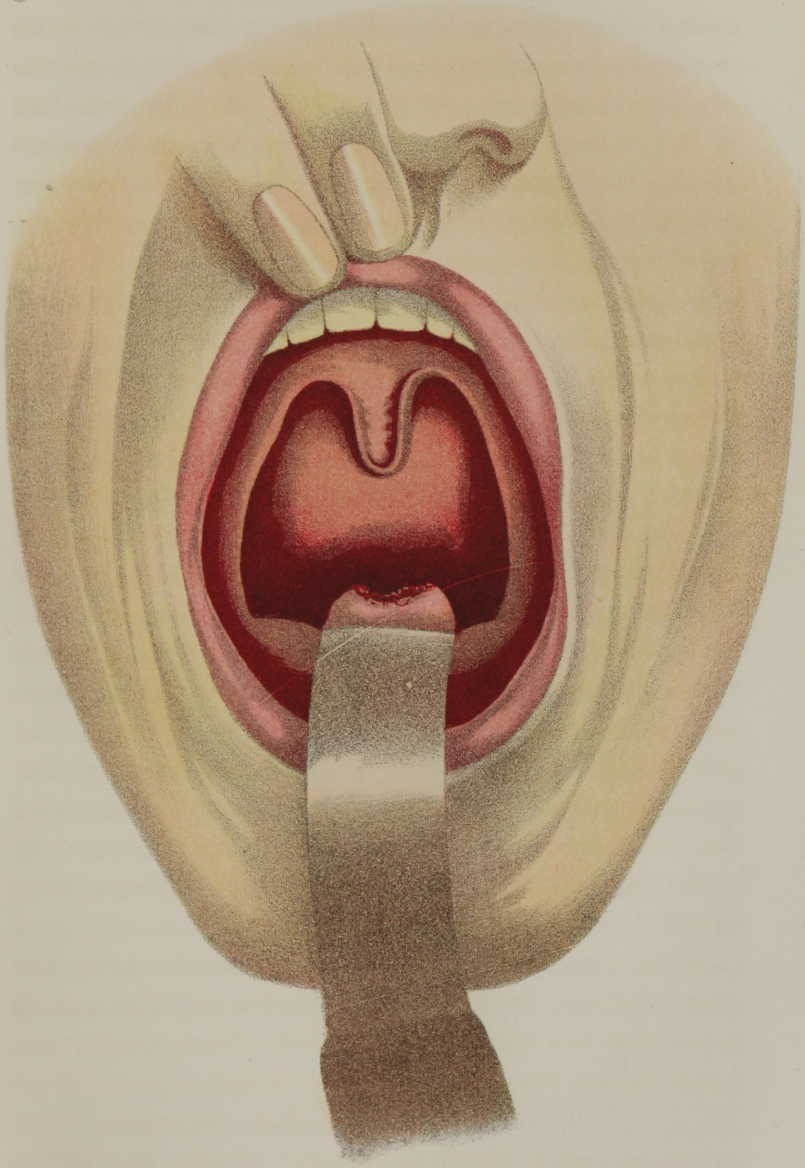
Dr. L. S. called on me in June, 1855, to consult me

about his health. During the preceding year he had been aware, he informed me, of some chronic irritation of his throat, for which he had occasionally applied the nitrate of silver solution. This gave him relief for a time, but three or four months before his visit to me, he began to cough, apparently from an increased irritation in the throat, but this irritation was not now relieved by the cauterizations. The cough, on the contrary, increased in severity, was obstinate, not being much influenced by any measures taken to relieve it. After a time some expectoration accompanied the cough, and these symptoms were followed by uneasy sensations or wandering pains about the chest. He lost flesh, and his strength diminished. Under these circumstances he determined, as he informed me, to give up his professional duties for a time, and seek to restore his health by a change of climate. It was at this stage of his impaired health that I saw him.

After hearing the doctor's history of his case, and particularly after examining his chest, and finding there no adequate cause for his severe and protracted cough, and other unfavorable symptoms, I suspected the presence of concealed erosions or ulcerations about the glottic or epiglottic regions. His throat was examined; the mucous membrane of the fauces and pharynx was moderately inflamed, and some of its follicles were enlarged.

With some difficulty the epiglottis was brought into view, when an ulcer, which had destroyed the mucous membrane and had penetrated into the cartilage, was found in the centre of the apex of this organ. (Plate XVII.) I was at once satisfied that the teazing and persistent cough which for several months had so an-

Fig. XVII



Ulceration of the Epiglottis

noyed Dr. S., was kept up by this condition of the epiglottis; and the result of the treatment adopted confirmed this opinion. The ulcer was well cauterized with the solid crystal of the nitrate of silver, and a strong solution applied to the mucous membrane of the fauces and pharynx. As in the preceding case, this single cauterization arrested the cough; and although Dr. S. returned several times subsequently and had the applications repeated on account of some remaining irritation, yet no further paroxysms of coughing occurred; his unfavorable symptoms all disappeared, and he regained a good degree of health, which, I believe, still continues.*

I have had an opportunity to exhibit these lesions of the epiglottis to many physicians who had never before seen anything of the kind in the living. Within a few weeks, when honored by a visit from three of the Senior Surgeons of the U. S. A.—Drs. McDougal, of Baltimore; Finley, of Philadelphia; and Satterlee, of New York—the case of a gentleman of this city, with a central ulceration of the epiglottis, was exhibited. This gentleman had been affected for two years with a cough, which he compared to the hooping-cough, because of its severe and spasmodic character. Topical applications to the local disease in this case arrested the cough in the course of a few days.

When ulcerations occur on the laryngeal face of the epiglottis—and in the tubercular cases observed by M. Louis, this surface of the organ, and generally speaking its lower half, was their almost exclusive seat—it will be

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* August 14th, 1863, being on a visit to Saratoga Springs, I to-day saw Dr. S., who is well, and has been able to attend to his professional duties ever since his treatment in 1855.

impossible to detect their presence by ocular inspection, as you can in those cases in which the border is invaded. I have described elsewhere the alteration which takes place in the aspect of the epiglottis, when that cluster of follicles which is situated at the base of this organ, and which constitutes the epiglottic gland, becomes the seat of ulceration. Its naturally crescentic shape will be considerably increased when ulceration to any extent exists in this location.*

In addition to the symptoms which have been enumerated, there is frequently some degree of pain in the larynx when the lower portion of the cartilage is ulcer ated, together with more or less difficulty in deglutition. Aphonia is also present, because, generally speaking, there are, coincident with these lesions, at the base of the epiglottic gland, ulcerations in the larynx, and about the vocal cords.

I shall be pardoned, I hope, for alluding to one other instance of epiglottic and laryngeal disease, inasmuch as the gentleman of whose case I shall briefly speak, was several months under the treatment of the celebrated Hahnemann, and his final directions, as given to this gentleman, illustrate a principle in Hahnemannic practice which I believe has not yet been published to the world.

Mr. G. B., a merchant, formerly in this city, visited Europe in 1838, principally on account of a disease—laryngeal phthisis—under which he had labored for several years. After consulting several eminent men in London, he went to Paris, and placed himself under the immediate care of Hahnemann.

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* At the present day, however, with the *laryngoscope,* these and other lesions of the air-passages are readily discovered.

Being in Paris at that time, and occupying rooms in the same house with Mr. B., I saw him daily, and watched with much interest the effects of Hahnemann's treatment on the case.

Mr. B., who had been under the treatment of Dr. G. (a Homœopathic physician of this city), before leaving for Paris, had the most implicit confidence in this plan of treatment, and gave, therefore, during a period of three months, undeviating attention to all the rules and directions of his physician. It is sufficient to say, however, that no effect whatever was wrought upon his disease; and, at the close of the above period of time, he left Paris for home, utterly disheartened, "to die among his friends." I had preceded him, and arrived in New York a few weeks before he came. Soon after he reached home, or early in 1839, I was called to see him, and his case was one of the first I ever treated by topical medication.

It was a strongly marked case of chronic laryngitis, attended with ulcerations of the epiglottis, and of the larynx and trachea. He was much emaciated; had severe cough, with expectoration of purulent matter.

Mr. B. now gave me the history of his treatment under Hahnemann, and why he quitted him so abruptly.

Until within a short period of the time he left, Hahnemann had assured him of the positive, ultimate success in his case, of the "potentized" remedies. But finding, at length, that no effect was produced on the disease, he informed Mr. B. that such was the peculiar character of his disease, that it could not be influenced by Homœopathic potions, and that the nature of the disease must be *changed.* He, therefore, advised Mr. B. to *contract syphilitic disease*, and await its secondary effect--

the occurrence of ulcers of the throat; that these would eradicate his present disorder, and that Homœopathy, in turn, would find no difficulty in expelling from his system the syphilitic poison

Mr. B., therefore, losing confidence in Hahnemann, gave up homœopathic treatment; and as his disease had greatly advanced in the meantime, involving the bronchial divisions, and was attended by a severe cough and expectoration, he came home to New York, and placed himself under my care.

This patient was treated by me, through many months, by topical applications, as in the preceding cases, conjoined with appropriate general remedies, and ultimately quite recovered his health. Mr. B. is still living, and will bear testimony to the correctness of the above statement.*

The number of cases of ulcerations of the epiglottis, which occurred among the four hundred and two patients, treated during the period of one year, amounts to *twenty six*, as estimated by Dr. Richards: about one-third of this number were females. I am confident, however, that a part of these cases, which have been recorded as ulcerations, were, in reality, erosions; because, at first, an erosion was considered as but the first stage of ulcer-

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* I publish this statement concerning the practice of Hahnemann, for the particular benefit of Prof. Henderson, of Edinburgh. When Prof. Simpson was preparing his masterly exposition of the "Tenets and Tendencies of Homœopathy," I was in Edinburgh, and at his request gave him some illustrations of the principles and practices of Homœopathy in America. These he embodied in the above work. In Prof. Henderson's Reply to Dr. Simpson's unanswerable facts and arguments, he devotes several pages of his work to a most appalling attack on me, and to the ridiculing of my name, instead of attempting to reply to the facts and illustrations I had given. I therefore record the above, concerning the practice of that great light in Medicine, that Prof. H. may have it to comment upon, in the next edition of his defence of Homœopathy.

ation. The exact proportion of these lesions, therefore, has not been definitely ascertained. From more recent and careful observation, I am inclined to the opinion, that erosions of the epiglottis occur with fourfold more frequency than ulcerations of this organ.

3. *Œdema of the Epiglottis, or infiltration of its connective tissue.*

It has been stated that the mucous membrane of the epiglottis adheres closely to its posterior surface; there being no connective tissue whatever interposed between the membrane and this cartilage on its laryngeal face. Consequently, in œdema of this organ, the infiltration of fluid must take place on the lingual surface, where considerable connective tissue is deposited, and cannot by any possibility be effused on the posterior or laryngeal face of the epiglottis. It is not claimed by any pathological writer, that *œdema* of the epiglottis, like the erosions and ulcerations of this organ, is peculiar to phthisis, or to any other disease of the air-passages. It is an alteration of structure, having its origin, generally, in catarrhal inflammation; and is most frequently observed in epidemic catarrhs, or influenzas. During the prevalence of an influenza, that occurred to some extent in New York, in the winter of 1853, and again in 1854, I observed many cases of œdema of the epiglottis.

In the course of the past winter, also, several persons, with this affection, have consulted me at my office for medical treatment. As we have stated, the infiltration of the sub-mucous connective tissue occurs on the lingual surface of the cartilage, causing the epiglottis frequently to assume a most anomalous aspect. Its lateral edges being rolled back and approximated, it presents, when the intumescence is considerable, much the appearance

of a round tumor at the base of the tongue. Partial, and in some instances complete aphonia, is caused by this lesion of the epiglottic cartilage.

In a paper which was furnished by the writer, and which was read before the London Medical Society in April, 1854, on "Aphonia, arising from organic lesions," the following case of œdema of the epiglottis is related:

Case—"A young gentleman, who, three weeks before, had had an attack of the prevailing epidemic [influenza], called on me, January 29th, 1853. The disease, in its early stage, was attended by a total loss of voice; and it was in reference to this voiceless condition that my opinion was desired. Some degree of cough was present, attended with slight expectoration, but the respiration was but little affected. On depressing the tongue of the patient, the epiglottis was readily brought into view, and it clearly presented that very anomalous aspect to which I have alluded.

Extensive infiltration having taken place in the submucous tissue, on its anterior face, the cartilage was enormously enlarged, its lateral borders were turned backwards and approximated, and its whole appearance was that of a round, puffy tumor, lying at the opening of the glottis. Examining with the finger, for the arytenoid cartilages, they were found to be not involved in the œdematous infiltration; and this exemption from the disease, in this location, accounted at once for the slight degree of difficulty presented in the respiration of the patient.

To procure a reäbsorption of the infiltrated serum, a strong solution of nit. argent. was applied freely to the epiglottis, and to the whole faucial region. A profuse expectoration of adhesive mucus, from these parts, fol-

lowed the application. The topical remedy was continued daily, for several days. Under its use, the tumefied epiglottis diminished constantly; at the end of a week the patient could speak aloud, although his voice had a muffled sound. Continuing the applications a few days longer, the epiglottis, at the end of this time, was found reduced to its normal size, and the patient's voice and general health were fully restored.

That the loss of voice in this case, as well as in many similar cases which have been observed, depended on the intumescence of the epiglottis, has been proved repeatedly by the fact, that when the epiglottis has been thus œdematous, voicelessness in most cases has been present, and also by the other fact, that the voice in most of these cases returned after the œdema of the cartilage had been removed.

In some cases we have had œdema of the epiglottis complicated with ulceration of this cartilage.

The following interesting case is of recent occurrence, and is one of this nature:

Case.—Mr. J. Dillon, a watchmaker, residing in the eastern part of the city, was brought to me, March 24th, 1857, in an extremely feeble condition. His wife, a strong, robust woman, accompanied him, and aided him from the carriage into my office. I was struck with his peculiar appearance. In some respects he resembled a patient in the last stage of phthisis. He was entirely anæmic; his countenance sallow and bloated, with complete aphonia, and a most harassing cough; and, although very feeble, was not emaciated.

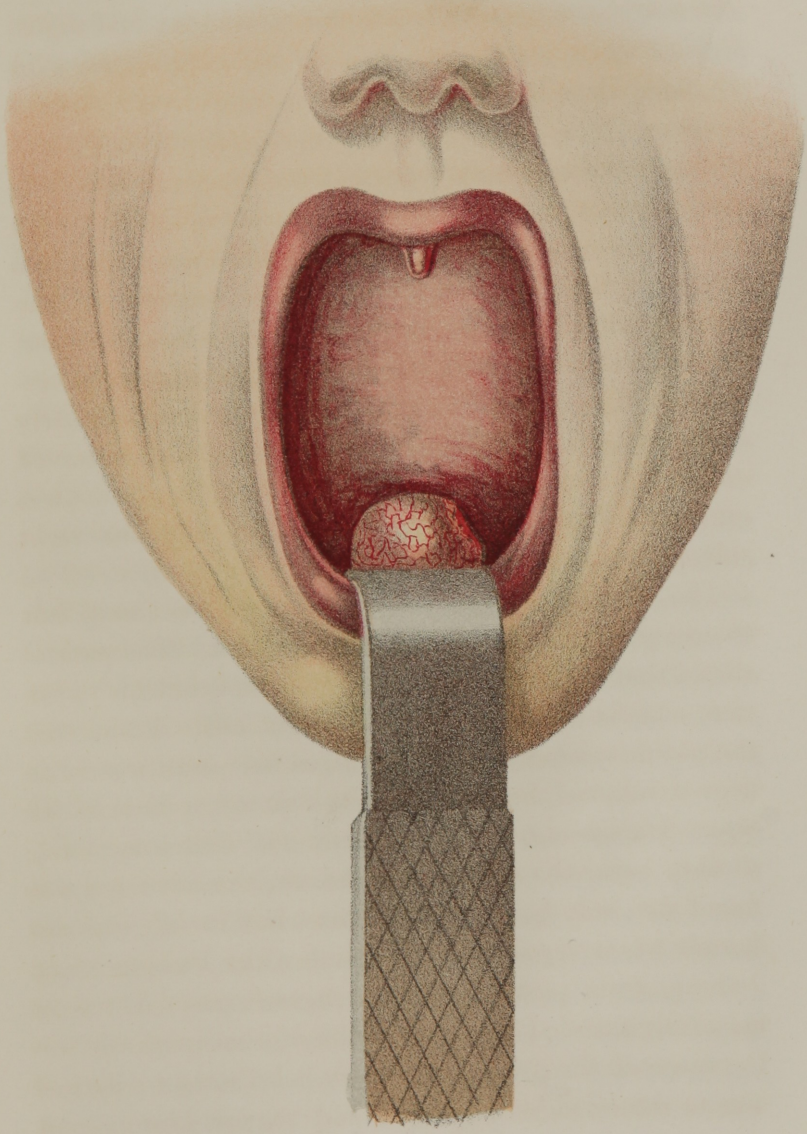
His wife gave a history of his case; stating that her husband had enjoyed good health (with the exception of having been occasionally slightly troubled with hæmor-

rhoids), until about three weeks before, when he took a hard cold, which was followed by inflammation and ulceration of the throat, and an entire loss of voice. A most severe spasmodic cough, likewise, came on, which for nearly three weeks had harassed him day and night.

