HUSTED. (N.C.)

HAY-FEVER * * * * * *

Cristellaria cultrata, Montfort, sp. Rare.
Cristellaria rotulata, Lamarck, sp. Quite abundant.
Cristellaria variabilis, Reuss. Rare.
Polystomella crispa, Linné, sp. Common.
Polymorphina elegantissima (?). Rare.
Uvigerina pygmæa, d'Orbigny. Rare.
Truncatulina lobatula, Walker & Jacob, sp. Common.
Pulvinulina elegans, d'Orbigny, sp. Not common.
Pulvinulina hauerii, d'Orbigny, sp. Not rare.
Pulvinulina karsteni, Reuss, sp. Quite rare.
Pulvinulina lateralis, Terquem, sp. Rare.
Pulvinulina punctulata, d'Orbigny, sp. Rare.
Spœroidina bulloides, d'Orbigny. Rare.
Rotalia beccarii, Linné, sp. Not rare.
Discorbina orbicularis, Terquem, sp. Abundant.
Anomalina grosserugosa, Gumbel, sp. Common.

HAY-FEVER: ITS TREATMENT PHYSIOLOGICALLY AND PATHOLOGICALLY CONSIDERED.

BY DR. N. C. HUSTED.

(*Read December 7th*, 1888.)

That Hay-Fever belongs to the Neuroses, has become an established fact; and, when the most eminent of our recent writers on this subject have brought forward such overwhelming proofs to show, that it is an affection of the nervous system, it seems folly to entertain any theories or ideas appertaining to its pathology, etiology or treatment, which are not based on a neurotic hypothesis. To the layman's mind it may seem strange that eminent writers should not come to any agreement concerning this troublesome affection; but, notwithstanding the fact that the nerve-theory has placed Hay-Fever on a new foundation, from which we may feel assured many bright superstructures will arise, yet many questions come before us, which will give rise to much future discussion.

In recognizing Hay-Fever as a nervous affection, certain questions naturally arise from such an hypothesis:

I. Is Hay-Fever of Neurotic *origin?*

II. If so, does it begin primarily, (*a*) in the central nervous cells, (*b*) in the nerve-trunks, or (*c*) in the terminal organs?

III. Are pathological lesions present?

IV. Is there an inflammation of the mucous membranes, giving rise to nervous hyperesthesia?

In the New York *Medical Record* of July 14th, 1888, Dr. B. O. Kinnear, of Boston, gives an interesting paper, in which he states, and endeavors to prove, that Hay-Fever is a disease of *central cell origin.* His argument shows deep study and a logical train of thought, and, although believing his premises to be faulty, I think the article adds greatly to our literature of the subject.

Explanation of Plate 15.

Human nerves and mucous membrane as related to Hay-Fever.—***mm, mm,*** mucous membrane; ***sc,*** spinal cord; ***cg,*** Casserian ganglion; ***oph,*** ophthalmic nerve; ***f,*** frontal branch; ***n,*** nasal branch; ***l,*** lachrymal branch; ***sm,*** superior maxillary nerve; ***gp,*** glosso-pharyngeal nerve; ***p,*** pneumogastric nerve; ***sp,*** superior pharyngeal branch; ***sl,*** superior laryngeal branch; ***b,*** bronchial branch.

HUSTED ON HAY-FEVER.

In support of his hypothesis, Dr. Kinnear makes use substantially of the following facts: Grief causes the tears to flow, the muscles of the face to contort, and induces rapid failure of muscular strength. Mental excitement acts on the secretions of the kidneys. Nausea and vomiting are often caused by a disgusting sight or smell. Joy and anger flush the face. Sneezing is an effort of Nature to throw off the foreign body from the mucous membrane of the nose, &c.

These are reflex acts giving rise to hyperactivity and hypersecretion. He reasons from this, that abnormal nerve-force, due to disease of the *central cells*, will give rise to abnormal effects on the system; *i. e.*, disease of the central ganglion, connected with the nerves supplying the mucous membrane of the nose and throat, causing what he calls abnormal nervous force, produces abnormal secretions from these parts. At the same time he declares Hay-Fever paroxysms to be reflex acts. Which is very true; thus showing the fallacy of his theory, that the disease originates in the central nerve-cells. Now a reflex act is due to the stimulation and irritation of a sensory nerve, over which the impulse travels; the central cells acting only to receive this impulse, and transmit it to the motor nerves. By this it will be seen, that a reflex act cannot take place, unless the impulse be first carried along a sensory nerve to the cell. And therefore Dr. Kinnear's assumption, that a diseased condition of the cells originates the reflex act, and its subsequent phenomena, seems to me to be false. In fact, he must deny the existence of all the well-known etiological factors, when he assumes that the disease is of central nervous origin.

