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THE
PATHOLOGY AND RADICAL CURE
OF
HAY FEVER,
OR HAY ASTHMA.



BY
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FELLOW OF THE AMERICAN LARYNGOLOGICAL ASSOCIATION, MEMBER
OF THE MEDICAL SOCIETY OF THE STATE OF NEW YORK,
OF THE AMERICAN MEDICAL ASSOCIATION, ETC.

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THE PATHOLOGY AND RADICAL CURE OF HAY FEVER, OR HAY ASTHMA.

All writers on hay fever, with a marked unanimity, agree that it is a most singular disease, that its cause is uncertain, that its pathology is unknown, and its treatment most unsatisfactory.

This absence of definite knowledge concerning it has arisen, not from lack of patient, careful, and close observation to determine its causes, but from the fact that these causes have been studied independently, that their relations to the tissue in the nasal passages, which is the part especially affected in this disease, have not been taken into consideration, and that the conditions in this tissue which render it susceptible to these influences have been entirely overlooked.

This fact is especially significant, for, in the examination of the various and more or less elaborate works on hay fever, we find no mention of any examination into the objective condition of the nasal passages, nor of any investigation as to the existence of any localized diseased condition which may predispose to the affection.

This is made more conspicuous when we consider the amount of labor expended during the past few years by the many hard workers, who have been carefully investigating the conditions of the tissue of the nasal cavity to discover the cause and means of cure of chronic nasal catarrh.

These investigations have revealed that the cause of nearly all of the most obstinate forms of nasal diseases, which have been considered incurable, can be removed, and the diseases more or less effectually and permanently cured.

These studies have also shown the nose to be a very important organ for maintaining in a normal condition all the organs with which it communicates, and have revealed relations existing between diseases of the nasal cavities and disorders of other

and sometimes distant organs, which were before unsuspected

As a further result of these investigations, it is clearly demonstrable that the special cause for hay fever does not alone reside in a special peculiarity of a special irritant which affects certain individuals in a peculiar manner, but in a special susceptibility of the tissue of the nasal passages of some individuals to be irritated by these substances when they are brought into contact with it; that this susceptibility of this tissue is occasioned by disease, either latent or active; that the removal of this diseased tissue will remove the susceptibility to irritation by these substances; and that the train of symptoms which appear to be more or less of a constitutional nature, producing the asthmatic and nervous symptoms (which have led to the classification of the affection as a neurosis), is but the result of the irritation of the Schneiderian mucous membrane, which is reflected to other parts and organs through the agency of the sympathetic nervous system, causing irritation in these organs, which is augmented by the consequent obstruction to nasal respiration during the attack.

In the attempt to discover the cause and to explain the pathology of this affection, variously called hay fever, hay asthma, grass asthma, rose cold, June cold, peach cold, ragweed fever, pollen fever or pollen catarrh, *catarrhus æstivus* (or summer catarrh), autumnal catarrh, etc., three theories have been brought forward to explain its phenomena:

1st. That it is caused by the pollen of certain plants and grasses floating in the atmosphere, which, being inhaled into the nasal passages, produces in them a special irritation, which excites more or less systemic disturbance in other organs.

2d. That it is caused by the lodgment or development in the nasal passages of vibrios or minute organisms which induce the attendant symptoms.

3d. That it is a functional disease of the nervous system, a neurosis.

Hay fever has also been attributed to the influence of heat and light, and to the odor of certain animals and plants.

The first, or pollen theory, originated with the laity in England in 1819. They observed that their annual attack of this affection was coincident with the ripening of grasses and the mowing of hay, and therefore attributed it to the inhalation of the pollen given off from the ripened grasses. Thus arose

the terms hay fever and hay asthma. This theory is the one generally held at the present time, and it is supported by the largest number of experimental observations.