To relieve this obstinate cough, and improve vocalization, his attending physician had administered repeated emetics. The operation of these, together with the violent coughing, greatly increased his hæmorrhoidal difficulty, so that, as both declared, the patient had lost from half a pint to a pint of blood daily, during the last two weeks. This accounted for the anæmic condition of the patient, and for his great feebleness. In searching out the cause of his cough, the lungs and throat were examined. The sounds on the right side were nearly healthy, a slight dulness on percussion was observed under the left clavicle, the inspiratory murmur was diminished in intensity, in comparison with the right side, and expiration was prolonged.

The thoracic symptoms, however, were not sufficient to account for the severity of the cough. The patient stated that his throat had been ulcerated, but his physician, who had cauterized it repeatedly, assured him that the ulcers were all healed. Still, as his cough was in no degree relieved, he had come to ask my opinion of his case. Depressing the patient's tongue with some force, so as to bring the epiglottis into view, this cartilage was found not only greatly œdematous, but its left superior border was covered by a large unhealthy looking ulcer. Judging from past experience, in such cases, I was at once fully satisfied that this lesion of the epiglottis was the cause of the protracted cough. I therefore desired him to return to his physician, and request him to come

Plate XIX.



Tubercular Ulceration of the Epiglottis

to my office, with the patient, the following day (for I was very anxious that he should know of this concealed local difficulty in his patient's case); or, if this was not convenient, to request him to examine for himself the epiglottis; confident that if the Doctor discovered the ulceration he would be able to relieve it, as he had already relieved others, in the upper part of the patient's throat. But the patient returned the next day, without the Doctor, bringing the request that I should treat the case, and the assurance of the Doctor that it was not necessary he should be present.

The treatment of this case was commenced by applying a solution of the crystals of nitrate of silver, 80 grs. to the ounce, not only to the ulcerated border of the epiglottis, but to its whole lingual surface, and an alterative was also prescribed, in doses of a fluid drachm twice daily. Form. No. 19. (Plate XVIII.)

March 26th. Find the patient greatly relieved, so far as his cough is concerned, but extremely prostrated, from the great loss of blood, which had escaped from the hæmorrhoidal tumors. He has discharged, say his attendants, "half a pint of blood" several times in the twenty-four hours. The last discharge being still in the vessel, was examined, and found to consist of dark coagulated blood, half a pint at least, in amount.

The patient's face, hands, and feet, are bloated, and it is quite evident that unless the hæmorrhage be speedily checked, he will die from loss of blood. An examination was made immediately after an evacuation of blood, when three large hæmorrhoidal tumors were found. The mucous membrane which covered these was ulcerated at many points, through which openings the blood was constantly oozing.

It was determined to operate upon these tumors with the *nitric acid*, instead of the knife or ligature; accordingly the next day, the 27th, aided by my assistants—Drs. Richards and Farrington—the tumors being brought down by an effort of the patient, I painted their surface freely with the nitric acid; a sponge wet with a solution of carbonate of soda was then applied to neutralize the redundant acid, and the parts being well smeared with sweet oil, were pressed back above the sphincter. The hæmorrhage was almost entirely arrested. A small amount of blood was discharged the next day, when the remaining portions of the tumors were again cauterized with the acid, after which the hæmorrhage ceased altogether. The operation proved perfectly successful.

During the two days in which attention was given to the treatment of the piles, the epiglottis was neglected, and the patient's cough again increased. A few more applications were made to the epiglottis, which reduced the œdema, and healed the ulcer. Tonics were administered to the patient, and he made a rapid recovery. He is now quite well, and is attending daily to his ordinary occupation.

It will be difficult to give the exact proportion of patients affected with œdema of the epiglottis, for in most instances of ulceration of the epiglottis, and in many cases of long-continued erosions of this organ, more or less œdema of the cartilage was found to be present. Dr. Richards has recorded twenty-nine cases of this lesion, which were observed among the four hundred and two patients to whom reference has been made. Eight only of the twenty-nine were females.

With those physiologists who have been accustomed to consider the integrity of the epiglottis as being essen-

tial to the perfect act of deglutition, this may be an interesting inquiry—how far are the functions of this organ interfered with by the lesions we have described? Ordinarily, neither erosions nor ulcerations of the border of the epiglottis will increase, to any extent, the difficulty of deglutition. Two cases have come under my notice, in which the epiglottis of the patient was entirely destroyed by œdema and ulceration; and yet, in both instances, these patients, after a few weeks, could swallow either solids or liquids without the slightest inconvenience. In both these instances the destruction of the epiglottis was caused by ulceration following extensive œdema of this organ; a condition which supervened upon a constitutional syphilitic taint. In the first instance, I did not see the case until the epiglottis was nearly destroyed by ulceration.

The second case was that of an unmarried gentleman, of New York, who, several years before, had contracted syphilis, of which he had supposed himself to have been cured. After taking a severe cold in May, 1855, which was attended with inflammation of the throat, ulceration of the tonsils and soft palate set in, and was followed by œdema and ulceration of the epiglottis.

When I first saw this patient, the disease had been progressing several weeks. A large ulcer had perforated the velum, and several smaller ones were about the left palatine arch, and in the sub-tonsillary fossa. The epiglottis was extensively œdematous, and its superior portion much ulcerated. The act of swallowing was both difficult and painful. Constitutional remedies were administered, and the ulcerated points were touched with the solid caustic. Under this treatment the ulcerations healed rapidly; the œdema of the epiglottis was reduced,

and the patient, at the end of two or three weeks, could swallow without difficulty. He returned to his home in the country, and continued better until some time in July, when he had another attack, and came back to the city for further treatment. Similar measures were adopted, and at the end of a week he again returned home greatly improved in health. I saw no more of him until the 19th of October following, when he again called on me ; and on inspecting his throat at this time, I was greatly surprised to find that two-thirds of the epiglottic cartilage were already destroyed by ulceration. The remaining portion was freely cauterized with solid nitrate, but the ulceration was not arrested until the epiglottis was almost entirely destroyed, a very small part of the cartilage only remaining. During the progress of the ulceration, the patient found but little difficulty in swallowing morsels of solid food in moderate quantities, but when he attempted to take liquids of any kind a violent spasmodic and suffocative cough ensued, by which the fluids were frequently ejected through the nose. After a few weeks, however, the parts adjusted themselves to the exigency of the case, the glottis was closed without the aid of the epiglottis, and deglutition was accomplished, and has ever since been performed without any embarrassment whatever; nor has phonation, in any degree, been interfered with by the loss of the epiglottis. This gentleman's case I have had opportunities of exhibiting to many physicians. By forcibly depressing the tongue, the lips of the glottis—not being concealed by the epiglottis—can be seen, and on directing the patient to make an effort at deglutition, the superior parts of the arytenoid cartilages have been seen to close laterally, like a double valve, over the glottic cavity.

In still another way we are able to demonstrate that the glottis in this case is closed after the manner I have described. By thrusting the middle and longest finger over the base, or roots of the tongue, the opening of the glottis can be reached by its point; and, on the moment of its touching the lips of the glottis, the irritation will cause a spasmodic closure of this opening, which can be distinctly felt by the finger.

All this accords with the facts elicited, and the conclusions adopted, by M. Longet, who has performed many interesting experiments on dogs, by completely excising the epiglottis, in several of these animals, and observing, subsequently, the effect of this operation on the act of deglutition.

He found that solid food, after the removal of the epiglottis, still passed with facility, but that in the deglutition of liquids, some portions of the fluid would escape into the glottis, causing the convulsive cough. M. Longet also established this fact, that the closure of the glottis, sufficient to protect the trachea in deglutition, is still effected, ultimately not only after the loss of the epiglottis, but after a division of the nerves which control all the muscles proper to the larynx.

This occlusion of the glottis, under such circumstances, he found was effected, not through the influence of the crico-thyroid, nor the thyro-hyoid muscles, for these were paralysed by a division of the nerves, but through the *inferior constrictors of the pharynx*, which by embracing the diverging alæ of the thyroid cartilage, folded them one against the other; thus approximating the borders of the glottis, and closing, effectually, the opening of the larynx. In the cases to which I have referred, in which ulceration had destroyed entirely the epiglottis of the

patients, the occlusion was effected apparently in the manner pointed out by Longet, for in both these patients (and the experiment was made by several medical men besides myself), in touching the opening of the glottis, the apices of the arytenoid cartilages, which form the lateral borders of this aperture, could be felt distinctly to close upon the end of the finger.

What, then, is the special function of the epiglottis, if its presence is not absolutely necessary to the integrity of deglutition?

The arytenoid muscles are the especial *constrictor* muscles of the glottis, and most physiologists have asserted that these muscles receive their nerves from the superior laryngeal; but M. Longet has demonstrated that they are supplied with filaments from the recurrent nerve, and that the mucous membrane covering the lips of the glottis, or the supra-glottic vestibule, in which is located that exquisite sensibility which is disturbed by the smallest drop of fluid, or the contact of any foreign body —that this space receives its filaments from the internal branch of the superior laryngeal nerve. These two nerves communicate freely with each other, but they have no connexion with the epiglottis, consequently the application of irritants to this body will have no influence upon either the motor or sentient nerves, peculiar to the larynx. But when the irritation of the sensitive mucous membrane at the entrance of the glottis, occurs, it is quickly transferred to the constrictor muscles of the larynx. It is therefore not correct to state, as many anatomists do, that the epiglottis of itself "closes completely the opening of the larynx" in deglutition.

This cartilage being placed between the entrance of the larynx and the base of the tongue, is pressed down-

wards by the abasement of the latter, at the same moment that the larynx is moved upwards and forwards in the act of deglutition, and the epiglottis is, in this way, moulded upon, and partially closes the glottis, protecting, at the same time, the sensitive mucous membrane which covers the supra-glottic space.

Although contrary to the ordinary belief, yet we announce the fact, one which can be demonstrated any day —as it has been a score of times, to medical men—that the epiglottis in its normal condition is an almost insensible organ; it may be touched with the finger, with the handle of an instrument, without producing any irritation. It may even be cauterized with the solid nitrate of silver, and no unpleasant sensation will be perceived by the patient, until the mucus which dissolves the caustic runs down and reaches the lips of the glottis, when a convulsive cough is produced.

When, however, this cartilage is eroded, or ulcerated, these lesions cause an irritation, which is not unfrequently followed by a severe and persistent spasmodic cough. This irritation, and consequent cough, I have been inclined to attribute to the morbid, or ulcerated secretion, running down and coming in contact with the exquisitely sensitive mucous membrane which covers the supra-glottic space; for this cough ceases at once, as we have seen, when this morbid exudation is arrested or changed. The special functions of the epiglottis, therefore, are, first, to render perfect the integrity of deglutition; for, as M. Longet affirms, although men and animals when deprived of it, swallow without difficulty solid food, yet it is not the same with liquids, for this cartilage serves to direct, past the two lateral portions of the larynx, the drops of liquid which, after deglutition, still lie upon the

dorsum of the tongue, and which flow over the epiglottis, and by it are prevented from falling into the supraglottic vestibule.

2d. In the act of vomiting, the occlusion of the glottis is effected by this cartilage, and thus the matters vomited are prevented from entering the trachea. In rumination also, in animals, the alimentary ball is, in the same way, hindered from falling into the glottis.

CHAPTER III.

TREATMENT OF CHRONIC PHTHISIS FOLLOWING FOLLICULAR DEGENERATION OF THE MUCOUS MEMBRANE OF THE AIR-PASSAGES.

In my view of the pathology of this disease, I have endeavored to show that the cellular degeneration commenced in the follicles situated in the superior portion of the air-passages; that its progress is from above downwards; that the abnormal change beginning generally in the follicles of the posterior nares, or those of the pharynx or tonsils, extends into the valleculæ, the pyriform sinuses, to the epiglottis, and the superior opening of the glottis, and that the occupation of the glandulæ in these locations constitutes the *First* or *Præ-Tubercular stage of the disease.*

I shall therefore observe the following stages:

1. The First or Præ-Tubercular Stage of Phthisis.
2. The Bronchitic Stage of Phthisis.
3. The Tubercular Stage of Phthisis.

SECTION I.—1. THE FIRST, OR PRÆ-TUBERCULAR STAGE OF PHTHISIS.

In the work to which I have frequently alluded, "Diseases of the Air-Passages," it is stated that the disease consists essentially in its formative stage of an inflammation—sub-acute in its character—of the mucous glandules of the nares, fauces, and pharynx; and is ex-

tended thence by continuity to the glands of the epiglottis, larynx, and trachea.

After many years' experience in the treatment of a great number of cases of follicular disease, I have found it more convenient, and I think it is pathologically more correct, to limit the primary manifestation or præ-tubercular stage of phthisis to a degeneration of the epithelial element of the *glandules* of the aerial mucous membrane located in the *fossa nasalis*, the tonsillary glands, the pyriform sinus, and to those of the epiglottis, and about the opening of the glottis. As the follicles of these parts are ordinarily affected in the order they are here named, and as disease generally lingers for months, and often for years, about these follicles, before affecting those of the trachea and bronchi; and, moreover, as it is while the deterioration is limited to the epithelium of these parts, that the affection is more certainly reached by remedial measures, and the dyscrasia it produces more certainly arrested in this, than at a later stage of the disease, it seems most appropriate to consider this the first, or precursory stage of Tuberculosis.

As it is in this precursory stage of the affection that the plan of treatment indicated is altogether the most likely to prove permanently effectual in arresting the malady, it is greatly to be deprecated that the attention of the physician is so seldom called to the disease, in this, its præ-tubercular stage.

It has been stated in a former chapter that the onset of this disease is in many cases so insidious and its progress so gradual, that it may have continued for months, and even for years, making considerable advance before the presence of any prominent local symptom shall have called the attention of the individual to the permanent

existence of the affection. At length the patient perceives an uneasy sensation in the upper part of the throat; or his friends, perhaps, are first to observe in him a habit of repeatedly attempting by "hawking," or by the act of deglutition, to clear the throat of something sticking, apparently, in the posterior fauces, or at the top of the windpipe. Earlier, or it may be about the same time, the voice appears changed; slight hoarseness is present, which at first is hardly perceived in the morning, or after meals, but which is increased towards evening, and after speaking or reading longer or louder than usual. The glandules, which in their normal state secrete a bland and transparent mucus, now pour out an increased quantity, which having become viscid, opaque, and adherent, and changed in quality, not only communicates the disease to related neighboring parts, but increases the irritation in these parts.

In this condition the symptoms may remain for a long period, nearly disappearing at times, and then being greatly aggravated by vicissitudes of temperature, increased exercise of the vocal organs, and by various other morbific causes. Yet I have seldom known the disease to disappear spontaneously after progressing to this extent, although it may continue for many years, and even through life, without awakening tuberculosis.

If we examine the throat during the progress of the above symptoms, we shall find the epithelium that covers this tissue in its normal state, more or less destroyed, its absence being manifested by the slightly raw or granulated appearance presented by that tissue. The membrane itself is frequently thickened, the follicles will be found hypertrophied, and to have become distinctly visible,

particularly those studding the upper posterior and lateral parts of the pharyngeal membrane. (Vide Fig.)

In those cases where the disease has been long continued, a portion of the follicles will be found in some instances greatly enlarged and filled with a yellowish substance, having a resemblance to, and presenting the physical character of, tubercular matter. These single diseased and distended follicles are not readily observed, and are therefore frequently overlooked. A single follicle situated in the tonsil or in the lateral tissues of the fauces, will in some instances become greatly enlarged by active heterogenous proliferation, its membrane stretching so as to become the size of a large pea or even that of a hazel-nut, and be filled with degenerated epithelial cells.

A gentleman of this city, whom I treated for long-continued and severe chronic folliculitis, was greatly disposed, during treatment, to this morbid distension of single follicles. When he came under treatment several were observed, filled with cheesy matter; one located at the side of the throat, just above the pyriform sinus, was distended by this characteristic lardaceous matter, which, on microscopic examination, presented the same tubercular appearance found in the cavities of diseased tonsils. (Fig. p. 218.) As these distended follicles frequently do not burst for many months, they should be opened, the contents pressed out, and the sac cauterized with the solid crystal.

It has been stated that the tonsillar glands are composed of aggregated follicles. In many cases, as we have seen, the deterioration commences in the cellular element of these organs, and we frequently find the tonsils hypertrophied, and exhibiting positive evidence that

some portion of the gland is in a morbid condition, and is constantly furnishing a *pathological fluid*, "which, when brought into contact with the neighboring parts, may then exercise an unfavorable contagious or irritative influence." (Virchow, p. 487.)

It is at this stage of the progress of the disease that so much will depend upon the course to be adopted by the attending physician, that success, ordinarily, will not attend a temporizing method of treatment.

