

Public Health.

H.F.Riedel.

March 3, 1925.

Hay Fever Prevalence on the Pacific Coast and the
Responsible Plants.

Outline of contents:

1. Prevalence:
 - a. Percentage in U.S.
2. History:
 - a. Disease established.1870.
 - b. False ideas.
3. Cause:
 - a. Sensitization of patient.
 - b. Wind borne pollen.
 - c. Neighborhood weeds.
4. Symptoms:
 - a. Constitutional.
 - b. Eyes.
 - c. Nose.
 - d. Mouth.
 - e. Ears.
 - f. Chest.
 - g. Skin.
5. Causes of reaction.
 - a. Types of pollen.
6. Biological tests made for Fever.
 - a. Skin and conjunctival reaction.
7. Immunity.
8. Conveyance of pollen.
9. Miscellaneous causes for Hay-fever.
- 10.Plants on Pacific Coast responsible.
 - a. California.
 - b. Oregon.
 - c. Washington.
- 11.Methods of eradication and special legislation.

Bibliography.

Hay Fever Prevalence on the Pacific Coast and the Responsible Plants.

It has been found that in most parts of the United States from 1 to 2 per cent of the population suffer from hay fever at some portion of the year, indicating that its victims may be counted by the hundred thousands.

It was not until about 1870 that the relationship of pollen to the disease was established. The development of hay fever about the time of hay harvest led to the belief that this was the cause of the disease. The particular pollens causing this disease were for a long time unidentified. As an illustration of this, when a patient developed an attack in the neighborhood of weeds, the conspicuous goldenrod was at once suspected and the ragweed, with its insignificant green flowers, was unobserved. While the pollen of many plants is wind borne, it varies to a marked degree. The pollen of the goldenrod, for instance, is toxic to susceptible persons and will develop a reaction if applied to the nostrils, but it is not abundant, is dislodged with difficulty, and is wind-borne to only a slight degree. In spite therefore of the fact that the goldenrod is treated in most reports and textbooks as an important factor in hay fever, it is responsible in only a small percentage of cases.

There are namely three fundamental factors as to the cause of seasonal hay-fever:

1. Hay-fever is due to a sensitization of the patient against one or more foreign proteins which are nearly always

those of the pollens of plants.

2. These pollens, to be important as the cause of hay-fever, must be wind-borne; i.e., they must be present in the atmosphere, capable of gaining entry to the patient's sensitive mucosa. Plants which are fertilized by insect-borne pollens are practically incapable of causing hay-fever, because their pollens are not found in the atmosphere. This fact clears the reputation of nearly all the garden flowers, such as roses, sweet peas, primroses, daisies, dandelions, clover, sunflowers, and golden-rod, which were formerly falsely accused of being major offenders.

3. The suspected plant must be pollenating in the patient's neighborhood at the time of his attack, and must throw off its pollen in appreciable amounts.

The constitutional symptoms of a patient will vary as to his sensitiveness. Usually they feel relaxed and depressed. The condition varies from something scarcely noticeable to a most profound prostration and is associated with slight or pronounced local symptoms. Together with mental symptoms there is muscular exhaustion, and patients often report asthenia. Involuntary muscles are frequently affected in the same way, e.g., one frequently finds a toxic heart during hay-fever.

The eyes experience a smarting and soreness, ranging from merely a slight irritation to an intolerable pain and photophobia. Objectively, first the inner canthus and progressively the whole eyeball becomes inflamed. In extreme cases, the conjunctiva swells and blisters, and finally a thin membrane seems to peel off. The conjunctiva of the eyelid swells and the eyelids become edematous, so that the patient describes the eye as being 'bunged up'. The lacrimal ducts will probably be closed by the inflammation, and as there is naturally an increased lacrimation,

the tears will course down the cheek in a severe attack. Finally the engorged and swollen conjunctiva may become infected, so the folds under the eyelids may be filled with a yellow semipurulent discharge especially upon waking in the morning.

The nasal secretion varies from a slight watery discharge to a mucous. There may be a slight tingling or an intolerable itching of the nose; sneezing designed to remove the irritant, may be continued as many as fifty to 60 times until the patient is completely exhausted. These symptoms give the appearance of a cold. The mucous membrane becomes inflamed and swollen and if this is pronounced, all passages of air may be blocked and the patient compelled to become a mouth breather. Infection of the mucous membrane is not infrequent especially toward the end of the hay-fever season, and such secondary infections may obscure the real nature of the case.

The throat-palate, and tongue become itching and sore, and red spots or small blisters may mark the inflammation. The irritation may lead to much coughing and the patient may be impelled to scratch the roof of the mouth.

The ears are a point of specific trouble, both by reason of the irritation in the external meatus and also by the blocking of the eustachian tube, which may cause earache, deafness, or giddiness.