The second theory originated with Helmholtz, in 1868, by his discovering, in the secretions from his own nose, vibrios or minute organisms, to which he ascribed his hay fever, for the reason that they could not be found in the secretions from his nose when free from the disease. In his letter communicating his discovery to Professor Binz, who first made it public (Virchow's "Archives," vol. xlvi., p. 100), Helmholtz himself does not charge them with being the cause, but only with increasing the irritation.

In 1873, Dr. Salisbury ("Infusorial Catarrh and Asthma") discovered an animalcular organism which he called the *asthmatus ciliaris*, and to which he attributed the hay fever. This parasite is said to inhabit stagnant and running water, and to be developed in fermenting organic matter.

This animalcular theory has had many advocates, largely owing to the encouragement which it has received from the believers in the germ theory of disease; but as yet it has not been confirmed by other scientific and careful observers.

The third theory, that it is a functional disease of the nervous system, was brought forward mainly by the late Dr. Beard, of New York, in his work on "Hay Fever," (New York, 1876.)

In ascribing the cause of the disease to the nervous system to explain the nervous phenomena which so frequently accompanied it, Dr. Beard evidently mistook the effect for the cause, since all these symptoms can be much more satisfactorily explained as arising by reflex irritation from the local affection in the manner already referred to.

A constitutional cause seems quite incapable of being the explanation of the annual recurrence of the disease at a definite season, and often at a definite day or hour, in persons in undoubted health and entirely free from all possible trace of nervous disorders, during the remainder of the year.

The dependence of this affection upon the presence of pollen and other irritating substances floating in the atmosphere has been, by the most careful researches, conclusively established.

Dr. Blakeley, in his elaborate researches, found that during the summer months the atmosphere of certain localities, often to the height of from 300 to 450 meters (1,000 to 1,500 feet), contains pollen grains in varying quantities, and that a small portion of this substance, even less than 0.0003 gram (grain $\frac{1}{2000}$) in weight, if directly applied to the mucous membrane of the nose of certain individuals, causes, within five minutes, occlusion of the nasal passages, with sneezing and lachrymation. This irritating effect is possessed by the pollen of all plants, but more especially by that of the Graminaceæ. ("Hay Fever," Manchester, 1880, second edition.)

The action of pollen upon the mucous membrane is explained by Berkart ("Asthma: its Pathology and treatment," London, 1878, p. 146) in its behavior upon contact with water vapor and also with mucus, according to the observations of Lühe.

Under the microscope, pollen appears as a simple cell, with granular contents and a cell-wall, consisting of an outer and an inner membrane. The extine is coated with an oleo-resin of a rich amber color, or at times a pale straw color, and contains several slits or pores, across which the intine is stretched so as to impede the escape of the granular matter. It does not appear that the oleo-resin has any specific action beyond enabling the grains to adhere to objects to which they may approach. On the addition of fluid, the cell is distended; the inner membrane projects through the slits of the outer in the shape of small mastoid processes, to which the granules are attached. A further distension causes the membrane to burst, and the granular contents are, with considerable force, ejaculated into the surrounding fluid. These granules irritate the mucous membrane, especially the mucous glands, and reappear finally in the sputa, resembling zoöglæa masses.

It has been shown by Dr. Beard that the pollen of plants is by no means the only cause for the symptoms termed hay fever.

The most common cause has been shown by Dr. Beard, to be dust in its various forms. In the 200 replies which he received to his letter of inquiry, coming mostly from the laity, and which formed the basis for his book on "Hay Fever," dust (indoor and outdoor) is given as a cause 104 times, while hay (dried or fresh) but 38 times, flowers 31, smoke 27, dampness 29, chills 25, cinders 23, brimstone matches 23, gas 23, fruit 22,

cold winds 19, drafts of air 16, perfumes 13, roses 5, etc., enumerating in all 30 different causes.

To account for the preponderance of instances in which the individuals ascribed the cause of their attacks to dust, as stated by Dr. Beard, Dr. Blakeley says it should not be overlooked that nearly all forms of dust, during the hay-fever season, are more or less loaded with various kinds of pollen, as an examination of the dust will readily show.