CASE.—Dr. D. P., a physician of Brooklyn, called on me January 28th, 1863. Some two or three years before he began to be troubled with irritation in the throat, which would occasionally interrupt for a few days his professional duties. Still he continued to attend his patients in the city the principal part of the year, although very slight exposure was quite sure to make him worse, and oblige him to intermit his duties for some days. About four months before he called to consult me, he began to have almost constant trouble in his throat, with pain and irritation at the top of his larynx, causing a desire to "hem," or to clear the throat of viscid phlegm, or matter, which appeared to be continually collecting in the fauces. He called on several of his professional brethren for advice, all of whom, on examination, assured him that his throat was not much "diseased," that the difficulty came from his stomach, etc., and advised a course of blue pills, followed by tonics, etc. This course, pursued several weeks, did not seem to relieve him permanently. Objections were made to propositions to visit me, as several physicians declared his disease was not in the throat; and as he had no constant cough, it could not arise from disease of the lungs. He was therefore dissuaded, for many months, from con-

sulting me. However, he came at the time above named, notwithstanding a professional friend in New York, after examining his case a few weeks before he came to me, had said that it was not diseased. But so positive was Dr. P. that disease existed there, that the very day he visited me, he called on his friend, and requested another examination, but the Doctor again assured him most positively, that no disease existed in his throat! and he advised him to have no *local* treatment, as *that* was not indicated in his case.

On auscultating his chest, a normal state of both lungs was found to be present; slight bronchial râle, alone, on one side was found. But an examination of the throat revealed extensive chronic folliculitis. Enlarged and indurated follicles studded the lateral posterior fauces, the tonsils were greatly hypertrophied and diseased, from which quantities of purulent or caseous matter could easily be discharged by pressure with the finger. (See Figs. 11 and 18.) The uvula was elongated; and on depressing the tongue, so as to see the epiglottis, much of its superior border was found to be serrated with old ulcerations and erosions.

Without then knowing what his medical friends had told him, I expressed the opinion that his disease originated in the cellular element of his throat, and that the excision of the tonsillary glands, and amputation of the uvula, followed by topical medication, etc., would be necessary for the successful treatment of the case.

As some objections were made to this plan of treatment, I refused to take charge of the case, unless it could be carried out. On the 30th the Doctor returned, and requested that the treatment might be employed.

The hypertrophied portions of the tonsils were excised,

the uvula truncated, and a solution of crystals of nitrate of silver, of the strength of 80 grains to the ounce, was applied to the enlarged follicles, and to the epiglottis; and Form. No. 16 advised, in drachm doses to be taken twice daily. The topical applications were continued every few days until the last of February.

Improvement began immediately. The throat healed in a few days, and on the first of March Dr. P. called to tell me that he had entirely recovered. He has been ever since in robust health.

Every year during the last twelve or fifteen years I have saved many valuable lives, I believe, by the employment of prompt and radical measures in the treatment of these well marked cases of follicular degeneration.

When the diseased glandules can be reached (those occupying the surface of the tonsils, and those studding the mucous membrane ordinarily can be) by topical medicaments, the pathological change can generally be arrested by these measures; but when *conglomerated* follicles are involved, and particularly those located in the centre of the gland, excision of the diseased portion becomes absolutely necessary to insure the successful treatment of the case.

That the operation is attended with but little pain, and when properly performed, is without danger, the author endeavored several years ago to show in his work on "Diseases of the Air-Passages," p. 216, etc. With a knife, having a long and slender blade, terminating in a probe point, and a pair of double hooks, the gland is seized, drawn out from between the pillars of the fauces, and excised at any point chosen.

Having operated with these instruments in many

thousand cases with perfect success I can truly aver that I have never known an instance where any real danger attended this operation. The hæmorrhage that follows is in some cases quite free, but never in such excess as to endanger the patient. Indeed the occurrence of pretty free hæmorrhage in these cases is always followed by good effects.

Nor is there any difficulty to be apprehended in truncating an elongated uvula. Various instruments have been employed for performing this operation.

The most simple and altogether the most convenient instruments are the curved scissors, and a pair of long and slender forceps, having finely serrated blades.

With these forceps the extremity of the uvula is seized, and the scissors being carried into the mouth, the excision of the organ at any point may be safely performed.

It is rarely indeed that the operation for excising the tonsils has to be performed a second time; and yet cases occur where it becomes necessary several times in the same individual to remove a diseased portion of the gland.

Occasionally a case occurs where a strong tendency to tubercular dyscrasia exists, in which the remaining elements of the gland will take on proliferation, and diseased hypertrophy will again occur. In such cases I have found that the permanent health of the patient will depend on the removal of the deteriorated portion.

A gentleman of Massachusetts came under my care several years ago, who had labored under chronic follicular disease some three or four years before coming to me for advice. He was predisposed to tuberculosis, and he presented many of the earlier signs of the disease.

His tonsils were greatly hypertrophied and diseased. These were freely excised, followed by appropriate local and general treatment for five or six weeks. Under this treatment all his unpromising symptoms disappeared, and he returned to his business apparently restored to permanent health.

About six months afterwards he returned to me, presenting very much the same appearance he did on his first visit. He stated that his health after his first visit continued good several months; that he had never been better during any period of his life; when, about ten months previous, after taking a slight cold, he began to perceive a little uneasiness on one side of his throat. This at length caused a frequent desire, as at first, to clear the throat; a cough soon after came on, which, continuing to increase, alarmed him about his lungs, and he determined to visit me again. On auscultating his chest, evidences of bronchial disease were quite apparent on the right side; the lungs were normal. The throat appeared healthy, all save the right tonsil, which was enlarged to nearly the extent it was when he first came to me, from the distended cryptæ of which *ichorous* juice was being constantly secreted.

The enlarged and diseased portion was immediately excised, and topical applications of nitrate of silver were made into the pyriform sinus of that side, and into the laryngeal cavity. His cough soon subsided, and in a week or two he returned to his home again, quite recovered.

He now continued to enjoy good health for nearly a year longer, when he returned the *third time*, with the follicles of the left tonsil enlarged again by proliferation, and causing the same class of symptoms on that side, which was awakened the previous year by disease in the

cellular element of the right tonsil. The operation for excision, of the diseased portion of the gland, was performed the third time in this case, and the patient has since, during a period of six years, enjoyed uninterrupted health.

Cases of this nature seldom occur when the operation is at first well performed, yet they are occasionally found; and whenever heterogenous proliferation in the elements of the tonsillar organ occurs, it will become necessary, as we have remarked, to excise the degenerated portion.

Ten years ago, a merchant of Boston, whose mother and several other members of whose family had died of phthisis, called on me for advice.

His tonsils, which were very much enlarged and much ulcerated, and which for two years before had caused him great trouble, were excised; and the hypertrophied and diseased follicles of the aerial passages were apparently permanently removed by the employment of appropriate topical and general measures. For eight years after this treatment he enjoyed excellent health, until two years ago, when he called on me, exhibiting many of the symptoms of the præ-tubercular stage of phthisis.

An examination of the throat revealed no diseased follicles of the membrane; but the right gland, which ten years before had been pretty freely removed, was again hypertrophied and was discharging a pathological fluid, which, when brought into contact with the neighboring parts, was exercising an unfavorable contagious or irritative influence.

I advised an immediate operation for its removal. This was done, and was followed by a few applications of a solution of nitrate of silver to the surface of the

gland, and down into the pyriform sinus of that side. All the unfavorable symptoms which for two or three months had been present, disappeared, and for two years he had been in most robust health.

A microscopic examination of the part named presented the appearance shown in Fig. 6 in the Appendix.

I desire, sincerely desire to impress upon the profession the great importance of *excision* of the heterologous or pathological formations which are so frequently found in degenerated tonsils. Every day of my life I have persons presenting themselves at my office, whose lives are saved only by this operation, followed by appropriate remedies. This very day two gentlemen came from the army, the one a chaplain, the other a surgeon, from each of whom I removed greatly enlarged and diseased tonsils, and both of whom have suffered many years under severe chronic follicular disease. Both of these gentlemen have been repeatedly examined by different physicians, who attributed their ill-health to some other cause. The surgeon had been examined and treated by two eminent professors of one of our medical colleges, who declared to him that the difficulty, the disease in the throat, of which he had made great complaint, was of little consequence, and would result in no injury to him. I found the cavities in the pathological hypertrophies filled with a caseous, contagious fluid, which had already conveyed disease into the pyriform sinus, and had extended into the bronchi of the right side. Cough and expectoration showed this extension of the disease; and as two or three members of his family had already died of phthisis, he became alarmed, and obtaining a furlough for the purpose, he left the division of Burnside, and came directly to New York for medical treatment. I feel confident

that I shall be able in a few weeks to restore this patient to confirmed health.

I have stated on a former page that the numerous compound *glandules* in the pyriform sinuses were very likely to be early affected by the *ichorous* exudation that is constantly passing from a diseased tonsil over the lining membrane of the throat to the parts below. When this occurs the symptoms of which the patient complains are ordinarily intensified. The desire to swallow, or to clear the throat by hemming, is more frequent. Frequently the patient complains of pain, or of a constant uneasy sensation on one or both sides of the throat. If both sides are affected, he will refer the sensation to the central portion of the throat, near the position of the *pomum adami.* By depressing the tongue with a bent spatula, the inflamed or granular appearance of the membrane can be at once detected. This pathological condition of the sinus is most readily observed by the use of the reflector of the *laryngoscope.*

The repeated application of the local remedy by means of a small sponge-probang down into the sinus, will very soon arrest the diseased action in this position.

The same treatment will be required when the follicles situated in the small *valleculæ* at the roots of the tongue are involved.

SECTION II.—THE BRONCHITIC STAGE OF PHTHISIS.

We frequently find nearly the same class of symptoms manifested in the bronchitic stage of the disease, or after the degeneration has extended to the follicles of the trachea and bronchi, that was present whilst the affection remained principally about the superior portion of the air-passages. The sputum soon becomes increased in

quantity, and is changed in quality, for on examination of the expectoration coming from the trachea, we find the microscopic changes that are observed in the collection, taken from the cavities of the tonsils, or from the glands of the pyriform sinus. (See Fig. 6.)

As the pathological exudation extends to the neighboring follicles of the trachea and bronchial divisions, the sputum will frequently not only be increased in volume, but will often present a yellowish white or a greenish yellow appearance; and the patient often begins to exhibit that dyscrasic or *anæmic* condition of the system, to which we have alluded on a former page. The countenance appears more pallid than in health, and the mucous membrane after a time, as we have said, partakes of the same morbid condition. But this condition frequently exists a long time before tuberculosis is recognised as a disease. In this stage alterative medicines (Form. No. 16, *vel* No. 19) and tonics (Form. No. 10, *vel* No. 11) should be continued in connexion with the topical measures through many weeks.

Since the commencement of the present unhappy war, I have treated a large number of soldiers from the field, laboring under follicular disease, which appeared to result from repeated colds contracted by exposure in camp. These cases were attended by partial and complete aphonia in many instances, from which, generally, they recover readily by early and appropriate treatment. But in other cases the disease, when neglected, becomes difficult to arrest.

October 15, 1861, Gen. G., U. S. A., æt. 30, came to me, aphonic, with cough and expectoration. I examined his case. He had had catarrhal symptoms, with some difficulty in his throat, during several years; but sup-

posing it to originate from a cold, he hoped it would soon pass away. But the hoarseness and cough continued, until they began to interfere with the discharge of his military duties, and he came to consult me concerning the difficulty.

On examining his case, I found the post-pharyngeal membrane, the sides of the fauces, and the nares, covered with hypertrophied *glandules*. He coughed and expectorated constantly, but not very freely. Auscultation revealed some bronchial affection, but the lungs were found in a normal condition.

I advised topical and general treatment, and expressed the opinion that the disease might be removed, probably, in a few weeks. I made an application to the pharyngeal and faucial membrane, but as he could not at that time remain for treatment, I prescribed a solution of iodide of potassium, and a gargle of creasote and tinct. myrrh, and he returned to the army, promising to obtain a furlough, and return for further treatment in a few weeks. By the use of the gargle and the alteratives, he was much relieved, and his engagements being pressing, I saw nothing more of him till after the attack upon and siege of Fort Pulaski, which was conducted by him. After which he obtained a furlough for several weeks, and came back for treatment in April, 1863, eighteen months after I first saw him. He had suffered almost constantly in the meantime with ulcerated throat.

April 23d. His cough has increased, expectoration more abundant. Enlarged and inflamed glandules are numerous in the membrane of the throat, the pyriform sinus, and aperture of the glottis. The upper part or central portion of the border of the epiglottis is serrated with erosions, and auscultation reveals the presence of

follicular bronchitis on both sides. But the follicles of the tonsils appear to have escaped, and present nearly a normal condition—a condition which I always consider favorable in cases where follicular disease has been progressing through several years. But the aphonic voice, the cough, and increased bronchial expectoration, as well as the physical signs revealed, indicate the extension of the disease along the membrane of the bronchi and their divisions. But a careful exploration does not reveal any abnormal condition of the lungs themselves.

The General stated that he had been sent on for treatment, and any length of time he might need for the same should be allowed.

April 28th. I commenced the topical treatment, and administered Form. No. 16 as an alterative. The application of the argent. nitrat. was repeated on the 29th, and was continued every day, until the 20th of May. Under this treatment Gen. G. improved constantly. The diseased follicles disappeared entirely, and the membrane, as far as could be seen, presented nearly a normal appearance. The cough was greatly diminished, but as it continued to some extent, and the expectoration, although much less, continued, it was deemed advisable to inject the bronchi.

On the 19th of May I introduced the elastic tube, and injected through it a drachm and a half of the solution of the strength of ten grains to the ounce of water. No cough or pain followed this operation.

This treatment was continued until the 6th of June, when Gen. G. felt able to return to duty. He was immediately ordered to Charleston, to commence the siege of that city, and has since continued in the faithful discharge of his duty.

The following case is of much interest, inasmuch as it not only illustrates the plan of treatment employed, but it afforded an opportunity after treatment, of comparing the lesions with the symptoms which existed during life, and of observing the effects of the treatment upon these lesions.

G. H. W. called on me for medical advice, May 10, 1850. His case presented all the well marked symptoms of laryngeal phthisis.

There was ulceration of the larynx; the epiglottic gland, which we have seen is composed of a nest of cellular granules,was found early in the case to be occupied by an open ulcer.

Complete aphonia existed, with a severe cough; difficulty of swallowing, with dryness and heat in the throat; some pain was present, which was increased on coughing. On examining the chest, there were found indications of the presence of tubercles in both lungs, and evidence of a cavity in the left lung. The throat was inflamed, the epiglottis thickened and vascular, its border serrated with erosions, and its lateral edges approximated, so as to give the cartilage a more crescentic shape than is natural.

It is unnecessary to detail at length the treatment adopted. Both topical and general remedies were employed. Applications of a strong solution of nitrate of silver were made successively to the fauces, the epiglottis—its border and laryngeal surface—to the glottis, and subsequently into the larynx, and thoroughly down into the trachea and bronchi; the patient was invigorated by tonics and good living.

Under this treatment the patient gradually and constantly improved. He regained his voice, his cough

diminished, and his strength and flesh were considerably increased. Mr. W. was absent during the month of August, but he returned in September, and the applications being again renewed, and for a time continued, were followed by such an improved state of health, that he returned to his occupation, which was that of bookkeeper in a large mercantile house in this city. On the 1st of January he called on me. At this time he coughed occasionally, and had some slight purulent expectoration, but he still continued greatly improved. After this I lost sight of him for several years, and knew nothing more of him until informed of his death by my colleague, Dr. H. G. Cox, who has kindly furnished me with the history of his last fatal attack, and of the autopsy of the case.

Until within a few days of his death, Mr. W. had continued to enjoy such health that he was able to attend constantly to the duties of his calling. Dr. Cox, who attended his family, had seen him often, and had occasionally prescribed for him. Early in September, 1853, nearly four years after I first saw and treated him, he had left his place of business, one very cold and windy day in December, and was returning to his home. Wishing to see a gentleman who lived in the west part of the city, he jumped from the omnibus at Canal street, and ran for some distance, facing a strong, cold wind, when he was suddenly arrested by a hæmorrhage from the lungs. He was obliged to be taken home in a carriage. Dr. Cox was sent for, who found him raising, quite frequently, masses of coagulated blood. Every effort was made to arrest the bleeding, but all measures were equally unavailing. The hæmorrhage, which lasted two or three days, continued till the patient died. The

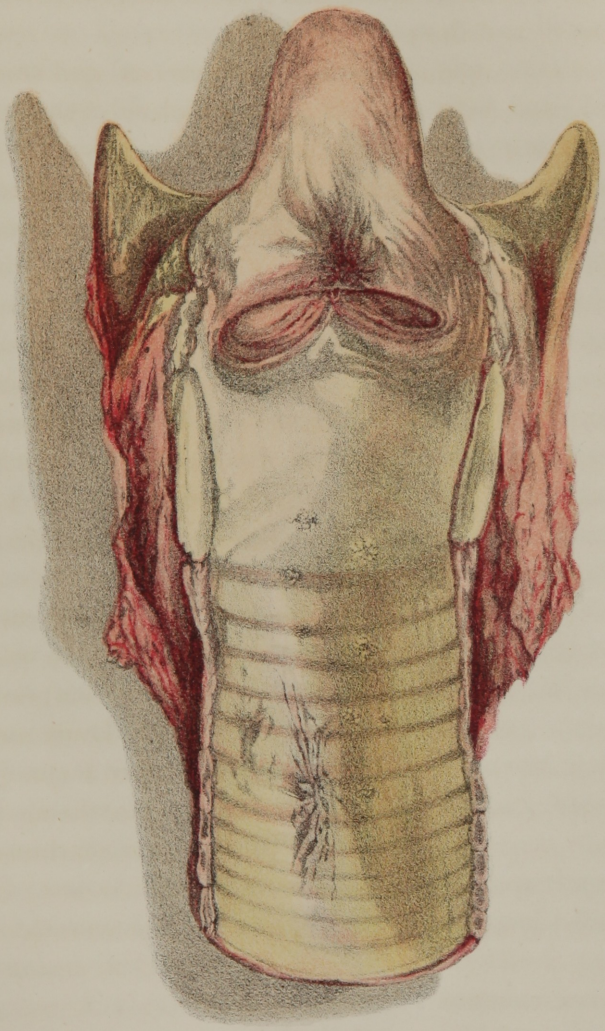
body was examined by Dr. Cox. Evidences of former tubercles were found in the lungs, but no recent ones. In the left lung were the remains of a tuberculous cavity; and opening into this dry cavity, was the mouth of a small ruptured blood-vessel, the hæmorrhage from which had caused the patient's death.