After a careful study of this affection, and believing it to be a disease of the nervous system, I have arrived at the following conclusions, which seem at least to be based on physiological, pathological and common-sense principles. Hay-Fever is a periodic, Neurotic disease, occurring in persons having a peculiar idiosyncrasy, or constitutional diathesis, and characterized by a hypersecretion of the nasal and pharyngeal mucous membranes. The paroxysms are reflex acts, due to an irritation of the *terminal fibres* of the nerves, supplying the nasal and pharyngeal mucous membranes. The impulse is carried along the sensory nerves to the central cells in the medulla, which, on receiving the impulse, transmits it to the vaso-motor system,

producing a congestion of the parts, from which the impulse originates. This abnormal blood supply increases the nutrition of the mucous membrane, giving rise to a hypersecretion of the mucous glands.

The blood-supply of the body is regulated by the great sympathetic nervous system, which surrounds the arteries, and the sympathetic nerve-endings are supposed to terminate in the muscular coats of the arteries. Any thing, which affects this system of nerves, will cause either contraction or dilatation of the vessels, thus diminishing or increasing the blood-supply of the part. A common illustration of this fact is shown when, on approaching a hot fire, the skin becomes red, and the action of the heat on the nerves of the skin causes the capillary blood-vessels to dilate, and thus increasing the action of the sweat glands, the surface becomes moist. In the same manner the application of cold to the surface causes contraction of the capillaries. Stimulation of certain nerves, connected with any organ or tissue of the body, will cause a determination of blood to those parts, and a hyperactivity.

The amount and continuance of a congestion, or hyperæmia, depends on the duration, rather than on the amount of irritation present. A severe cut on the surface of the body, with some sharp instrument, causes local hyperæmia of the surface incised, while it is comparatively of short duration ; while the prolonged presence of a splinter, or other foreign body, will cause severe inflammation, which may ultimately end in gangrene. Such illustrations show the influence of the nerves over the arterial system, and demonstrate to us that the nerve-theory of Hay-Fever is not altogether unfounded.

It may easily be seen from the above facts, how certain substances, coming in contact with the mucous surfaces of the nose and throat, will set up an irritation in the terminal nerve-fibres ; and how this irritation, in the form of nerve-impulses, keeps flashing along the sensory nerves to the switch-men in the medulla, who, in the form of nerve-centres, having no action of their own, irrespective of events taking place elsewhere in the body, receive their elective despatches, and faithfully transmit them down the cervical spine, and, by means of the cervical sympathetic system, dilate the nasal and pharyngeal capillaries, thus causing the familiar discharges from the nose and throat.

Physiologists have time and again proven for us these reflex acts ; we are constantly seeing them illustrated in our every-day life ; and surely their connection with this disease is not beyond the range of possibility.

There is another factor, which enables us to regard Hay-Fever in the light of a Neurosis. This is its almost exclusive confinement to patients in the higher walks of life. As the human race advances to higher degrees of civilization and refinement, in direct proportion do the Neuroses multiply among our aristocracy, and each successive generation shows us the increase. The Anglo-Saxon race appears to be alone liable, English and Americans being those who are almost exclusively affected. As to Temperament,—it almost always occurs in the nervous and energetic.

Sir Morell Mackenzie, in his work on Hay-Fever, quotes a case, in which a young lady, who was a victim of Hay-Fever, on visiting the Royal Academy, was so struck with the realistic representation of Hay-Fever, that she was at once seized with a severe paroxysm of her complaint, from which she was at the time free. Dr. Mackenzie thinks she must have passed a hay-cart on her way to the academy. It seems probable that in a person of highly sensitive nervous organization, such a sight would act reflexly on the nerves, already in a state of hyperæsthesia, and produce the paroxysm. The sight or thought of anything sour will cause an increase in the salivary secretion ; and so this case seems to bind us still closer to the nerve-theory of Hay-Fever. Why is it that some of us suffer, while others enjoy immunity ? For the same reason that, on exposure to some contagious disease, one man will contract it, and the others escape. We give it that very convenient but unfortunate term, " idiosyncrasy,"—that peculiar liability, some of us have, to contract certain diseases, which we can not as yet explain, and which is often hereditary.

The active cause of the irritation causing Hay-Fever still remains unsettled, to a certain extent ; but the majority cling to the pollen theory. I would raise the following questions :

I. The pollen from vegetable life acts as a direct irritant to the nerve-endings in the mucous membrane.

II. The pollen, or atmosphere, contains bacilli, which act as a ferment, on entering the blood.

III. The nasal membrane is kept moist by the secretion from the mucous glands.

The mucous membrane is covered with ciliated epithelium, the cilia being continually in a state of motion. Now if, from any cause, these cilia are in a state of hyperactivity, it can be seen how the mucous, instead of accumulating and keeping the membranes moist, will be thrown off, as it accumulates, and the membrane, becoming dry, is easily irritated by the presence of foreign bodies. This, seems to me to be a possible explanation of the fact, that Hay-Fever attacks only the favored few ; the hyperactivity of the cilia depending on the Neurotic diathesis of the patient. It is well known that the atmosphere is filled with bacilli of different species, which are innoxious until they find a mucous membrane favorable to their growth. The Hay-Fever bacillus has not yet been captured ; and it is possibly lurking in the air we breathe, waiting to pounce down on the mucous membrane of those of us, who present a favorable predisposition. The ideas presented are merely suggestive, there being no space for their discussion in this paper.