Thus, we see that with these numerous and widely diversified causes we would be led to look to the parts affected for the explanation of the phenomena to discover why the inhalation of this diversified "invisible nastiness" (as Tyndall very appropriately terms it) should so often produce this common result.

Those who still believe in the nervous origin of the disease will ask: If the affection be due to a local cause, how is it that it will appear in persons each year on exactly the same day, and even at the same hour? These individuals are undoubtedly affected by the pollen of certain plants, and the precision with which some plants ripen annually all botanists know. This is also shown by the fact that on removal of the individual to a seaport or to a mountainous region, or to any other locality where the pollen of these plants is not found, he remains entirely exempt.

Accepting the local irritant theory as the true or only satisfactory one, I will briefly endeavor to show, anatomically and pathologically, how the train of symptoms—as, turgescence of the nasal mucous membrane, lachrymation, sneezing, asthma, etc.,—follows as a result of these irritating substances lodging in the nasal passages.

Covering the inferior turbinated bones and the lower part of the septum there is a highly vascular erectile tissue analogous to the cavernous tissue of the genital organs, to which Professor Bigelow, of Boston, has given the name of turbinated corpora cavernosa. ("Boston Medical and Surgical Journal," April 29, 1875, vol. xcii, p. 489.)

This vascular erectile tissue is directly under the control of the vaso-motor nerves, and is exceedingly sensitive to impressions applied not only locally to the part, but to other portions of the body. Often it may be noticed that a draft of cold air striking another portion of the body will cause this tissue to

become engorged sufficiently to occlude one or sometimes both nostrils, and it is the involvement of this tissue which causes the distressing sensations arising from a cold in the head.

Sometimes slight disease or hypertrophy of this tissue, and not sufficient to give the patient any special annoyance, will increase its susceptibility to irritation to a marked degree, and it is the irritation reflected from this tissue, through the sympathetic nerves to other parts and organs, which, as I shall endeavor to show, is the excitor of the varied and distressing symptoms complained of by hay-fever sufferers.

It is proved by experiments on animals that violent irritation of the Schneiderian membrane will induce, through the sympathetic nerves, congestion and irritation in the larynx and lungs similar, though in a less degree, to the derangements induced in the lungs by irritation of the larynx.

The most recent investigations of the sympathetic nerve-centers show that they possess in a marked degree a correlating function between near and distant organs.

This fact is clearly pointed out by Dr. Edward Woakes in a very able article on the "Correlating Function of the Sympathetic Ganglia," read before the International Medical Congress held at London, August, 1881. ("Transactions," vol. ii, p. 75.)

He showed that the "afferent fibrillæ of a sympathetic ganglion, which are for the most part associated with sensori-motor nerves, are in reflex relationship with the efferent vaso-motor nerve furnished to the arteries from the same ganglion which receives the afferent fasciculi. In other words, an excito-vaso-motor function is established between the afferent and efferent elements of a given sympathetic ganglion. It is in this sense that these organs are said to exercise a correlating function in regard to such operations as belong to them, between tissue areas often widely separated."

It was first observed by Drs. S. Weir Mitchell, Morehouse, and Keen (in their work on "Gunshot Wounds and other Injuries of the Nerves," Philadelphia, 1864), that falling down, and sometimes momentary loss of consciousness, resulted from gunshot wounds of the brachial plexus, whether inflicted in the upper arm or neck, and was produced by the vessel dilatation in the brain caused by the reflex irritation through the inferior cervical ganglion. It is also well known by physiolo-

gists, as was first shown by Claude Bernard, that irritation of the fifth pair of nerves causes the side of the face to become red, the conjunctiva red, and its vessels congested.

Taking, for example, the frequent occurrence of giddiness or vertigo and noises in the head from deranged digestion, which has been so unaccountable, Dr. Woakes shows that it is due to congestion of the labyrinth from the vessel dilatation caused by the reflected sympathetic irritation from the stomach.