On examining the epiglottis, larynx, and trachea, Dr. Cox found the cicatrix of a large ulcer at the centre and base of the epiglottis; and scattered over the mucous membrane of the larynx and trachea the cicatrices of numerous small superficial ulcerations were found. All had been perfectly healed. (Plate XXII.)

Knowing that this patient had been under my care for several years before (as above detailed) Dr. Cox removed the larynx and a portion of the trachea, and sent the morbid specimen to me. By examining this pathological preparation, the marks of the follicular ulcerations along the tracheal membrane may be plainly seen, particularly the cicatrix of the large ulcer at the base of the epiglottis.

Now, I respectfully submit, if these erosions and ulcerations were caused, *primarily*, by the passage of tuberculous matter over the mucous membrane of the parts where they were found, as M. Louis and others believe, how is it that they were healed? (for the purulent expectoration continued long after being arrested) or, being healed, how should they have continued healed, through so long a period, when the *cause* of their production was remaining, for a time, constantly in operation?

Plate. XXII.



Ulcerations of Mucous Membrane of Larynx & Trachea.

SECTION III.—THE TUBERCULAR STAGE OF PHTHISIS.

The attempt has not been made in this work to trace distinctly and positively the line of demarcation between the non-tubercular and the bronchitic stage of phthisis, on the one hand, and the tubercular stage of the disease, on the other. In the first chapter of the work we alluded to the unfortunate fact, that it is not until the antecedents have given place to the consequent—not until the morbid product has to some extent blocked up the air-cells, that the physical signs, which constitute the only positive evidence of the actual presence of tubercular disease, disclose to us the true nature of the malady. It has been constantly insisted upon that deterioration in the cellular elements of the aerial membrane may commence, and often continue through an indefinite period, before proliferation shall take place in the air-cells of the lungs. Where no hereditary or tubercular taint is present, the dyscrasia which accompanies, and which marks the advent of this stage, is generally slow in its approach; and to my mind, the absence of all hereditary predisposition affords the best evidence of the *curability* of the case. But let this pathological degeneration be continued in the cellular element of the tissues, and sooner or later that anæmic condition of the fluids to which we have alluded, as indicative of the presence of a tubercular dyscrasia, will be quite likely to occur.

It is a matter, therefore, of the highest importance, that the treatment of the disease be entered upon before it has reached this stage.

Whenever the system is reduced by long-continued follicular disease, and especially if the anæmic condition of the fluids to which we have referred be present

alterative medicines and tonics, both vegetable and mineral, should be adopted; and together with topical treatment, be persistently employed.

The iodide of potassium (or Form. No. 19) should be given in teaspoonful doses night and morning, and Form. No. 11, or Form. No. 8, may be administered in drachm doses, either alone, and continued; or one of the tonic preparations should be alternated with the others, and the tonic, together with the topical applications, may be continued with advantage through many months.

Local measures of the same character are to be employed in the treatment of the affection, after the pathological change has involved the epithelial cells of the bronchial membrane, and those of the air-sacs, as those recommended in the treatment of the disease in the first stages. In the management of the bronchitic stage, a difficulty at first arose from our inability to introduce, by means of the sponge-probang, a sufficient quantity of the caustic solution into the bronchial division; for on passing the instrument into the glottic opening, and through the rima of the glottis, much of the fluid would be discharged from the sponge before it reached the tracheal division. On this account I was accustomed, in a multitude of instances, when treating the bronchitic or early stage of tuberculosis, to introduce the saturated sponge several times at the same sitting, in order that an increased amount of the fluid might be conveyed into the bronchiæ; and it frequently happened that patients observing the effects, would return in a few days, and request that as much of the fluid as possible should be passed into the windpipe, as the cough and expectoration, they declared, were invariably greatly improved by the operation.

For these reasons *bronchial injections* were adopted, and have been constantly employed more or less in the treatment of the bronchitic and tubercular stages of tuberculosis.

I do not intend here to enter into a discussion of the anatomico-physiological questions involved in the subject of the possibility or the practicability of this operation, of introducing medication into the air-tubes by means of either the sponge probang or the bronchial tube. Much unprofitable disputation on these subjects has, in former times, occupied the attention of the profession—a question which may be, as it has been, settled by the laryngoscopists; as with this instrument the sponge-probang and the tube may be *seen*, and has been seen, to enter the trachea with perfect ease. But the important fact to be remembered is, that in the incipient stage of follicular deterioration, the disease is often successfully treated *without entering the windpipe by either of these instruments.* Many of these cases to which I have referred, were restored to perfect health, by applications made to the diseased membrane, *above* the trachea.

The cases in the following chapter are intended to illustrate the benefit to be derived from catheterism of the air-passages in this stage of the disease.

CHAPTER IV.

SECTION I.—CATHETERISM OF THE BRONCHIAL TUBES.

In December, 1854, I read a paper before the Academy of Medicine of New York, "On the Injection of the Bronchial Tubes and Tubercular Cavities of the Lungs;" and subsequently, namely, in March, 1856, I published in the American Medical Monthly a detailed report, containing a statistical table of one hundred and six cases of pulmonary and bronchial diseases, treated by means of catheterism of the air-passages, conjoined with appropriate general remedies.

Still continuing this plan of topical treatment in diseases of the chest, I have since had opportunities to confirm the truth of some of my early observations; and, what is of equal importance, to correct other views which later experience and more extended observations have shown to be erroneous conclusions. It is to record and announce these recognised errors, and to point out some of the difficulties, as well as the advantages that attend this plan of treatment, that I bring the subject of Topical Medication before the profession.

I propose briefly to consider the following questions:

1. Can the operation of catheterism of the air-passages be performed with certainty and facility?

2. What are the difficulties and dangers of the operation?

3. What advantages are to be derived from this method of treatment?

1. With regard to the first inquiry—the possible practicability of the operation? On this point it will not be necessary long to dwell. As very few of the profession, at the present day, will deny its performance, under favorable circumstances, I shall only refer to the opinion of a few members of the profession, from among many of those who have considered this question.

At the discussion that followed the reading of my paper, to which I have alluded, on bronchial injections, before the Academy of Medicine, several years ago, it was remarked by a distinguished member of that body, who denied the practicability of the operation, that "the Academy must not decide this question until we had heard from Europe on the subject, as the profession there would act without prejudice or partiality."

Already, testimony has come to us from eminent men of the profession, in Great Britain, France, and Germany, that this operation of injecting the bronchi has by them been successfully performed.

Prof. J. Hughes Bennett, of Edinburgh, in his work, *Clinical Lectures on Medicine*, says: "I have now introduced the catheter publicly in the clinical wards of the Royal Infirmary, in several patients affected with phthisis in various stages, in laryngitis, and in chronic bronchitis, with severe paroxysms of asthma. * * * I have been surprised at the circumstance of the injections not being followed by the slightest irritation whatever, but rather by a pleasant feeling of warmth in the chest (some have experienced a sensation of coolness), followed by ease to the cough, and a check for a time to all expectoration." "These facts are made known to the profession," Dr. Bennett declares, "with a view of recommending a practice which, if judiciously employed,

may form a new era in the treatment of pulmonary diseases."*

In Paris, Prof. Trousseau, Loiseau, Blondeau, and others, have succeeded in injecting the air-passages, in various diseases of these parts. It has been employed in early phthisis, by M. Trousseau, as well as in diphtherite, in which latter disease it was attended with complete success.

It has been still more extensively employed by Loiseau, in the treatment of both diphtheritis and croup. The method of Loiseau is thus described by Trousseau, who was appointed by the Imperial Academy of Medicine, of Paris, to report upon his plan of treatment: "With the extremity of the forefinger," says M. Trousseau, "he (Loiseau) depresses the tongue, seizes the epiglottis, raises it, and presses the end of the finger between the aretino-epiglottic folds. There is then nothing more easy than to make the end of the tube glide over the finger. The air which escapes through the exterior extremity of the tube proves that it has really entered into the larynx. Through this tube, serving as a conductor, a caustic, the nitrate of silver, for example, or any other medicated substance, may be carried."

In the discussion which took place at the time, before the Academy, on this subject, M. Depaul said, "The process of catheterism of the larynx, as proposed by Dr. Green, was declared by some as being very difficult, even upon the cadaver; but I maintain," said he, "that nothing is easier than this catheterism for those who have performed it a certain number of times." Still more recently than this, comes to us the testimony of Prof.

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* See Clinical Lectures on Medicine, p. 609.

Greisenger, of Germany, as reported in the *Deutsche Klinik*, and in the *Gazette Hebdomadaire*. Prof. Greisenger has been able, as he affirms, to introduce medications of nitrate of silver solution into the air-passages. In regard to the practicability and danger of this operation, Prof. G. says: "For us, after the experiments we have made, we can affirm that these fears are illusory, and that the different parts of the operation can be performed with a rigorous exactitude." And, finally, we have the testimony of the Committee, appointed by the New York Academy of Medicine, to inquire into the truth of the performance of this operation; for they affirm, in their report made to the Academy, that of the thirty-two patients upon whom the attempt was made to inject the bronchi, the operation was performed in *eleven* cases successfully, and to the entire satisfaction of the committee. It must, therefore, be concluded that the "operation of catheterism of the air-passages," under appropriate circumstances, can be positively performed.

Notwithstanding this operation is being daily performed at the present time, yet it is not always accomplished with certainty and facility. Nature has so guarded the opening into the aerial passages that catheterism of the bronchi is an operation that will be found difficult often to accomplish. In many cases, I am confident, the tube passes over the glottic aperture, and enters the œsophagus, even when the operator feels quite certain that it has been introduced into the larynx. In my own practice I have found myself deceived, not unfrequently, especially in the first years of my experience in this mode of treatment. At first I believed the instrument to have taken the right course, but afterwards

ascertained, in many instances, that it had entered the œsophagus.

2. What, then, are the difficulties that oppose themselves to the facile performance of this operation, and what the dangers?

The *epiglottis* does not of itself close entirely the aperture of the glottis. This cartilage being placed between the entrance of the larynx and base of the tongue, is pressed downward by the abasement of the latter, in the act of deglutition, and being moulded upon, only partially closes the glottis. It is not, therefore, correct to state, as many anatomists do, that the epiglottis "closes completely, of itself, the opening of the larynx" in deglutition.

The arytenoid muscles are the especial *constrictors* of the glottis. These muscles (as Longet has demonstrated) receive filaments from the recurrent nerve. Covering the lips of the glottis is a narrow zone of exquisitely sensitive mucous membrance, which receives its nervous filaments from the internal branch of the superior laryngeal nerve. These two nerves, the one supplying the constrictors, and the other this strip of mucous membrane, communicate freely with each other, but they have no connexion whatever with the epiglottis. The irritation of this body, therefore, will have no effect upon either the motive or sentient nerves peculiar to the larynx. This is important to remember, namely: that the epiglottis, in its normal state, is an organ nearly insensible; but when the least irritation of that sensitive portion of the mucous membrane which covers the supraglottic space occurs, this irritation is quickly communicated to the constrictor muscles, through filaments of the recurrent and laryngeal nerves, and the aperture of the

glottis is as quickly shut up. When it is desirable, therefore, to medicate the aerial passages in disease of these parts, it is necessary, as all are aware, to educate the glottic aperture, by repeated cauterizations of this opening. For if, under ordinary circumstances, the attempt be made to pass the sound, or probang, into the larynx before the exquisitely normal sensitiveness of this point of membrane be partially subdued, it will prove abortive; or, if successful, and the instrument be made to pass the supra-glottic guard, a violent spasmodic action, not only of the constrictors, but of all the other muscles of the larynx, will occur, followed, often, by great irritation of the parts, and a suffocative cough; and if, under these circumstances, the operator persist in finishing the operation, by injecting a solution of the nitrate of silver into the bronchi, the irritation and cough are both greatly increased, and in some instances inflammation of the bronchial and pulmonary tissue has been awakened, apparently by these combined disturbing causes. This condition, as the result of these causes, may be illustrated by the following case:

Mrs. F., a widow lady, aged 35, recently returned from California, came under my care July 31, 1858; she was in the second stage of tubercular consumption. Auscultation revealed tubercles, with softening in the right lung. The disease of the lungs had been preceded by follicular laryngitis for many months. The right tonsil, which was still ulcerated, was nearly destroyed, and the pharynx was granular from the diseased and enlarged follicles.

She was placed under general treatment, ordinarily adopted in such cases, together with the application of a solution of nitrate of silver to the throat.

This treatment was continued until the 13th of August,

when the parts were thought to be sufficiently prepared to allow the introduction of the injecting tube. On this day I introduced, without any difficulty, the tube, and injected a drachm of the nitrate of silver solution into the right bronchus. No irritation followed the operations. As is the case almost invariably, after injections in either pulmonary or bronchial diseases, the cough and expectoration were considerably diminished for several days after this operation. With intermediate cauterizations with the sponge-probang, the bronchial injection was employed on the 16th, the 20th, and the 24th, with similar beneficial results with the first operation, the patient continuing constantly to improve. On the 26th of the month, in attempting to use the tube, the throat of the patient was found to be unusually sensitive, and it was with some difficulty that the instrument was introduced into the larynx. It was passed, however, into the trachea, in precisely the same way that it had been done on former occasions. A spasm of the glottis immediately succeeded its introduction, and instead of withdrawing it at once, as it should have been done, I proceeded to finish the operation, and injected a drachm of the solution (15 grains to the ounce) into the bronchi. By the time the operation was completed, the whole chest seemed thrown into a violent spasmodic action; a convulsive cough, with dyspnœa, followed, which continued during several hours, but was finally somewhat relieved by the use of chloroform, and the administration of anodynes. The cough and dyspnœa, however, with increased expectoration, and pleuritic pains, continued for several days; and, although the patient became in the course of a week quite comfortable again, under general treatment, yet she never entirely recovered the favorable

state she was in before the occurrence of the spasm. As the patient and friends were greatly opposed to any further *topical* treatment, it was never afterwards employed. The pulmonary symptoms increased, the disease progressed, as usual in such cases, and the patient died on the 10th of October, about two months after the last employment of the tube.

Remarks.—The above was a well-marked instance of tubercular disease of the lungs, following a long-continued case of folliculitis; one of those cases, in short, a great number of which in their early stage, in the hands of other practitioners, as well as in my own, have been, and are, successfully treated by topical medication, conjoined with general remedies; and, although a *cure* in this case could not, probably, have been effected, yet, from the favorable progress made before the operation on the 26th, I am confident in the belief that the life of the patient would have been prolonged by the treatment, if it had not been for this untoward occurrence.

A case, similar to the one I have related, came under the observation of my assistant, Dr. Richards. Not having been present when the operation was performed by Dr. R., I take his account of the case.

The patient, Mr. D. M., had been long under treatment for obstinate chronic bronchitis. Topical medication, by means of the tube and sponge-probang, had been repeatedly employed, and the patient had been greatly benefited by the treatment. Mr. M. is the same patient whose case is mentioned by the Committee of the Academy of Medicine in their report on Bronchial Injections. His case is No. 30; and the Commission thus speak of the success of the operation, as then performed in their presence: "The tube," say the Commit-

tee, "was passed without much strangling; the air was freely expelled through the tube. An injection of two or three drachms of a solution of the nitrate of silver, of the strength of thirty or forty grains to the ounce, was then thrown in. All present were satisfied that the experiment was successful." In this instance, as the report affirms, no irritation followed the operation, nor had any irritation attended any previous operations. But on a subsequent occasion, namely, on the 20th of May, 1856, he called to have this tubing operation repeated. Dr. Richards, being in attendance that morning, introduced the tube in the same manner as it had been done, both by Dr. R. and myself, on many former occasions. At this time, however, a spasm, from some cause, was immediately induced; Dr. R. did not withdraw the instrument, but proceeded to inject, as at other times. By the time the operation was finished, the muscles of the throat and chest were violently convulsed, and this was followed by a suffocative cough and profuse expectoration. This irritation, increased cough, and expectoration lasted during several days; but it finally subsided, and the patient ultimately regained a good degree of health.