The chest suffers more from constitutional effects of hay-fever than from the direct action of the pollen; but if from habit, surgical interference, or the course of the disease, the patient is a mouth breather, then the pollen in the atmosphere reaches the lung. Statistics show 45% of all hay-fever patients are Hay-asthma.

The skin may tingle or itch from the direct action of

the pollen and give the sensation of 'goose-flesh' all over the body. The face and neck may become flushed, a rash or blotchy patches may appear to such an extent that they are very distressing. When this subsides, the skin looks dry and scaly.

So the means of diagnosis are:

1. Characteristic symptoms described above which mark the affection as an air-borne toxic idiopathy.
2. The marked periodicity and its relation to seasonal plants.
3. Diagnostic biological reactions which can be secured at any time of the year. Hayfever patients react to grass pollens and non-hayfever patients do not.

If a susceptible person is brought within the pollinating radius of hay-fever weeds so that the pollen may reach their nostrils in sufficient quantity he will react, the length of time required for reaction depending on the kind and amount of pollen he has inhaled and his resistance to hay-fever. Of the two kinds of pollen, the extine or spiculated pollen and the unspiculated grains, the former cause a marked reaction when inhaled by a person sensitive to them; usually within 2 minutes. Reaction to unspiculated pollens is delayed and less marked, although they may be quite prolonged. They are caused not by a local irritation, but by absorption of the protein content of the pollen. In the cases in which the variety of hay-fever is known, as in the ragweed form, the commencement of the attack may be accurately predicted by watching for the appearance of the pollen on the staminate flowers, and the disappearance of the attacks may likewise be foretold.

The method of making the biological test for hay fever is as follows: For the pollen of botanical genera which have not yet been tested, a weak saline extract(1-20,000) of the pollen is first used. Care should be taken that the saline solution used is a one-half of 1% solution, as a stronger or weaker solution causes irritation of the nasal mucosa independent of the action of the pollen extract. When the subject fails to react to this weak extract, stronger extracts are applied. When these also prove negative, some of the pollen is applied as a final test.

The pollen extract is prepared by adding 1cc. of the specified pollen to 10cc.of 5% salt solution. After the soluble extracts have been dissolved, the liquid is filtered and 7% alcohol is added. When used for testing the reaction of a patient or for immunizing, this is diluted so as to represent a pollen extract of 1 to 10,000 to 1 to 200,000 or more according to the toxicity of the pollen used.

For the conjunctival reaction, the extract is applied to the conjunctival sac, the reaction being indicated by the hyperemia produced. The skin reaction is secured by making a number of light scratches on the skin and rubbing in a drop of the pollen extract to be tested. A positive reaction is indicated by reddening and edema of the area surrounding the abraded surface accompanied by itching.

Immunity in hay fever is frequently only apparent, the freedom from attack being due to insufficient exposure. This explains the case of persons who have reached the age of 30 or more without being affected, who suddenly develop an attack when they visit a place in which hay fever pollen is in the atmosphere, or when, as frequently happens, they move to such a locality.

One attack increases the susceptibility, and for this reason is usually followed by other attacks. Hay fever is common in children, but the reason that this is not more generally known is that these attacks are usually mistaken for "colds".

There are two principal methods by which pollen is carried from one plant to another. One method is by insects, the other by the wind. In the first case the flower is usually bright-colored, or white if it blooms at night, sweet-smelling and with honey glands, and the pollen grains are comparatively few. In the second case the flower is not bright-colored, sweet-smelling nor honey-secreting, and the pollen is formed in immense quantities and is light and buoyant.

The only pollens which cause hay fever are those which are carried by the wind, and are therefore in the air. In warm climates, where weeds of some kind are growing almost continually, there is probably no month in the year in which there is not some pollen in the air. All plants that have very inconspicuous flowers, as is the case with most of the common weeds, which are very numerous and form pollen in great abundance, are probably wind-pollinated and may be regarded as dangerous from a hay-fever standpoint.

Although the pollen of wind-pollinated plants are by far the most frequent and important causes of hay fever, occasionally patients with hay fever do not give any reaction to the pollens abundant at the time of their symptoms. In certain individuals, foods, such as green corn, peaches, melon, green apples, and strawberries, which are eaten only at certain times of the year, are found to cause the hay fever symptoms, and partial or entire relief results from avoiding the foods by which they are affected.

Many patients who are sensitive to a pollen find that their hay fever symptoms are aggravated by eating certain foods which at other times they can eat without discomfort. The use of home-made wines, such as dandelion and elderberry wine, may aggravate hay fever in patients which are sensitive to the pollens that occur in such wines.