We have many other practical illustrations of this correlating function through the sympathetic nerve between near and distant organs.

Irritation of the larynx, attended with cough, is not infrequently induced by disease or by foreign bodies in the external ear. It is to be observed frequently that, in persons with apparently sound ears, even the placing of the end of the finger in the external auditory canal will provoke a violent paroxysm of coughing and engorgement of the vessels of the larynx.

This sympathetic irritation also exists between the larynx and ear in an inverse order, as shown by the severe earache so often produced by ulceration of the larynx. Otalgia, congestion, and inflammation leading to suppuration of the middle ear are not infrequently produced by diseased teeth, and also by disease in the nasal cavity unaccompanied by occlusion of the Eustachian tube.

A close sympathy also exists between the lachrymal apparatus and the nose, as seen by the marked and almost instant congestion of the conjunctiva and suffusion of the eyes which follow the application of an irritant to the Schneiderian membrane.

This sympathetic connection between the different organs explains the frequent derangement of one organ caused by disease in another and sometimes distant organ, and is shown by the instances of laryngeal congestion and violent cough produced by irritation and disease of the uterus and its appendages.

Between the nose and the larynx a close and intimate relation exists. It is now a well-established fact with laryngologists that many cases of laryngeal hyperæmia and laryngeal irritation are induced entirely by disease in the nasal cavity through the sympathetic nervous communication between the two regions.

Voltolini first pointed out that many cases of asthma are provoked by the irritation from nasal polypi. ("Galvano-Kaustic," S. 246, u. 312, 1871.) Traube was the first to believe that a fluctuatory hyperæmia of the bronchial mucous membrane was the sole cause of dyspnoeal attacks ("Bemerkungen über cardiales Asthma," "Ges. Beitr. zur Path. und Physiol.," Berlin, 1878, Bd. iii, p. 209), and later investigations prove conclusively that engorgement of the pulmonary vessels does take place through vaso-motor nervous influence in the manner already described. Several careful observers, as Fränkel, Weber, Schaeffer, Bresgen, Biermer, Mulhall, and some others, believe that in many instances asthma, produced by this fluctuatory hyperæmia of the bronchial mucous membrane, is caused by irritation or disease of the terminal fibers of the nerves supplying the nasal cavity. This is observed more often in cases of chronic hypertrophic nasal catarrh, and is verified by the disappearance of the asthmatic symptoms on the removal of the cause in the nose.

In this manner is explained the intimate connection which so often is seen between these different regions. Thus, irritation of the terminal fibers of the sphenopalatine ganglion is communicated to the Gasserian ganglion which is located in the sensory root of the fifth; this communicates with the carotid plexus of the superior cervical ganglion of the sympathetic; this in turn communicates with the pneumogastric, which distributes its fibers to the larynx, lungs, heart, œsophagus, stomach, intestines, etc. We also have the otic ganglion, the ophthalmic ganglion, the maxillary ganglion, and the superior and inferior dental nerves all united in common through the sympathetic, in this beautiful system of nervous communication, and any or all of the parts may suffer from irritation set up in any one part, however remote it may be.

The importance of unobstructed nasal passages and free nasal respiration is generally recognized, but, in seeking for the cause of the symptoms which arise when these passages are obstructed, the nose is quite commonly overlooked. It is for this reason that I have purposely discussed somewhat in detail this sympathetic connection which exists to a greater or less degree between the nasal cavity and other parts and organs, and have endeavored to make it clear that the train of symptoms attending this affection, as suffusion and irritation of

the eyes, sneezing, asthma, and other local or systemic derangements, is the result of this intense local irritation set up, in the tissue of the nasal passages, by these irritating substances.

In this relationship I also wish to point out that latent, as well as active, disease of this tissue will, in many instances, excite in it a hyperæsthesia or an inordinate sensitiveness to local impression.