I have before stated that Prof. Bennett has employed bronchial injections in the treatment of pulmonic diseases. In the *Edinburgh Medical Journal*, and in his work, recently published, on "Clinical Medicine," he has reported some most interesting cases, in which this method of treatment was employed.

Since the publication of the above work, by Professor Bennett, I have been favored with a letter from him, on the subject of bronchial injections, in which, among other things, he alludes to the occurrence of an accident,

in his own practice, similar to those whose history has been given. He writes: "A gentleman, in the last stage of phthisis, with cavities in both lungs, and tubercles very generally distributed among them, after long treatment with the probang, allowed me to inject the bronchi. I did so, and he was immediately seized with the most violent dyspnœa. I thought he would have died in my study. It continued several days, and then gradually declined. After five weeks' confinement to bed, he was restored to the same condition he was in formerly. This was six months ago. My opinion is, that he made a too violent effort to hold his breath and retain the catheter, and either ruptured an emphysematous portion of the lung, or caused a small abscess to break, as the operation was followed by abundant purulent expectoration."

In a letter which I received several years ago from the distinguished professor of Clinical Medicine in Paris, M. Trousseau, he, among other interesting statements made on topical medication, mentions the occurrence of an accident in his practice, from the use of nitrate of silver solution, under circumstances different from any that have come under my own observation. He remarks: "I often cauterize the interior of the larynx. I sometimes, but rarely, use a hollow caustic holder like that of Dr. Loiseau's, and I have also injected into the trachea solutions of nitrate of silver and sulphate of copper. This practice, in my hands, has never been attended by any danger, and I have never heard that Dr. Loiseau has had any accident to deplore. * * * * I have introduced caustic solutions very frequently into the trachea and bronchial tubes, after tracheotomy, in cases of croup. For six years I never operated for tracheotomy without injecting caustic solution." "Once this practice," con-

tinues M. Trousseau, "in my hands, caused the immediate death of a child. The case was as follows: I had operated upon a child two and a half years old; he breathed very well. I dropped into the trachea ten or fifteen drops of a solution of nitrate of silver; a coagulation of thickened mucus, which was in the principal bronchi, immediately followed, and the child died, strangled, in less than a minute." "An accident of this kind," he adds, "can never happen if a sponge, moderately wet with the caustic solution, be used; and with the instrument which you use, a model of which you have sent to me, I cannot see how an accident can occur to the lungs."

It would also seem impossible that this accident, to which Prof. Trousseau alludes, could have resulted from the cause to which he refers it. He had used it frequently before in the same manner, during a period of six years, without the occurrence of any such accident.

During the winter of 1859, it will be remembered that many severe cases of membranous croup and diphtheritic inflammation occurred in some of our larger cities. This was the case particularly in Boston, Mass., in which city the physicians reported some almost hopeless cases that were saved through the combined measures of tracheotomy, followed by repeated injections of a solution of nitrate of silver, through the artificial opening into the trachea and bronchi. In one instance, as reported in the *Boston Medical and Surgical Journal*, in the case of a child aged four and a half years, Dr. Gay, assisted by Drs. Bowditch and Perry, "injected through the artificial opening into the trachea, *every four hours*, about one-third of a tea-spoonful of the solution of nitrate of silver, of the strength of 20 grains to

the ounce of water." This treatment was continued through several successive days and nights, and resulted in the complete recovery of the patient. It would seem, therefore, that in the case reported by M. Trousseau, the patient must have died from some other cause than the one mentioned, namely: dropping "ten or fifteen drops of a solution of nitrate of silver into the trachea."

Nor is there any need of the occurrence of any accident from the employment of catheterism of the bronchi, if proper cautions are adopted; for, with our present knowledge and experience in the use of this measure, it is one, we maintain, that may be employed with as much safety as any of our other remedial agents.

To the precautionary measures necessary to be adopted in topical medication, I shall refer, after alluding to another supposed danger.

When the attempt was first made to inject the trachea and bronchi, it must be remembered that there were no precedents, no recorded cases, in which this practice had been adopted, to which we could refer, for guiding us in regard to the strength of the remedies, or to the amount of medicaments that could with safety be injected; consequently, it became necessary to proceed with much caution in the inauguration of this practice. Fortunately, those persons upon whom the attempt was first made to employ this method of treatment, were among those patients who for a long time had been under treatment for laryngeal and bronchial diseases; to whose larynges the sponge-probang had been frequently, and for a long time, applied; consequently they were particularly well prepared for the introduction of the injecting tube, and for the employment of the injections; and it was for these reasons that bronchial injections, in the

first instances in which they were employed, were better borne, and were accomplished with more facility than they have been in most instances since. At any rate, I soon found that in recent cases I had more difficulty in effecting the introduction of the tube, and that it was necessary to employ, at first, a *very mild* solution, which could be subsequently increased in strength. The following case will illustrate one of the difficulties to which I refer:

In September, 1854, Miss H., a young lady of this city, was recommended to my care, by her friend and physician, Dr. C., for the treatment of a bronchial affection. The ordinary signs of bronchitis were very marked. Topical applications, of the nitrate of silver solution, were made to the glottis and larynx, and the general remedies, ordinarily recommended in such cases, were administered. This course of treatment was continued several weeks, without producing any decidedly beneficial effect upon the patient. About this time I saw the patient on several occasions in consultation with the physician who had recommended her to my care. He advised a further perseverance in the plan of treatment, but suggested the employment of catheterism of the bronchi (an operation he had seen performed, in similar cases, several times upon my patients), if the present measures, after a further trial, should be unsuccessful. But her disease continued to resist the influence of those measures which had proved quite successful in the management of other apparently similar cases. On the 7th of November, therefore, the bronchial tube was, with some difficulty, introduced, and nearly a drachm of the solution injected into the bronchi. An unusual amount of irritation followed this operation.

The introduction of the tube induced a spasm of the glottis; the patient coughed severely, and complained, while she remained in my office, of pain in the larynx and bronchi. She, however, left soon after the operation, for her house, in the upper part of the city, but did not return for any further treatment. The subsequent history of her case was obtained afterwards from herself and her mother.

The cough and bronchial irritation continuing after her return home, the patient and her friends became alarmed, and called in their ordinary medical attendant, who, in turn, called in a consulting physician, but both concluded to do nothing, for the irritation gradually subsided, and, along with it, the alarm of the patient and her friends; and, still better, the cough and bronchial disease, which had so long and so obstinately resisted other measures, entirely disappeared, and the young lady has continued in good health up to the present time.*

Spasms of the glottis will, as I have before stated, occasionally occur, caused by the irritation of the supraglottic space, in the introduction of the tube, although great pains may have been taken to prepare the parts by previous training. In this case, I at first attributed the spasm and subsequent cough and dyspnœa to irritation, produced at the glottic opening. But from some observations and experiments which I have since made, I am fully satisfied that the disturbance in this instance, and probably in the case mentioned by Dr. Bennett, as well as in some others, similarly affected, was caused by the

* She has since married, is in excellent health, and has become the mother of several children.

employment, at first, of a solution of too great strength. I have recently instituted some interesting experiments upon animals (the cat and dog), in order to ascertain how strong a solution of nitrate of silver can be borne, when injected into the trachea and bronchi. I experimented upon these different animals, but found the results the same, under similar circumstances, in both the cat and dog. But I will detail the history of only one case.

A young dog, eight months old, weight fifty pounds, was treated by bronchial injections. His jaws were opened by an assistant; a cord being placed round his tongue, it was readily drawn out of his mouth, when the epiglottis, and the opening of the glottis, were seen without any difficulty. I passed the tube quite readily into the larynx, and carried it down eight inches, into the trachea. Here it was allowed to remain several minutes, without producing the least disturbance, while the respired air passed freely through the tube. After a time I injected a small amount of a weak solution of the nitrate of silver through the tube into the lungs of the animal; but as he did not seem to be at all affected by this, I soon after threw in half an ounce of a solution of the strength of fifteen grains to the ounce. After being released, he commenced playing about as usual, without showing a symptom of any disturbance whatever. The next day he appeared perfectly well, and was as playful as ever. At 5 o'clock P. M. on the following day, I again introduced the tube into the dog's larynx, and conveying it down, nearly the whole length of his trachea, but not below the tracheal bifurcation, I injected into the bronchi the ounce syringe full of a strong solution of the nitrate of silver, of the strength of thirty grains to the

ounce of water. This amount, in proportion to the weight of the animal, would be equivalent to three ounces of the solution of this strength to an adult. The respiration of the animal was not impeded at the time, nor did any signs of suffocation follow immediately this operation of injecting so large an amount of fluid into the air-passages. The dog, for a time, ran about as usual. At 7 o'clock, two hours after the operation, I visited him at his kennel, and calling him out, found him with tail hanging down, eyes dull, and breathing with some difficulty, and uttering occasionally a short cough. On listening to his sides, moist, bronchial, and crepitant râles were heard throughout both lungs. He was allowed to lie down in his kennel. At 10 o'clock I went to him again, when I found that all these symptoms had greatly increased; the dyspnœa was quite difficult, and the dog was disinclined to move about. He died during the night.

I examined the lungs the next day; the bronchial mucous membrane was highly inflamed. Both lungs were inflamed, and gorged with blood; and bloody and frothy mucus blocked up the bronchial tubes. The animal died, therefore, of inflammation of the lungs and bronchi, superinduced by the large and strong injection of a solution of nitrate of silver into the bronchi.

Remarks.—It is evident, then, that nitrate of silver may be used of that strength, and to that amount, in bronchial injections, as to prove fatal to animal life. So, also, may the too frequent use of all or of any of the potent remedies destroy life.

3rd. In relation, then, to the third inquiry, "What advantages are to be derived from this method of treatment?" I reply: bronchial injections of a solution of

nitrate of silver, when judiciously employed, have proved to be, and will continue, I believe, to be a valuable therapeutic means in thoracic disease.

In the commencement of this paper, I referred to the detailed report which was published by me two or three years ago—a report containing a statistical table of one hundred and six cases of pulmonary and bronchial diseases, treated by means of catheterism of the air-passages, conjoined with appropriate general remedies. The following is the brief analysis given at the conclusion of the report of the above cases: "If we analyze the *one hundred and six cases*, reported in the table, it will be found that *seventy-one* of the sum-total have been recorded as cases of *advanced phthisis*—cases in which tubercular cavities were recognized, in one or both lungs; and *thirty-nine* cases of *early phthisis*. Of the first division—advanced phthisis—*fourteen* have since died. *Twenty-five* were more or less improved; their lives, apparently, being prolonged by this means of medication. *Seven* only of the thirty-two cases of advanced phthisis were not benefited by the injections. Of the *thirty-nine* cases of *incipient tuberculosis*, *twelve* of this division have apparently recovered. *Five* more of this number are now, or were, at the last report, in the enjoyment of a good degree of health. These five cases were classed by my assistant, Dr. Richards, with the twelve recoveries; making *seventeen*, in all, of the thirty-nine cases of early tuberculosis which have apparently recovered.

"Of the remaining *twenty-two* cases, many of whom are still under treatment, *seventeen* have been greatly improved by topical medication; *three* more have been moderately benefited; while *three* only have failed to

obtain any advantage from the local measures which have been adopted.

"Of the *twenty-eight* cases of bronchitis, *sixteen* have been dismissed, cured, or so much improved as to require no further treatment. All the others have been greatly benefited."*

This method of treatment, in this class of diseases, has been continued, more or less, since the report to which I have referred was made; and such has been the amount of success which has continued to attend this plan of treatment up to the present time, I am now ready to affirm, after an experience of many years, in a field of observation unusually large, that *if I was required to relinquish all other known therapeutic measures or topical medication in the treatment of diseases of the chest, I should choose the latter, with hygienic means alone, in preference to the entire class of remedies ordinarily employed in the treatment of these diseases.* But I shall now refer briefly to the opinion of other physicians as to the value of this mode of treatment.

In chronic bronchitis, in asthma, and in early tuberculosis, cauterization of the air-passages has been found to be a most valuable and efficient remedy. As I have stated, topical medication, in the treatment of thoracic diseases, has been continued by me since the publication of the "Report of the One Hundred and Six Cases" to which reference has been made. During this period of three or four years, large numbers of patients, affected with chronic laryngeal and bronchial diseases, with asthma, and with tubercular phthisis, have been

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* See published "Report of One Hundred and Six Cases of Pulmonary Diseases, treated by Bronchial Injections," &c., pp. 34–5.

treated, and the success which has continued to attend this practice has served to increase greatly my confidence in this measure, as a therapeutic agent. I shall, however, omit a further detail of these cases coming under my own observation, and only refer briefly to the opinion of other physicians on the value of this mode of treatment.

At a meeting of the French Academy of Medicine, subsequent to the reading of M. Loiseau's paper on Catheterism of the Larynx in Disease, a very favorable report on the management of some of the diseases of the air-passages by this method was adopted; the commission making the report declaring that catheterism of the air-passages in the treatment of diphtheritic inflammation and other kindred affections is not only practicable, but is of great utility.* "I believe this method," said M. Velpeau, "to be a good one. While diphtheritis is at the opening of the air-passages, it is curable, and M. Loiseau has ascertained that it is not difficult to carry medications into the larynx."†

"As a therapeutic means," says the editor of the *Gazette Médicale de Paris*, "it merits a more serious attention. What is the relation of cauterization to croup? It is a powerful, energetic means, *the only one which, up to this time, has really succeeded.* When the disease is limited to the upper part of the air-passages, we cauterize, and all practitioners agree that this means is truly of great benefit. What is laryngeal cauterization other than carrying beyond the limits of ordinary cauterization, a remedy recognized as good, efficacious, not only against the essence of the disease itself, but

* See *Union Médicale*, Aug., 1857. † Ibid. ‡ Ibid.

also against the pathological secretion?"* And the learned editor of the *Gazette Hebdomadaire*, after calling attention to what had been done in America in the treatment of croup by cauterization, adds: "These experiments should be repeated by us, with that attention which the authority and the honorable position of our American *confrères* command. M. Loiseau, anticipated, as it is seen, in every particular, has given us, however, a useful example, and his merit will still be great if he succeeds in introducing into use a practice worthy of more attention than it has yet received."†

During the last year the *Gazette Hebdomadaire* and other French journals have contained the histories of several severe cases of diphtheria, which, under the care of Loiseau, Trousseau, Gros, and other physicians of Paris, were successfully treated by catheterism of the larynx. In alluding to one case reported by M. Gros, where the diphtheritic inflammation had extended deeply into the air-tubes, threatening immediate suffocation, but which was permanently cured by injections into the larynx, the editor of the *Gazette Hebdomadaire* says:

"This fact has an important practical signification, and speaks loudly in favor of the advantages which may be derived from catheterism of the air-passages, and from topical applications, carried by this measure directly into the larynx and trachea."‡

Indeed, M. Trousseau has recently expressed, before the French Academy, his want of confidence in all the ordinary violent remedies in the treatment of croup, such as severe vomiting, blisters, leeches, etc., declaring

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* See *Union Medicale*, Aug., 1857.

† *Ut supra*, Aug., 1857.

‡ *Gazette Hebdomadaire*, Sept., 1858, p. 660.

his belief that we must place our main dependence upon direct catheterism, or cauterization of the air-passages, followed, if this measure is unsuccessful, by tracheotomy. All this goes to prove, in the opinion of eminent medical men, the entire practicability of catheterism of the air-passages.

In Dr. J. Hughes Bennett's work, to which I have already alluded, he has devoted a chapter to the consideration of "Injections of the Bronchi in Pulmonary Diseases." He remarks, "Whilst tuberculosis is at first a constitutional disease, its localization in any part reacts more or less on the general health; and the opinion I have long entertained, that any means which could enable the physician to act directly on the tissue of the lung or inflamed bronchi, would assist his efforts at cure, at once led me to take a favorable view of this new mode of treatment. The nitrate of silver ought to act as beneficially on the mucous membrane of the trachea and bronchi as on that of any other hollow viscus, and we have seen previously that the remedy may be applied to the tracheal mucous membrane, by means of an artificial opening, not only without injury, but with decided benefit." He further adds, "Without entering into minute particulars, I have only to say that I have confirmed the statements made by Dr. Horace Green."

The cases in which Dr. Bennett employed this method of treatment, as he states in his work, were patients "affected with phthisis in various stages, with laryngitis, and in chronic bronchitis, with severe paroxysms of asthma. In other cases in which I attempted to pass the tube, it was found to be impossible; in some because the epiglottis could not be fairly exposed, and in others on account of the irritability of the fauces, and too

ready excitation of cough from pressure of the spatula."*

This, then, is only a part of what has been done in France, Germany, England, and Scotland, in the employment of topical medication in disease. In some of these countries, far more extensive observations on this mode of treatment have been made than in our own country; certainly more than in our own city! But I shall not stop here to compare the careful inquiries, the scientific observations made, and the frankness and candor exhibited, by the profession of other countries, on this subject, with the course pursued by many of my "American confrères."

If necessary, I could give the opinion of many other practitioners, in Europe and America, who have tested topical medication, in the treatment of diseases of the air-passages, and who profess to have derived signal advantage from this therapeutical measure.