On starting this paper, I had determined to make no mention of symptomatology. The symptoms are well known to most of you here present. But certain circumstances have determined me to speak of a very distressing one. The difficulty of breathing, and tightness about the chest, and cough, are regarded by many as the extension of the pharyngeal inflammation to the air-cells of the lungs. When the cellular tissue of the lungs becomes inflamed, something more serious than an asthmatic attack is going to happen. In fact I do not consider Hay-Fever to be accompanied by inflammation ; for inflammation always leads to proliferation, and destruction of tissue. I regard it merely as a congestion, which does not get as far as inflammation. These chest symptoms are plainly due to irritation of branches of the pneumogastric nerve. As we know, branches of this nerve are distributed to the lungs ; it has also branches which form a part of the pharyngeal plexus. There can be no question that stimulation of this plexus will excite the branches which supply the lungs.

The Treatment.—Numerous remedies are proposed every year, but none of them do more than give partial or temporary relief. A gentleman, visiting a suburban town, had occasion to

call a physician in the night to prescribe for a severe paroxysm of this disease. The good old country doctor came, felt of his pulse, and enquired if he had tried any remedies. "Yes," he replied, "I have been trying *remedies* all my life, and now I want something to *cure* me."

Any treatment of Hay-Fever, to be effectual, must be based on a correct theory of its causation. Recall the fact, that the nasal and pharyngeal capillaries are in a state of engorgement, caused by the action of the nerve-impulses, which start in the plexuses of those parts, on the central cells of the sympathetic system, whose duty is to keep these vessels in a state of contractility. It seems evident from this, that anything, which will cause the sympathetic nerves to regain their normal condition, will relieve this congestion in the capillaries. This is done by the use of Chapman's ice-bags. They must be applied to the spine, and remain there from ten to fifteen minutes, and even as long as an hour, at each attack. After three or four applications, it will be found that the attacks will be warded off, or I may say the disease will be arrested. During the past year, some half dozen cases came under my care. I found the ice-bag to invariably arrest the attacks, and, in one particular case, the attacks have not recurred. Thus far I consider it a cure.

NOTES ON A NEW OCHRACEOUS THALLOPHYTE.

BY ALEXIS A. JULIEN, PH. D.

(*Read January 18th*, 1889.)

In the month of July, 1886, I observed and collected a curious ferruginous plant-growth, which occurred on the sides and in the basin of a cold spring, at a point on the Shark River, in Monmouth County, New Jersey, and which resembled the so-called *Leptothrix ochracea*, Kützing, of Europe, in general appearance. Early in September of the same year, another occurrence was discovered by a friend, which I have since visited and examined, at several points along a large brook, called the Sandburg, near Mountaindale, Sullivan County, New York. Soon after, the same growth made its appearance in tanks of our laboratory, into which water plants from the

Shark River had been transferred, and has since been cultivated with little difficulty. In November, 1887, I discovered a third locality in Monmouth County, about five miles east of that on the Shark River, near the seashore, at Ocean Beach, New Jersey.

At all these three points and in the tanks, more complex associated forms have been since obtained and were at first attributed to the *Cladothrix dichotoma*, Cohn, and *Crenothrix Kühniana*, Zopf, of Europe.

The study of abundant material, from the natural localities and laboratory-cultures, has shown that we have, at last at these localities, and perhaps at other reported American occurrences of supposed *Crenothrix*, a new genus of aquatic fungus of algoid habit, which is a true schizomycete, branched, and apparently the largest bacterium yet found, with filaments often 15 millimeters or more in length.

In advance of the full description of this interesting plant, a brief statement of its more important morphological characteristics will be here presented.

Though remarkably pleomorphic, all the stages of its growth are sharply distinguished within two classes, the vegetative or unicellular, and the reproductive or multicellular.

From a microspore of ordinary form, leptothrix of various kinds is produced by sprouting, viz., gently curved and twisted filaments, irregularly bent spirochate and screw-filaments, spirilla and vibrio-forms, all with distinct and thick sheaths, often still more thickened by gelatinization and excretion of ferric hydrate. Within the leptothrix-filaments, a condensation of protoplasm ensues, producing, in some cases, cylinders and granules, equal-sized cocci, and even arthrospores ; in others, chains of connected bacilli, which may multiply by fission and sometimes themselves develop minute endogenous spores. These chains emerge from the original sheath and soon reveal their investment by a still more delicate sheath, from which, in turn, new chains of rectilinear elements emerge and generally break up into their constituents. Both in the original leptothrix and its secondary chains, many of the rods are often bent or curved, sometimes vibrio-like, and by pressure, sometimes penetrate the thinner sheath of the chains, and, so diverging from the axis of the filament, form branches at a small angle.