The conclusion, that this hyperæsthetic tissue of the nasal passages sustains a certain relation to the causation of hay fever, has been reached in a natural manner, by observing from time to time, that patients who were under treatment for nasal diseases, and who also suffered severely from hay fever during the summer months, were relieved, or their attacks lessened in severity, in proportion as these diseased conditions in the nasal passages were removed; and that, in cases where this hypertrophied turbinated tissue was removed altogether, the patient became entirely exempt from subsequent attacks.

It has been observed, furthermore, that in every instance in those who were subject to hay fever, more or less disease or hypertrophy of this tissue existed, although hyperæsthesia of this tissue is induced in but a portion of those in whom this hypertrophy is found; and, as this hypertrophy is the cause, in nearly all cases, of what is termed nasal catarrh, so we find that hay fever is most prevalent in those regions where there is a predisposition to catarrhal diseases, and where the atmospheric conditions are such as to cause these hypertrophies.

By way of illustration, I will cite some well-marked and typical cases of hay fever which were entirely relieved by treatment of the nasal disease.

F. J. T., farmer, aged thirty-three years, was referred to me by my late friend, Dr. J. I. Denman, November 18, 1878. For twelve years previous, he had more or less sensitiveness in the nose and throat, and was subject to frequent colds in the head. Early in the fall of 1876, while at the Centennial, he took a heavy cold in the head, which did not leave him as his colds had done before.

Shortly after this he had a watery, and later a thick and tenacious, discharge from the nose, which continued until I saw him.

In the fall of 1879 his nostrils became narrowed so that he had much difficulty in breathing through them, particularly at

night on lying down. His sleep was disturbed by loud snoring, he was frequently aroused by attacks of dyspnoea, and in the morning his throat would be dry, with a bad taste in his mouth. He also remarked in this connection that he had been a sufferer from hay fever during these twelve years, and that it was becoming more severe each year.

His attacks came on about the first of July, during hay fever time, and continued until early fall, and were attended with severe asthmatic attacks. They were becoming so severe that often he had to refrain from working in the field, and to shut himself up in the house; and frequently during the winter, on shaking dry hay to feed his horses, symptoms similar to his summer attacks would be brought on. Other forms of dust, and also damp air affected him. He especially wished to know if these attacks of hay fever could be prevented. I told him the only sure way was to take an ocean voyage, or to go to some locality where hay fever sufferers were exempt.

An examination showed both nostrils to be greatly narrowed by inferior turbinated hypertrophy; also that there was pharyngo-laryngeal catarrh, a markedly scrolled and somewhat omega-shaped epiglottis with two small cysts, near the tip, on the lingual side.

In addition to the removal of the cysts, and topical treatment to the larynx and pharynx, I advised the removal of the turbinated hypertrophy with the galvano-cautery, to which he most cheerfully consented.

On the thorough removal of this hypertrophied tissue from the nose, and the cure of the disease in the throat, he was entirely relieved of the irritation of the nose, the discharge ceased, and he was troubled no more by snoring and attacks of dyspnoea at night.

Greatly to his, and also to my own surprise, he was not attacked by hay fever during the following summer; and, as he informed me a short time ago, he has been entirely exempt from it, during each summer since.

G. B., aged thirty-three, merchant, was referred to me April 5th, 1880, for treatment for marked nasal obstruction and nasal catarrh of ten years' standing. He stated that during each season he had had hay fever and hay asthma very severely, coming on about the 25th of July and continuing the remainder of the summer, oftentimes so severely as to compel him to seek relief at some reputed resort.

He was subject to frequent colds in the head, and had difficulty in breathing through the nose, with irritation in the throat and impairment and muffling of his voice, though he was not markedly hoarse.

An examination revealed in both nostrils marked anterior turbinated hypertrophy, the right nostril being nearly occluded.

Treatment.—I advised removal of this tissue with the galvano-cautery, which was done April 12th, and resulted in restoring free nasal respiration, removing his annoying catarrh, and, greatly to his surprise, giving him entire immunity from hay fever during the two summers which followed.