I will only refer to some favorable testimony from some parts of our own country. During the last year, as it was remarked on a former page, croup and diphtheria were more than ordinarily prevalent in some of our larger cities. This was the case particularly in Boston; and here, many very severe cases of diphtheria occurred, and some almost hopeless cases were saved by cauterizations of the larynx; and others, by tracheotomy, followed by repeated injections of a solution of nitrate of silver, through the opening, into the trachea and bronchi.

In a report of some most interesting cases of the disease, read before the Boston Society for "Medical Improvement," and subsequently published in the *Boston Medical and Surgical Journal*, Dr. Gay says, "After

* Clinical Lectures, &c., p. 609.

tracheotomy, and the insertion of the tube, the injection of a solution of nit. argent. through the tube, into the trachea and bronchi, is our strongest dependence, and most of the other measures are mere auxiliaries." "In seven cases of decided menbranous croup," says Dr. Gay, "in which these combined measures were employed, and in which the membrane was expelled through the tube, there have been *five recoveries*, and *two deaths*." Many other severe cases were successfully treated by cauterizations of the larynx and trachea, employed before the operation of tracheotomy became imperative.

I shall close this chapter by describing the method I employ in practising catheterism of the bronchi. I have received letters from many medical men, requesting me to give them an account of the manner of performing the operation, and a description of the instruments employed. As it has been, and is, impossible for me to comply with all these individual requests, I cannot do better than to reproduce the directions I sent to Prof. J. Hughes Bennett, who several years ago wrote to me, desiring me to send him a description of the operation, and a set of the instruments I employed. My reply is published at length in Prof. Bennett's recent volume of "Clinical Lectures," from which I shall extract.

"I would, with pleasure, send you the instruments I employ, but they are simple, and may be obtained at any surgical instrument maker's shop. They consist of an ordinary flexible, or gum catheter, and a small silver, or glass syringe. The catheter is Hutching's gum-elastic catheter (No. 11 or 12), which is 12½ inches in length; and, as the distance from the incisor teeth to the tracheal bifurcation is, ordinarily, in the adult, about eight inches; if this instrument is introduced so as to leave only two

inches of the catheter projecting from the mouth, its lower extremity must, of course (if it enter the trachea), reach into one or the other of its divisions. I first prepare my patients by making applications with the sponge-probang, and nitrate of silver solution, for a period of one or two weeks, to the opening of the glottis and the larynx, until the sensibility of the parts is greatly diminished. Then, having the tube slightly bent, I dip the instrument in cold water (which serves to stiffen it for a moment, and obviates the necessity of using a wire), and with the patient's head thrown well back, and the tongue depressed, I place the bent extremity of the instrument on the laryngeal face of the epiglottis, and gliding it quickly through the rima glottidis, carry it down to, or below, the bifurcation, as the case may require. It is necessary that the patient continue to respire, and the instrument is most readily passed during the act of inspiration. The tube being introduced, the point of the syringe is inserted into its opening, and the solution injected. This latter part of the operation must be done as quickly as possible, or a spasm of the glottis is likely to occur. Indeed, if the natural sensibility of the aperture of the glottis is not well subdued by previous applications of the nitrate of silver solution, or if the tube, in its introduction, touches roughly the border or lips of the glottis, a spasm of the glottis is certain to follow, which will arrest the further progress of the operation. The *epiglottis*, *which is nearly insensible* (and this you may prove on any person, by thrusting two fingers over the base of the tongue, and touching, or even scratching, with the nail, this cartilage), should be our guide in performing the operation. The strength of the solution, for injecting, is from 10 to 25 grains to the

ounce of water. Commencing with 10 or 15 grains to the ounce, its strength is subsequently increased, and the amount I now employ is from ½ to 1½ drachms of this solution."*

Allow me further to add, that, latterly, in commencing the injections, I have used a solution still weaker than above denoted. When my patients are prepared for catheterism, by repeated cauterizations of the opening of the glottis and larynx, to reduce the normal sensitiveness of the parts, the tube is then introduced, and a drachm of a solution of nitrate argent., of the strength of from 5 to 10 grains to the ounce of water, is injected through the trachea. Afterwards, the solution may be gradually increased in power; but, at the present day, I seldom employ the remedy in bronchial injections, of a strength above 20 grains of the salt to an ounce of water.

Should a spasm of the glottis occur, as I have before remarked in this paper, on the insertion of the tube into the larynx, the instrument should be promptly withdrawn, and no further attempt be made to proceed with the operation, until the irritation has fully subsided. It is necessary that the applications of the sponge-probang be continued in the intervals of the employment of the tube.

In cases of bronchitis, and in early phthisis pulmonalis, even, the use of injections into the bronchi, once or twice a week, operates to diminish the cough, expectoration, and dyspnœa, with great certainty, and very many cases of these diseases have recovered under local treatment, after other measures had failed.

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* "Clinical Lectures on Medicine," pp. 608–9.

CHAPTER V.

CONTINUATION OF THE TREATMENT OF CHRONIC PHTHISIS; LOCAL AND GENERAL.

If the views I have advanced, with regard to the nature and pathology of *chronic phthisis*, be correct, the treatment advocated in the preceding chapter will claim the attention of the profession. I shall, therefore, endeavor to describe more particularly the therapeutical measures which are recommended.

Topical Remedies.—In the employment of local measures, allusion has been made, generally, to one remedy —the *nitrate of silver*. Other medicaments are frequently employed, such as the different preparations of iodine, zinc, and glycerine; and of the sedatives, morphine, atropine, conia, etc. But in the treatment of chronic disease of the respiratory apparatus, the remedy most generally efficacious, is the solution of *nitrate of silver*.

After having tried most of the remedies to which allusion has been made, I became fully satisfied that for safety, efficacy, and certainty of action, no known local therapeutic agent can compare with the crystals of the nitrate of silver, in the treatment of laryngeal, bronchial, and pulmonary affections. I speak of the *crystals* of the nitrate; for in preparing the solution for topical applications to the aerial mucous membrane, the *argenti nitras fusum*, or the solid nitrate, should not be employed, as it is much more likely than are the crystals,

to contain the nitrate of potash, or copper, or lead, in combination.

When pure, the crystals are transparent, white or nearly colorless, and are completely soluble in distilled water. A solution of the strength of from two to four drachms of the salt in an ounce of distilled water, when applied freely to the mucous membrane, does not act, as has been supposed, by burning, or by a destruction of textural matter; it forms immediately a union with the albumen and other secretions of the mucous lining, and this compound, thus formed, defends the living tissue from the action of the caustic, whilst it operates to produce a most favorable change in the vital action of the part.

Method of applying the solution.—In the treatment of laryngeal disease, by the direct application of the nitrate of silver to the diseased surface, I have employed, ordinarily, a solution of this substance, of the strength of from two to four scruples of the nitrate, to an ounce of distilled water. When, however, there are found extensive ulcerations of the epiglottis, or about the opening of the larynx—ulcerations, which it is desirable to arrest at once, I have not hesitated to apply directly to the diseased parts, a solution of double the strength of the last named. Or, what I generally prefer in such cases, the solid crystal may be used to touch, at first, the ulcerated points, but one or two applications of the crystals, only, or of a medicine of the above power, should be made at one time; for, ordinarily, however extensive the lesions may be, it will not be necessary to employ a solution of greater strength than one composed of four scruples of the salt to an ounce of water. On the other hand, it has been found, that

one of less strength than of from forty to fifty grains of the nitrate to an ounce of fluid, will have but little effect upon a diseased mucous surface, where ulcerations exist.

IODINE.—In many cases, and in certain stages of nearly all cases, of follicular disease, *iodine*, in combination with other remedies, will prove valuable as a local agent. Employing glycerine as a solution, I have often used the following combination:

℞	Iodine, - - - -	℈j.
	Iodid. Potass., - -	ʒi.
	Glycerine, - - -	℥j.

Misce.

After applying the solution of nitrate of silver in chronic cases requiring this treatment, for a great length of time, it not unfrequently happens that the caustic solution loses apparently its effects. A resort to the iodine mixture for a short period will often prove more efficacious for a time, when a return to the nitrate of silver will be attended with results as beneficial as at first.

Zinc.—A solution of *zinc* may be employed, not only for the same purpose, but often, when the diseased follicles on the pharyngeal membrane prove obstinate, the use for a time of a strong solution of the *sulphate of zinc* will frequently serve to change the action of the membrane; when the subsequent use of the nitrate will again prove more efficacious.

Glycerine is employed more as a medium for the application of other remedies, than as a local remedial agent alone. Still, in cases of tracheal and bronchial disease, attended with a sensation of dryness, its occa-

sional application to these parts will be followed by an agreeable sensation of blandness and moisture of the lining membrane.

SEDATIVES.

Morphine.—Dissolved in glycerine or mucilage, I have often employed this sedative as a local agent with much advantage. Dr. Scott Alison, who speaks favorably of this remedy, says: "I have employed this solution of morphine with mucilage; I have observed a reduction in the cough and sense of irritation. I have employed morphia to no greater extent than the eighth of a grain. The practice is perfectly safe. I have not seen the slightest bad effects from it; and of course, by exhibiting morphia in this way, we do not induce dyspepsia and constipation as we often do when we give it by the stomach. I think it not unlikely that a larger quantity of morphia might be conveyed into the larynx than into the stomach, as the nervous constitution of the part is less delicate, and less connected with the brain and the heart."

Preparations of *atropine* and of *conia* have also been employed by Dr. Alison in medicating the larynx and trachea; and often, he says, with decided advantage. But I have never used, in this manner, either of these remedies.

CHAPTER VI.

GENERAL REMEDIES.

When the deterioration first commences in the follicles of the pharyngo-nasal membrane in sound constitutions, topical medication alone, judiciously and perseveringly employed, will prove efficacious in arresting the local affection in a large proportion of cases. But when the disease has continued until the general system is implicated, constitutional measures, in connexion with topical remedies, will be required.

Iodine.—Iodine and its compounds are arranged by Dr. Thomas under the head of excitants.

In quite a large portion of the cases of follicular disease which have come under my notice, where the morbid affection of the mucous cryptæ had been long continued, it has been found that there existed more or less of a diseased condition of other parts of the glandular system. Symptoms indicative of the presence of derangement of the hepatic organs have frequently been manifested in connexion with follicular disease. Hence, iodine, or some of its preparations, have proved in my hands of essential service, in the treatment of this complicated form of the affection.

It is the opinion of Dr. Clark, that the action of iodine on the animal economy resembles, in a great degree, that of mercury. The effects of the two remedies may be similar in some respects. The action of the organs of excretion, it is true, is promoted by both medicines, but not in the same degree. Paleness or

blanching, it is well known, is frequently produced by a course of mercury; an effect which has been ascribed to the diminished number of the red globules of the blood; while, on the other hand, an increased nutrition of the body, or *embonpoint*, is the frequent result of the employment of iodine. Under its influence, Dr. Clark himself remarks—"when it is judiciously employed, the patient recovers flesh, health, strength, and color; hitherto pale, relaxed, and feeble, he becomes full, strong, and florid. From the influence which iodine has in causing the disappearance of visceral and glandular enlargements, it has been supposed that its continued use would have the effect to produce general emaciation; but this has been denied by many." Lugol asserts, that instead of producing emaciation, it encourages growth and increase of size, and Dr. Manson also, in his Medical Researches on Iodine, states that it exerts no peculiar or specific influence on the absorbents.

In the administration of iodine in follicular disease, I have found, almost invariably, a specific effect produced upon the organs of secretion by the use of the medicine. For some time after commencing the remedy, an increased quantity of viscid mucus is thrown off by the diseased glandulæ; and the patient often complains of a disagreeable taste, produced by the morbid secretions from the faucial and pharyngeal membrane; and in some instances, the irritation of the throat is at first increased by this salt. After a while, the secreted fluid is diminished in quantity, becomes bland, and is of a healthier quality, while the lining membrane presents an improved condition. Equally salutary are the effects produced, ordinarily, on the secretions of the digestive organs by the use of iodine.

The iodide of potassium I generally consider the best preparation for administration, in disease of the mucous follicles. Although the constitutional effects of iodide of potassium are very analogous to those of iodine, yet it may be given in larger doses, and for a longer period, without producing disorder of the system, than the free iodine. When indications of a scrofulous diathesis are present in any case, it will be preferable, and will prove more efficacious, to exhibit the two preparations in combination.

In the earliest stages of follicular disease, when the symptoms indicate the presence of chronic thickening of the lining membrane of the laryngeal cavity, or when we have evidence of the presence of any constitutional syphilitic affection, in combination with follicular derangement, the iodide of potassium, conjoined with the iodide of mercury, will prove a valuable remedy. The apothecary will sometimes object to the above combinations, because a decomposition is effected, the protiodide of mercury being converted by the iodide of potassium into the biniodide and metallic mercury. But it is well known to chemists that these different iodides will unite together in different proportions, by which those compounds, which Berzelius terms *double iodides*, are formed. The biniodide thus formed in the above solution, immediately unites with a portion of the iodide of potassium in solution, and a double salt—the hydrargyro-iodide of potassium—is the result.

In such cases, this combination of the iodides, as in Form. No. 19, has proved highly advantageous.

ARSENIC.

Arsenic is not only a valuable antiperiodic, but it is a most powerful alterative, and its use for many years has proved highly efficacious as a *tonic*, in the treatment of all stages of chronic phthisis where debility is present.

A few years ago, in a number of the *Edinburgh Medical Journal* (May, 1858), a highly valuable paper, on the "Physiological and Therapeutical Effects of Arsenic," was published by Dr. James Bigbie, in which the author expresses, in strong terms, his confidence in arsenic, as a most useful and available therapeutical agent, powerful in many intractable affections, and exercising a commanding influence over diseases hitherto considered incurable." Under its use, in the treatment of numerous and various diseases, Dr. Bigbie affirms that an improved digestion and a better appetite invariably occur; and in no instance has he observed any injurious consequences to result from its employment.

The liquor arsenicalis of the pharmacopœia is the preparation ordinarily employed for securing the remedial effects of the medicine. In exhibiting this preparation, it is given by him to adults in doses of five drops of the solution, after each meal, largely diluted with water—the medicine being increased one drop every third day, until the physiological action of the remedy is manifested, such as itchiness and swelling of the eyelids, a silvered tongue or tenderness of the epigastrium. The dose, on the occurrence of any of these symptoms, should be diminished, or the intervals of its administration lengthened.

It is in the persistent use of arsenic, in cases of folli-

cular disease, that the highest beneficial effects are ultimately obtained. But throughout the entire use of this mineral, its poisonous action should be guarded against, by limiting its exhibition to the production of those symptoms only which indicate its earliest physiological action.

In the treatment of chronic phthisis, I am accustomed to administer this remedy, in combination with some bitter tonic, as in Form. No. 9, or with quinine, as in No. 10, in which combination it has proved, in my hands, a powerful and valuable remedial agent.

MANGANESE.

In the management of chronic phthisis, it is important, in the stage of debility, to keep the system of the patient well supported by the employment of such tonics as tend to improve the condition of the blood, which, as we have seen, always becomes more or less deteriorated in this affection. For many years, in the treatment of this disease, I have employed with signal benefit some of the preparations of *Manganese.*

I have had much experience in the use of this mineral tonic, and have been fully satisfied that the remedy will prove a most valuable addition to our therapeutic preparations.

The presence of manganese in the blood has been fully established by the experiments of MM. Millou, Hannon, and others; and recently, M. Burin, in a memoir presented to the French Academy of Medicine, has given an analysis by which he shows the amount of manganese in the blood globules, and exhibits the condition in which it exists. It is, indeed, as constant an ingredient of this fluid. in its normal condition, as iron,

and it is well known that a deficiency in quantity, of both these metals, may be observed in the blood in many cases of anæmia, chlorosis, tuberculosis, etc.; and hence the employment of manganese is proper in most instances, where the administration of iron is indicated. It can be administered, moreover, with entire safety in those cases in which hæmoptysis is an occasional symptom. Frequently both remedies may be given in combination with great advantage.

The most important preparations of Manganese, for pharmaceutical purposes, are the phosphate and the malate. We have administered, in tuberculosis, to a large number of patients, the phosphate of manganese, as in Forms Nos. 11 and 12, with most favorable results. These mixtures should be kept in well closed bottles, and as the manganese is not altogether soluble, the medicine should be shaken before being administered.

The malate of manganese is considered by some practitioners a more eligible preparation, inasmuch as it is quite soluble, and the base of the salt is in the form of protoxide, the acid being easily digested

IRON.

In some cases where tonics are indicated, and yet for some cause are not well borne, they may be administered, especially some of the martial preparations, with much safety, and often with advantage, by combining them with some of the sedative preparations.

The different forms of iron, whether employed as found in the natural chalybeates, or in the artificial preparations of the chemist, make their primary impression on the digestive organs, augmenting, ultimately, the power

of the secretory and excretory systems, and rousing the nutritive faculty in every part of the body.

The combination of a chalybeate with a stimulus, as in Form. No. 33, I have found to be a most valuable tonic in the treatment of tuberculosis.

In debilitated and anæmic patients, or in females presenting indications of a chlorotic condition of the system, the phosphate and the citrate of iron have been found useful preparations.

Syrup of the iodide of iron is a valuable therapeutic agent, and may be used as a tonic in doses of from fifteen to twenty-five drops.