Mr. C. S., Abilene, Kansas, aged thirty-four years, a stout, well-developed man, came under my care December 31st, 1881. He had been troubled more or less with naso-pharyngeal catarrh since he had scarlet fever, twenty years ago; and, during each summer, with hay fever, coming on about the 15th of August and continuing until frost came, and attended by more or less asthma. He was not free at any time from a sensitiveness about the throat and nostrils, and some difficulty in breathing through them, when exposed to damp air or dust. He was also subject to frequent colds and attacks of hoarseness, with cough, and sometimes difficulty in articulation. His general health was good. An examination revealed marked hypertrophy of the vascular tissue covering the inferior turbinated bones and the lower portion of the septum, and also pharyngo-laryngeal catarrh.

Treatment.—I advised removal of the tissue obstruction in the nostrils and local medication to the larynx and pharynx. Wishing to avoid, if possible, all operative procedures, he decided to try the effect of local medication alone. Accordingly, for four weeks the most efficient and approved local medicaments were employed, with marked benefit, to the laryngeal affection, but with only temporary relief to the nasal obstruction. He went home, but returned April 8th, ten weeks afterward, to have the hypertrophied turbinated tissue removed, which was thoroughly done in both nostrils, the posterior turbinated hypertrophy, with Jarvis's snare, the middle and anterior hypertrophy, with the galvano-cautery. Local applications were also continued to the larynx, pharynx, and the surrounding slightly diseased portions of the nasal passages. He returned home

May 15th, with complete relief from all his old nasal and laryngeal affections. In a letter, received from him but a short time ago, he states that he escaped the hay fever last summer, and has since remained very well.

Mrs. J. W. K., aged thirty-one years, was referred to me February 2, 1882. She had had nasal catarrh and obstructed nostrils for eight years, and each summer during this time hay fever very severely. Four years ago she began to have frequent and severe headaches, profuse discharge from the nose, loss of smell on the left side, and tinnitus aurium. She had also become unable to use her eyes to read or sew, on account of intense headache which was immediately brought on. Her general health was much below par, and she was weak and anæmic.

Examination.—Obstructed nostrils, from turbinated hypertrophy and chronic follicular pharyngitis.

Treatment.—I advised the removal of this turbinated tissue, which was done February 12th, in both nostrils, with the galvano-cautery. The operation, with some attending treatment, resulted in complete relief of the nasal stenosis, disappearance of the headaches on using the eyes or at any other time, and marked improvement in her general health. She also escaped completely, her annual attack of hay fever.

Miss L. C., aged twenty-two years, vocalist, consulted me May 20, 1882, in regard to an impediment in her singing voice, and pharyngeal irritation; and also in regard to hay fever and asthma, which had attacked her every year in July for eight years. This she wished prevented if possible, as she was unable to sing during the remainder of the summer. At other times she felt very well, and had no special trouble from catarrh or nasal obstruction, unless exposed to the inhalation of dust.

Examination showed the vocal disability to be due mainly to hypertrophied tonsils. In the nose there was considerable hypertrophy of the turbinated tissue, which slightly impaired the nasal resonance, but which, owing to the large size of the passages, did not obstruct nasal respiration. Removal of the tonsils greatly improved the voice. She decided to have the nasal hypertrophy removed, to avoid, if possible, the hay fever. This was done June 21st, the posterior portion, with Jarvis's nasal wire écraseur, the middle and anterior, by the galvano-

cautery. After the healing of the parts, the sensitiveness to exposure to dust was removed, and she has, this summer, completely escaped her annual attacks of hay fever.

In all these cases it will be seen that the galvanic cautery was used either alone or as a supplement to the use of the snare.

In many cases, on attempting to remove the nasal hypertrophies with the snare alone, or by the employment of caustics, as nitric acid, chromic acid, acetic acid, etc., the attacks of hay fever were to a greater or less degree lessened, but not altogether prevented; although at that time the hay fever was supposed to be only an accidental association, the connection between it and the hypertrophy of the turbinated tissue not then having been recognized.

For the removal of this tissue, Jarvis's snare is the most efficient means of removing that at the posterior end of the turbinated bone, as the tissue here is usually more or less pedunculated and can be readily engaged in the loop; while that covering the middle and anterior portion of the turbinated bone is almost always sessile, and it is rare that enough of this tissue, and particularly the deep plexuses of vessels, can be removed by it to be effective, even when the clamp-forceps or the transfixion needle is used.

In the employment of caustics, the mucous and cellular tissue is readily removed, but the vessels, being much more resisting, are not destroyed.

The galvanic cautery, therefore, is the most reliable and radical method to employ.

It serves a threefold purpose: that of destroying the tissues and vessels with which the electrode comes in contact, of obliterating the surrounding vessels by the plastic exudate which is thrown out, and of removing the hyperæsthesia of the terminal nerve-fibers in the part.

By using a small electrode and burning but little at each introduction, to avoid the excessive heating of the surrounding tissues, and afterward, by keeping the parts protected by vaseline warmed and thrown into the nostrils with the spray tube immediately after the operation and until the slough separates and the parts are healed, and avoiding during this time the use of aqueous solutions, the inflammatory complications which have so frequently occurred can be almost invariably pre-

vented. On burning but little at each introduction of the electrode, it is usually necessary to introduce it several times before destruction of the tissue is accomplished; but this is far preferable to burning it all off at one introduction of the electrode, and pain is thereby almost completely avoided.

The pain attending the operation with the galvano-cautery, or with the snare, is usually comparatively slight, and does not often require an anæsthetic; but in persons with very sensitive nostrils, or where the fear of the operation is great, ether can be administered.

In operating with the galvano-cautery, nitrous-oxide gas is the most convenient anæsthetic.

This opinion, that nasal disease is the direct cause which predisposes to attacks of hay fever, is also supported by Dr. Daly, of Pittsburgh, in a recent article on the "Relations of Hay Asthma and Chronic Naso-Pharyngeal Catarrh." ("Archives of Laryngology," April, 1882, vol. iii, p. 157.)

In this article Dr. Daly reports the histories of three patients who were chronic sufferers from hay fever, for six, fifteen, and twenty-one years, and, in every instance where he removed this turbinated hypertrophy and cured the nasal disease, the patients were given complete immunity from further attacks, although constantly exposed to the same influences which had affected them so severely before.

Thus, from the study of hay fever in the light of the most recent investigations as to its cause, and our present knowledge of nasal diseases and their influence on other organs, we may draw the following conclusions:

1st. That hay fever is an affection not confined to age, sex, or condition in life.

2d. That it is excited by the pollen of flowers or grasses, dust, or other irritating substances floating in the atmosphere, which are brought, by inhalation, in contact with the nasal and bronchial mucous membrane.

3d. That the nasal mucous membrane, in certain individuals, is very susceptible to the irritating effect of these substances, while in others it is not.

4th. That this hyperæsthesia is associated with or occasioned by a diseased condition, either latent or active, of the naso-pharyngeal mucous membrane and nearly always with an hypertrophied condition of the vascular tissue covering the turbinated bones and the lower portion of the septum.

5th. That the systemic disturbances, such as asthma, etc., are the effect of the local irritation of this diseased tissue in the nasal passages which is reflected to the larynx, bronchi, and lungs, causing in them a fluctuatory hyperæmia, produced through the correlating function of the sympathetic ganglia connecting these different regions.

6th. That the treatment during the attack can only be palliative, such as to soothe the inflamed parts and to quiet the systemic disturbance which may be occasioned.

7th. That in most cases the only effective relief, during the attack, consists in going to a seaport or mountainous region, or to any locality where the air is free from the substance which produces the irritation.

8th. That curative measures can only be adopted when the individual is free from the attack.

9th. That the removal of the diseased tissue in the nasal passages removes the susceptibility of the individual to future attacks of hay fever.