HYDROCYANIC ACID.

In the treatment of chronic bronchitis or in allaying the cough present in the tubercular stage of the affection, I have derived great benefit from the use of this remedy combined as in Form. No. 1. or 2. Follicular bronchitis is occasionally complicated with an irritable condition of the gastric membrane, manifested by tenderness of the epigastrium, a red tongue, frequent headache, and a feverish condition of the system. In such cases, where the inflammation has extended to the mucous membrane of the stomach, producing this not uncommon form of *bronchogastritis*, the exhibition of the above combination with the hydrocyanic acid, the alkali, and the bitter vegetable infusion, as in Form. No. 4, will exert a prompt and decidedly happy influence on this diseased action.

The *anhydrous* or pure hydrocyanic acid, which consists of one equiv. of cyanogen and one equiv. of hydrogen, is of a nature so exceedingly poisonous, that it cannot be employed with safety in medicine. The *medicinal*

acid, which is the preparation that should always be directed to be used in our prescriptions, contains only 25 per cent. (United States Pharmacopœia) of the pure acid. That of the Apothecaries' Hall, London, contains 3.2 per cent.; whilst the medicinal acid of the French apothecaries is nearly equal to that of the United States Pharmacopœia, namely, 2.4 per cent. of the pure acid of Gay Lussac.

FORMULÆ.

Form. No. 1.

℞ Acidi hydrocyanici (Med.) gtt. lx.
Morphiæ sulph., gr. iij.
Tinct. sanguinariæ } aa. f ℥ ss.
Vini ipecacuanhæ }
Syr. pruni virginianæ } f ℥ v.
vel misturæ amygdalæ }

Fiat mistura cujus sumat cochlearium parvum bis terve in die.

Form. No. 2.

℞ Acidi hydrocyanici, gtt. xl.
Vini antimonii f ℥ ss.
Syrupi tolutan. f ℥ ss.
Mucil. acaciæ f ℥ ij.

Fiat mistura, capiat cochl. parvum ter quaterve in die.

Form. No. 3.

℞ Acidi hydrocyanici (Med.) gtt. xxv.
Vini ipecacuanhæ f ʒ ij.
Syr. tolutan. f ℥ j.
Aquæ destillatæ f ℥ iij.

Fiat mistura, cujus sumatur cochl. parv. quartâ quâque horâ.

Form. No. 4.

℞ Extract. belladonnæ, gr. x.
Acidi hydrocyanici (Med.) gtt. lx.
Tinc. calumbæ } aa. f ℥ j.
Syr. simp. }
Aquæ destillatæ f ℥ ij.

Form. No. 5.

℞ Extracti hyoscyami ʒ j.
Argenti nitratis, gr. x.
Bismuthi subnitratis, ʒ iss.

Fiant pilulæ xl.; quarum sumatur una mane ac nocte.

Form. No. 6.

℞ Extracti conii *vel* lupuli ʒ j.
Argenti nitratis, gr. x.
Capsici pulv. } aa. ℈ ij.
Quiniæ disulphatis }

Fiat massa, in pilulas xl. dividenda. Capiat unam bis terve in die.

Form. No. 7.

℞ Extracti lupulinæ ʒ j.
Argenti nitratis, gr. x.
Bismuthi subnitratis ʒ iss.
Quiniæ disulphatis ℈ ij.

Fiant pilulæ xl.; cujus sumatur una bis terve in die.

Form. No. 8.

℞ Extracti conii ʒ j.
Sesqui-oxydi ferri ʒ ij.
Tinct. calumbæ f ℥ iss.
Syr. tolutan. f ℥ ss.
Ol. gaultheriæ, gtt. x.
Aquæ fontanæ f ℥ ij.

Fiat mistura, cujus sumat coch. parv. mane ac nocte.

Form. No. 9.

℞ Liquor. potassæ arsenitis f ʒ iss.
Tinct. cinchonæ f ℥ iij.
Syr. aurantiæ f ℥ j.

Hujus mist. sumat cochl. min. bis terve in die.

Form. No. 10.

℞ Quiniæ disulph. ʒ j.
Liquor. potassæ arsenitis f ʒ ij.
Acidi sulph. aromat. f ʒ j.
Tinct. cinch. co. } aa. f ℥ ij
Syr. zinziberis }

Form. No. 11.

℞ Manganesii phosphatis ʒ ij.
Tinct. cinchonæ f ℥ iij.
Syr. sarzæ f ℥ iv.
Mucil. acaciæ f ℥ j.
Ol. gaultheriæ gtt. xx.

Fiat mistura, cujus sumantur coch. duo vel tria minima bis terve in die.

Form. No. 12.

℞ Manganesii phosphatis ʒ iss.
Ferri phosphatis ʒ iij.
Tinct. calumbæ f ℥ ij.
Syr. tolutan. f ℥ iv.
Ess. gaultheriæ f ʒ j.

Form. No. 13.

℞ Extracti nucis vom. ʒ ss.
Argent. nitratis, gr. xii.

Fiat massa et in pil. xl. divid.; sumat j. mane et nocte.

Form. No. 14.

℞ Extract. nucis vomicæ, gr. xxxii.
Tinct. cardamom. } aa. f ℥ j.
Syr. zinziberis }
Aquæ font. f ℥ ij.

Fiat mistura, cujus cap. gtt. xx. vel xxx. bis terve in die.

Form. No. 15.

℞ Strychniæ, gr. xii.
Acidi acetici, gtt. lx.
Alcohol f ℥ j.
Aquæ font. f ℥ xi.

Fiat mistura. Capiat gtt. x. usque ad xxx., bis terve in die.

Form. No. 16.

℞ Potass. iodid. ʒ ij.
Tinct. rhei f ℥ i.
Syr. sarzæ co. } aa. f ℥ ij.
Aquæ font. }

Fiat mistura, cujus sumatur cochl. parv. mane ac nocte.

Form. No. 17.

℞ Decoc. polygalæ ℥ v.
Potass iodid. ʒ iij.
Tr. opii camphor. f ℥ j.
Syrupi tolutan. f ℥ ij.

Fiat mistura. Capiat cochleare parvum bis in die.

Form. No. 18.

℞ Iodini puræ, gr. vj.
Potass. iodid. ʒ iss.
Tinct. cardamom. f ℥ i.
Syr. sarzæ co. f ℥ iij.

Fiat mistura. Exhibe cochl. parv. bis terve in die.

Form. No. 19.

℞ Protiodid. hydrarg., gr. iij.
Potass. iodid. ʒ ij.
Tinct. rhei f ℥ j.
Syr. sarzæ co. f ℥ iij.

Fiat mistura, et detur cochl. parv. bis in die.

Form. No. 20.

℞ Potass. iodid. ʒ ij.
Protiodid. hydrarg., gr. ijss.
Tinct. gentianæ } aa. f ℥ ij.
Syr. sarzæ co. }
Sumatur cochl. parv. bis terve in die.

Form. No. 21.

℞ Hydrarg. chlorid. corrosiv., gr. iv.
Tinct. gentianæ ℥ iv.
Syr. aurantii ℥ ij.
Fiat mistura, cujus detur cochl. parv. ter in die.

Form. No. 22.

℞ Tinct. sanguinariæ ℥ j.
Tinct. opii ʒ ij.
Vini ipecacuanhæ ʒ vj.
Syr. tolutan. ℥ ij.
Fiat mistura, quarum capiat ♏ xxx. usque ad lx. quater in die.

Form. No. 23.

℞ Tinct. sanguinariæ ℥ j.
Morph. sulph., gr. iss.
Tinct. digitalis } aa. ℥ ss.
Vini antimo. }
Ol. gaultheriæ, gtt. x.

Form. No. 24.

℞ Tinct. cimicifugæ racemosæ } aa. ℥ j.
Tinct. sanguinariæ }
Morph. sulph., gr. ij.
Syr. acaciæ ℥ ij.
Ft. mistura; exhibe cochl. parv. tusse urgenti.

Form. No. 25.

℞ Zinci sulphatis, gr. x.
Ipecacuanhæ pulv. ℈j.
Aquæ tepidæ f℥ iv.

Fiat mistura.

Form. No. 26.

℞ Liquor. ammon. acetatis f℥ ij.
Misturæ camphoræ f℥ iijss.
Vini ipecacuanhæ f℥ ss.
Syrupi tolutan. f℥ ij.

Fiat mistura, cujus exhibe cochl. mag. sextis horis vel sæpius.

Form. No. 27.

℞ Ant. et potass. tart., gr. ijss.
Aquæ cinnam. f℥ ij.
Syrupi simp. f℥ ss.
Aquæ puræ f℥ iijss.

Fiat mist., cujus sumat. cochl. parv. secundâ vel tertiâ horâ.

Form. No. 28.

℞ Ferri citrat. ʒ ij.
Syrupi aurantii } aa. f℥ ij.
Aquæ menth. pip. }
Aquæ puræ f℥ iv.

Fiat mistura, de quâ sumatur cochl. parv. bis terve in die.

Form. No. 29.

℞ Argent. nitratis ℈j.
Aquæ rosæ f℥ iv.

Fiat gargarisma.

Form. No. 30.

℞ Tinct. aconiti
Tinct. opii
Tinct. camphorat.
Chloroformi
} aa. ℥ ss.

Misce pro liniment.

Form. No. 31.

℞ Unguent. stramonii ℥ j.
Plumbi carb. pulv. ʒ j
Opii pulv. ʒ iss.

Fiat unguent.

Form. No. 32.

℞ Proto-iod. hydrarg., gr. x.
Potass. iodid. ʒ j.
Cerati simp. ℥ j.

Fiat unguent.

Form. No. 33.

℞ Extracti conii ʒ j
Sesqui-oxydi ferri ʒ ij.
Tinct. calumbæ ℥ jss.
Syr. tolutan. ℥ ss.
Ol. gaultheriæ, gtt. x.
Aquæ fontanæ ℥ ij.

Fiat mistura, cujus sumat. coch. parv. mane ac nocte.

THE END.

APPENDIX.

PLATE X.

500 Diameters.

Fig. 1 represents follicles of the tonsils greatly enlarged by proliferated epithelial cells.

Fig. 2. Two cases of hypertrophied and diseased tonsils from patients laboring under chronic folliculitis. The one on the left side (*a*) from a patient most diseased, the cavity large and filled with disintegrated or "cheesy" matter. The one on the right side not much diseased; the nuclei or cells larger, and no granules.

Fig. 3. The appearance of matter taken from the cavity (*a*) in tonsil of Fig. 2. Its resemblance to tuberculous matter, as seen in Fig. 6 on page 193, will be apparent.

Fig. 4. Another large and diseased tonsil full of ulcerations containing diseased or "cheesy" matter. The microscopic appearance of this matter as seen in Figures 7, 8, and 9 in Plate II.

Fig. 5 shows the appearance of the epithelial cells lining the air-sacs, highly magnified, and treated with acetic acid. Some of the centre cells were drawn by the aid of the *camera lucida;* their outline being traced as thrown down on the paper.

Fig. 6. An excised tonsil greatly hypertrophied and diseased. *a* and *b*, large ulcerated cavities filled with broken up epithelial cells. *c*, an incision in the healthy portion of the cut surface of the gland; the matter from which showed cells almost perfectly healthy.

PLATE X.—500 Diameters.

FIG. 1.

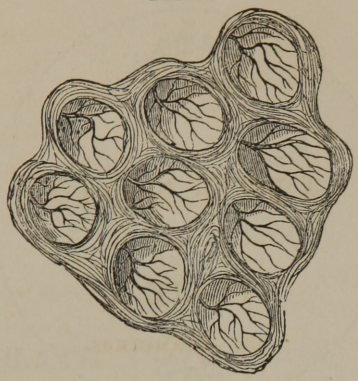

FIG. 2.

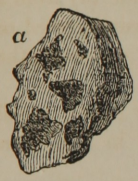

FIG. 3.

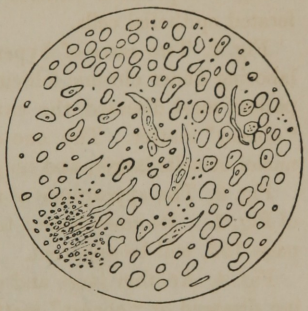

FIG. 4.

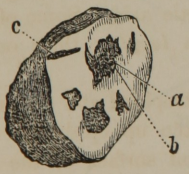

FIG. 5.

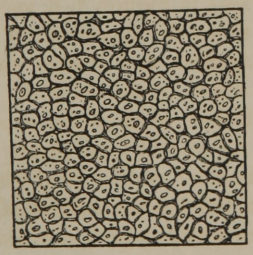

FIG. 6.

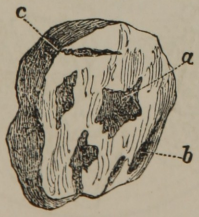

PLATE X.—(*Continued.*) 500 Diameters.

FIG. 7.

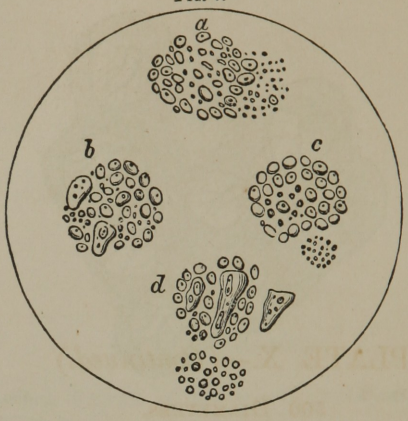

FIG. 8.

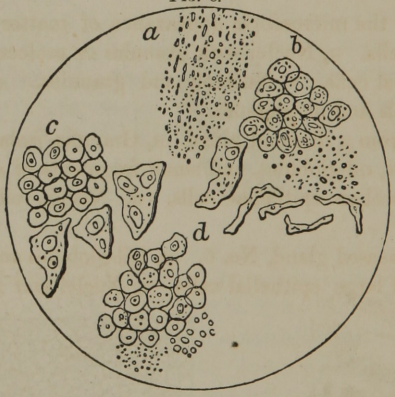

FIG. 9.

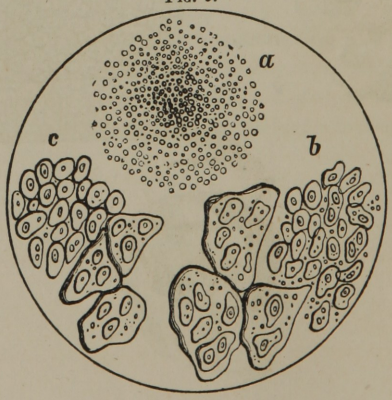

PLATE X.—(*Continued.*)

500 DIAMETERS.

Fig. 7 exhibits the microscopic appearance of matter from disintegrated epithelial cells. *a*, Nuclei with granules or molecules. *b*, Nuclei with small epithelial cells. *c*, Nucleoli and granules. *d*, Nuclei, with small epithelial cells and oil-globules.

Fig. 8. Matter from a diseased gland. *a*, Granules isolated. *b*, Nuclei, with some granules, oil-globules, and small fragments of epithelial cells. *c*, Nuclei, with unbroken epithelial cells. *d*, Nuclei, oil-globules, and granules.

Fig. 9. From diseased gland, No. 6. *a*, Oil-globules and granules. *b*, Isolated nuclei and large epithelial cells. *c*, Nuclei and smaller epithelial cells, isolated.

INDEX.

Addison, Dr. W., his theory of consumption, 98
Air-cells, structure of the, 136; disintegration of, in tuberculosis, 191.
Air-passages, catheterism of the, 300; description of the operation, 322; cauterization of, in asthma, 317.
Alison, Dr. Scott, on the use of morphine in chronic phthisis, 328.
Alveoli, of the air-cells, 138.
Amygdalæ, the, or tonsillary glands, 126.
Anæmia, peculiar, symptomatic of tuberculosis, 188.
Anatomical investigations, improvements made by Vesalius in, 14.
Ancell, Mr., his opinion that phthisis is a blood disease, 106, 117; on the lymphatic vessels, 145; on the lymphatic temperament, 166; on ulcerations of the mucous membrane of the air-passages, 187.
Andral, on the origin of pulmonary tubercles, 44, 144.
Animal tissue, its elementary cells, 118; three groups of, 120.
Aretæus, his accurate description of the rational signs of consumption, 6.
Arsenic, its use recommended by Rhozas and others in pulmonary disease, 11, 12; used in chronic phthisis, 332.
Arytenoid cartilages, the, 129.
Asses' milk, 10, 17, 19.
Asthma, cauterization of the air-passages in, 317.
Auscultation, medial, Laennec on, 36.

Badham, Dr., the first to describe bronchitis, 29.
Baillie, Dr., the first correct describer of tubercles of the lungs as the cause of consumption, 25.
Bark, Peruvian, a remedy recommended by Morton, 18; by Portal, 30.
Baron, Dr., his hypothesis of the origin of tubercles, 39.
Barthez, on tubercle, 79.
Basement membrane, structure of the, 124.
Baudelocque, attributes tubercular disease to imperfect nutrition, 56.
Baumes, his views on consumption, 24, 101, 144.
Bayle, his elaborate work on phthisis, 31; treatment proposed by, 32.
Beddoes, Dr., his treatment referred to, 28, 29.
Bennett, Professor J. Hughes, on the nature of tubercle and the treatment of consumption, 92, 117, 199; on catheterism of the air-passages, 301, 320.
Blood, the, not the primary seat of the tuberculous dyscrasiæ, 118; intimate relationship between the contents of the lymphatic vessels, diseased cellular elements of tissues, and the circulation of the, 164; contamination of the, 165.
Boerhaave, ignorant of the true nature of consumption, 19, 144.

Bronchi, the, 134.
Bronchiæ, the, 136.
Bronchial injections, 299.
Bronchial tubes, catheterism of the, 300.
Bronchitic stage of phthisis, the, 290.
Bronchitis, chronic, cauterization of the air-passages in, 317; description of the operation, 322.
Broussais, on the nature and origin of tubercles, 40.
Buffalini, Professor, on the identity of tuberculous disease and scrofula, 91.

Campbell, Dr. J. J., his views on the nature, pathology, and cure of pulmonary phthisis, 72.
Capillary plexus, the, 140.
Carmichael, Dr., on the origin of consumption, 65.
Carswell, Robert, on the nature and origin of tuberculous affections, 57.
Cartilages, the thyroid, cricoid, and arytenoid, 129.
Catheterism of the bronchial tubes, 300; statistics of cases, 316; opinions of physicians, 318; method of practising, 322.
Cauterization of the air-passages, 300 et seq.
Cautery, the, recommended by Celsus, 8.
Cayol, distinguishes between tracheal and laryngeal phthisis, 33.
Cell territories, the, of Virchow, 121.
Cells, elementary, constituents of, 118; the nucleus and nucleolus, 118, 119; all the tissues not composed of the same type of, 120; structure of the air-cells, 136; epithelial, the seat of the initial lesion in chronic tuberculosis, 152; pathological metamorphosis of cell-contents, 155; steps of the morbid process in the degeneration of the epithelial cells, 168; disintegration or softening of the air-cells in tuberculosis, 191.
Celsus, treatment advised by, in consumption, 7.
Chapman, N., on the distinction between phthisis and scrofula, 81; treatment of phthisis, 82, 83.
Chordæ vocales, or vocal ligaments, 130.
Ciliated epithelium of the larynx, 132.
Clark, Sir James, 2, 3; on the nature, causes, and treatment of tuberculous disease, 59; five different varieties described by, 61; on the hereditary transmission of consumption, 157; on the early symptoms of consumption, 174.
Connective tissue, 124.
Constadt, M., his theory as to the nature of tuberculosis, 71.
Consumption, pulmonary, definition of, 1; great mortality from, 2; knowledge of the ancients with regard to its nature, etiology, and treatment, 4; its pathology and true nature, 148; preliminary manifestations of, 150; hereditary transmission of, 157; earliest symptoms, 171; extension of the morbid process, 181; second stage, 185; third stage, 191; treatment of the præ-tubercular stage, 201; primary lesions, 205. And see Phthisis.
Copland, Dr., considers tubercle and scrofula identical, 107; on the treatment of consumption, ib.
Cotton, Dr., on the nature and treatment of phthisis, 105.
Cough, one of the earliest symptoms of tubercular phthisis, 172.
Cricoid cartilage, the, 129.
Cruveilhier, M., on the production of tuberculous disease by irritation of the air-cells, 54; observations on the lymphatic glands, 144.
Cullen, views of, on consumption, 22.

Darwin, Dr., on the nature and treatment of consumption, 27.
Davies, Dr., his views on consumption, 64.
Dessault, on the nature and treatment of consumption, 20.
Digitalis, as a remedy in the treatment of consumption, 27, 28.
Dioscorides, recommends fumigations and the external use of sulphur in consumption, 6.
Dyscrasia, tuberculous, does not originate in the blood, 160.

Epiglottis, anatomy of the, 130, 245; ulcerations of, in tubercular phthisis, 182; principal lesions, 246; ulceration of the mucous membrane of the, 257; œdema of the, 267; its special function, 276; insensible in its normal state, 304.
Epithelial cells, the seat of the initial lesion in chronic tuberculosis, 152; steps of the morbid process in the degeneration of the, 168.
Epithelium, the, composition of, 123; ciliated, of the larynx, 132; tesselated, of the lungs, 139; degeneration of the epithelium of the glandular follicles, 155.
Erosions and ulcerations of the mucous membrane, difference between, 257.
Exercise, horseback, recommended by Sydenham, 16.
Expectoration, nature of the, in early phthisis, 181.

Family, history of a, illustrating the transmission of a tuberculous dyscrasia to offspring, 201.
Fat of the goat, a popular remedy in Pliny's day, 8.
Fauces, pillars of the, 126.
Fever, hectic, as described by Galen, 9.
Follicles, subcutaneous mucous, of the uvula and tonsils, 126, 127; nature and order of the pathological changes in the glandular follicles, 153.
Follicular disease, topical treatment of, 207.
Follicular glands, position and structure of the, 125.
Forestus, his remedies for consumption, 12.
Fossæ nasales, lesions of the, 205.
Fournet, M., his researches on the physical signs of the early stage of phthisis, 70.
Foxglove, as a remedy in the treatment of consumption, 28.

Galen, erroneous views of, on the nature of consumption, 8, 9; remedies employed by, 10.
Galenists, the, their materia medica almost entirely vegetable, 12.
Gellerstedt, Dr., on the pathology of phthisis, 83.
Gibbs, Dr., on ulcerations in the mucous membrane of the air-passages, 187; on diseases of the throat, epiglottis, and windpipe, 196.
Gilbert, Dr. Henry, his views on the pathology of phthisis, 73.
Glands, position and structure of the follicular, 125; tonsillary, 126; racemous mucous, of the pharynx, 128; racemose, of the larynx, 132; of the trachea, 133; the origin of all glands depends upon a process called proliferation, 152; lesions of the tonsillary, 214.
Glandular follicles, nature and order of the pathological changes in the, 153; appearance of the, in the initial stage of tuberculosis, 179.
Glover, Dr. R. M., on tubercle and scrofula, 87–89.
Goat, fat of the, a popular remedy in Pliny's day, 8; milk of, 10, 17.
Godwin, on the study of the nature of pulmonary consumption, 175.
Good, Dr., on the nature and treatment of consumption, 41.
Graves, Dr. R. J., on the pathology and treatment of phthisis, 77.

Hahnemann's treatment of chronic laryngitis, 265.
Hall, C. Radcliffe, on the mode of development of tubercle, 108.
Hasse, Professor, on the origin and nature of tuberculosis, 89; on the lymphatic glands, 145; on erosions of the epiglottis, 258.
Heberden, no important contributions by, 29.
Hectic fever, as described by Galen, 9.
Hereditary influence, 50, 157, 160; cases illustrative of, 201
Hippocrates, consumption as described by, 4; treatment recommended by, 5; attributes glandular swellings in scrofula to an excess of lymph, 143.
Histology, special, of the respiratory organs, 123, 162.
Hoffman, his theory of phthisis, 18; treatment, 19.
Horseback exercise, recommended by Sydenham, 16.
Hydrocyanic acid, use of, in chronic phthisis, 335.

Inhalations, 13; recommended by Darwin, 27; not much to be depended on, according to Laennec, 38.
Injections, bronchial, 299.
Intercellular matter, or the material out of which cells are developed, 121.
Iodine, a valuable local remedy in follicular disease, 327; as a general remedy, 329.
Iron, use of, in chronic phthisis, 334.
Isthmus faucium, the, 125.

Kölliker, on the structure of the air-cells of the lungs, 137; on the lymphatic vessels of the lungs, 140.

Laennec, his views on the nature and treatment of consumption, 35; on the earliest symptoms of consumption, 171.
Larynx, anatomy of the, 128; peculiarities in its mucous membrane, 131; lymphatic vessels of the, 134, 163; ulcerations of, in tubercular phthisis, 182.
Lawson, Professor, on the symptoms of the precursory stage of phthisis, 195.
Lebert, his peculiar views on the nature and constitution of tubercle, 85; on its identity with scrofula, 86.
Legrand, A., on the difference between tuberculous and scrofulous diseases, 99.
Lesions, primary, of the aerial membrane, 205; of the tonsillary glands, 214; of the pyriform sinuses, 240; of the epiglottis, 245.
Lobules of the lungs, structure of the, 137.
Louis, M., on the pathology and treatment of phthisis, 45; on hereditary influence, 160; on the earliest symptoms of tubercular phthisis, 172; on the ulcerations of the mucous membrane of the aerial passages, 182.
Lungs, the, structure of, 135, 164; great influence of the tonsils in determining disease of, 178, 218.
Lymph, nature of, 142.
Lymphatic system, tuberculous affections more or less allied with changes in the, 143.
Lymphatic vessels of the trachea, 134, 165; of the lungs, 140; similarity between the contents of the tubercle granule and those of the lymphatic vessels, 146; relationship between the contents of, and the circulation of the blood, 164.

Madden, W. H., on the origin and treatment of phthisis, 96.
Manganese, use of, in chronic phthisis, 333.
Mascagni, on the treatment of consumption, 24.
Materia medica, the, of the Galenists, almost entirely taken from the vegetable kingdom, 12.

Meechay, of Gottingen, on consumption, 28.
Metallic preparations not used to any great extent until many centuries after the death of Galen, 12.
Milk diet recommended by Galen, 10; rejected by Stahl, 17.
Morgagni, views of, 20.
Morphine, as a local agent in chronic phthisis, 328.
Mortality caused by tubercular consumption, 2.
Morphological changes in the tissues, 150.
Morton, the use of Peruvian bark recommended by, 18.
Mosely, on the treatment of consumption, 24.
Mucous membrane, essential constituents of the, 123; peculiarities in the, of the larynx, 131; of the lungs, 136; ulceration of the mucous membrane of the aerial passages, in tubercular phthisis, 182; difference between ulcerations and erosions of, 257.

Nitrate of silver, topical application of, in follicular disease, 207; in lesions of the epiglottis, 251; advantages to be derived from its use, 315; method of applying, 326.
Nucleolus, the presence of, marks the highest degree of cell-development, 119.
Nucleus, the, of the elementary cell, 118.

Oral cavity, anatomy of the, 125.

Padline, Dr., theoretical views on the nature of tuberculosis, 65.
Paget, Professor, on the softening of tubercle, 112; on the identity of scrofula and tuberculosis, 113.
Palate, the soft, 125.
Paracelsus, attributes consumption to a deficiency of moisture in the system, 11; advises mineral remedies, ib.
Parola, Louigi, his theory that tuberculosis originates in defective respiration, 100
Parr, Dr., his objection to the use of digitalis, 29.
Paterias, remedies used by, in the treatment of phthisis, 13.
Pathological changes in the glandular follicles, nature and order of the, 153.
Peruvian bark, employed by Morton, 18; recommended by Portal, 30.
Pharynx, anatomy of the, 127; appearance of the glandular follicles, in the initial stage of tuberculosis, 179.
Phillips, Dr., on the identity of tubercle and scrofula, 86.
'Phthisiologia,' the, of Morton, 18.
Phthisis, the pathology and true nature of, 148; early symptoms of, 168, 171; first or præ-tubercular stage of, 279; the bronchitic stage of, 290; the tubercular stage of, 297; local and general treatment of, 325. And see Consumption.
Pillars of the fauces, the, 126.
Plexus, capillary, 140.
Pliny the elder, the first to recommend the use of resinous effluvia, 8.
Portal, an important contributor to medical pathology, 30.
Præ-tubercular stage of chronic phthisis, treatment of, 201.
'Predictions and Aphorisms,' the, of Hippocrates, 4.
Proliferation, the process of, 152.
Pneumonia, chronic, as described by Broussais, 41.
Propositions regarding the inceptive pathology and true nature of phthisis, 148.
Pulmonary consumption, definition of, 1

Pulmonary vesicles, or air-cells, structure of the, 136.
Pyriform sinuses, lesions of the, 240.

Raulin, his treatise on consumption, 23.
Remedies, topical, 325.
Respiratory organs, special histology of the, 123, 162.
Rhozas, an Arabian physician, advises fumigations with arsenic, 11.
Rilliet, researches of, on tubercle, 79.
Rima glottidis, the, 130.
Rokitansky, Karl, his views on the nature of tuberculosis, 75.
Rollo, on inhalation, 28.
Rush, Dr., views of, on the nature and management of consumption, 25.

Schultz, Prof., on the origin of ulcerations, 145.
Schwann, the homogenous substance of, 121.
Scrofula, and consumption. For the opinions of various writers on the identity of, see 26, 56, 78, 81, 86, 88, 90, 91, 98, 99, 105, 107, 113, 144.
Sea-voyage, the remedy most relied on by Celsus, 8.
Sieveking, Dr. E. H., on the seat of pulmonary tubercle, 111.
Simon, M., his theory that tuberculosis is a disease of the lymph in the glands, 101.
Sinuses, pyriform, lesions of the, 240.
Softening, process of, different opinions entertained by physicians on, 192.
Solenander, his plan of arresting incipient consumption, 12.
Southey, Dr., of London, statistical observations by, 33.
Sputa, nature of the, in early phthisis, 181.
Stahl on hectic and consumption, 17; treatment advised by, ib.; condemns the use of bark, 18.
Stokes, Dr., on the treatment of consumption, 66.
Sulphur, vapor of, 13.
Sydenham, his views of the nature of consumption, and treatment recommended by, 15, 16; regarded phthisis as scrofula of the lungs, 144.

Theses relating to the inceptive pathology and true nature of phthisis, 148.
Thyroid cartilage, the, 129.
Timms, Dr. Godwin, on the true nature of consumption, 115.
Tissue, animal, consists of elementary cells, 118, 162; three groups of, 120; connective, 124; ultimate pulmonary, 136; morphological changes in the, 150; relation between their cellular elements and the circulation of the blood, 164.
Tonsillary glands, the, 126, 162, 214.
Tonsils, histologists not agreed as to the nature of the secretion from the, 215; great influence of the, in determining disease of the lung, 218; pathological changes in degeneration of the, 220; importance of the excision of the abnormal portion in enlarged, 226, 233, 285.
Topical treatment of follicular disease, 207.
Trachea, anatomy of the, 133; lymphatic vessels of the, 163.
Treatment of the præ-tubercular stage of chronic phthisis, 201; local and general treatment of chronic phthisis, 325.
Trousseau, on cauterizing the air-passages, 309.
Tubercle, or tuberculous matter, 1; Laennec, on the development of, 37; Baron on the origin of, 39; Broussais on, 40; Dr. Good on, 41; Andral on the origin of, 44; as defined by Louis, 46; Cruveilhier on, 55; Carswell on, 57; Dr. James Clark on, 59; Dr. Davies on, 64; Dr. Stokes on, 66; Williams on, 67; Con-

Tubercle, continued.
statt and Campbell on, 71, 72; Rokitanski on, 76; Graves, Dr., on, 77; Rilliet and Barthez on, 79; Gellerstedt on, 84; Lebert on, 85; Phillips and Glover on, 87; Professor Hasse on, 89; J. Hughes Bennett on, 92; Virchow on, 102. Van der Kolk on, 103; C. R. Hall on, 108; Sieveking on, 111; Paget on, 112; Dr. S. Wilks on, 114.
Tubercle granule, striking similarity between the contents of and those of the lymphatic vessels, 146.
Tubercular stage of phthisis, the, 297.
Tuberculosis, pulmonary, definition of, 1; primary symptoms of, 177, 178; in its initial stage, amenable to treatment, 177; cauterization of the air-passages in, 317; description of the operation, 322. And see Consumption and Phthisis.
Tuberculous dyscrasia, nature and origin of, 162: may be transmitted to offspring 201.

Ulcerations, tubercular, in the glandulæ of the mucous membrane of the air-passages, 186; difference between ulcerations and erosions of the mucous membrane, 257.
Uvula, appearance of the, in the initial stage of tuberculosis, 179; relaxation of, presenting some of the symptoms of phthisis, 180; pathology of the elongation of the, and case, 211.

Valsalva, opinions of, 20.
Van der Kolk, on the origin and formation of tubercle, 103.
Van Swieten, opinions of, on consumption, 21.
Vasa afferentia and efferentia, the, 142.
Velum pendulum palati, 125.
Venesection, recommended by Dr. Good, 42; by Dr. Clark, 63.
Vesalius, improvements made in anatomical investigations by, 14.
Vesicles, pulmonary, or air-cells, structure of the, 136.
Virchow, on the origin of tubercle, 102; his theory of cell-territories, 121; on the lymphatic vessels of the lungs, 140; cell-doctrine of, 153; on cellular pathology, 161; on the development of tubercular corpuscles, 170.
Vogel, a firm believer in the contagious nature of consumption, 23.

Waters, Dr., on the structure of the air-cells of the lungs, 137.
Welles, Dr., on the antagonism between intermittent fever and tubercular consumption, 33.
Wilkinson, Dr., on the proximate cause of tuberculosis, 146.
Wilks, Dr. Samuel, on miliary and yellow tubercle, 114.
Williams, Dr. C. J. B., on the nature and treatment of tuberculosis, 67.
Willis, views of, on consumption, 14.

Zinc, use of, in follicular disease, 327.

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