Some patients have seasonal hay fever, particularly in the spring and early summer, but the period of symptoms does not correspond exactly to any season of pollination. Such patients are sometimes found to be sensitive to animal emanations such as horse dander, the hair of dog or cat, or in rare instances of guinea-pig or rabbit, goose, and chicken feathers, or in a few cases to the feathers of some pet bird. Their symptoms may occur at any time of year, when they come into close contact with the offending animal, but the hay fever becomes pronounced and of long duration in the spring and early summer, when animals shed their coats and birds moult their feathers. Stron

Strong odors, such as the perfume of lilac, lily, hyacinth, sweet pea, honeysuckle and peony, flowers that have little or no pollen, may cause vasomotor symptoms, ranging in severity from sneezing to asthma, in patients who are sensitive to some pollen; such attacks are usually temporary and disappear with other hay fever symptoms when the patient is treated with the appropriate pollen extract.

The special plants that are responsible for hay fever along the Pacific coast, principally the states Washington, Oregon, and California, are numerous, but I have tried to list the principal plants or causes and minor causes in the two seasons Spring and Fall respectively.

In California, spring hay fever is present from May 5 to July 5. The principle causes are the grasses, the most common being:

- | | | |
|---------------|---|---------------------|
| Rye grass | - | Lolium perenne. |
| Salt grass | - | Distichlis spicata. |
| Bermuda grass | - | Cyanodon dactylia. |
| Broncho grass | - | Bromus maximus. |
| Wild oats | - | Avena fatura. |
| Hohnson grass | - | Holus halepensis. |

The minor causes of hay fever are:

- | | | |
|---------------|---|------------------------|
| Grease-nush | - | Hymemelen salsola. |
| Sheep- sorrel | - | Rumix acetosella. |
| Goose-foot | - | Chenopodium album. |
| Timble weed | - | Amaranthus graceizans. |
| Salt bushes | - | Spiries atrplex. |

The fall fever occurs between July 15 and September 10.

The principle causes are:

- | | | |
|-----------|---|-------------------------|
| Sagebrush | - | Artemisia tridentata. |
| Mugwart | - | Artemisia heterophylla. |

The minor causes are:

- | | | |
|-----------------|---|-----------------------|
| Poverty weed | - | Iva axillaris. |
| Bush sandbar | - | Franseria durnosa. |
| Western ragweed | - | Ambrosia psilostadya. |
| Cockleburs | - | Xanthium. |

In Oregon, Spring fever(hay) is present from April 25 to May 29, and the principle causes are:

- | | | |
|--------------------|---|----------------------------------|
| Velvet grass | - | Notholeus lanatus (most common). |
| Other grasses are: | | |
| Sweet vernal | - | Anthoxanthum odoratum. |

- Brome grass - Bromus caranatus.
- Orchard grass - Dactylis glomerata.
- Rye grass - Lolium perenne.
- Blue grass - Poa pratensis.

Th The minor causes are:

- The docks - Rumix crispus and occidentalis.
- Lamb's quarters - Chenopodium album
- Red blite - Chenopodium rebrum.

The fall hay fever prevaless from July 1 to September 10, The principle causes are:

- Sagebrush - Artemisia Frigida.
- Indian worm wood - ~~Artemisia~~ dracunculoides.
- Poverty weed - Franseria acanthicarpa.

In Washington, the spring hay fever season is from June 12 to July 1, and the principle causes are:the grasses of the Poaceae group, the most common being:

- Velvet grass- - Nothoholus lantus.
- Early hair grass - Aira praecox.
- Rye grass - Lotium perenne.
- Squirrel-tail - Hordeum jerbatum.
- Chess - Bromus secalinus.

The fall hay fever is between July 5 and October 7, the principle causes are:

- Bur ragweeds - Franseria chamusonis and bipinnat-
ifida(east of cascades).
- Poverty weed - Iva axillaris.
- Prarie ragweed - Iva Xanthrifolia.

Some of the minor causes are:

- Jerusalem oak - Chenopodium botrys.
- Russian thistle - Salsola pestifer.

The above list as prepared shows the most common hay-fever weeds. These, however, form only a small proportion of the total varieties, and it is probable that the majority of weeds, which are found in great profusion and the pollen of which is abundant and wind-borne, are the cause of hay-fever to some persons.

The methods of eradication of the hay-fever weeds are naturally a question of convenience and economy. The most effective are careful cultivation. Where this is not practicable, these weeds may be kept down by grazing cattle, and especially by sheep. When neither of these methods is available, the weeds should be destroyed or cut before they reach the flowering stage, as this will prevent both the pollinating and the formation of the seeds. On the roadside, which is a favorite site for hay-fever weeds, it is sometimes found to be more economical to use some form of chemical weed killer.

An important item in the eradication of hay-fever weeds is the distance at which pollen may produce an attack of hay fever. It has been shown by means of glass slides exposed to the wind that some pollen may travel a great distance—even several miles. It has been found that pollen is scattered rapidly as it is carried by the wind, and that its decrease is inversely as the square of the distance. Therefore pollen is not often a source of hay fever at a distance of over a half mile, and even a much shorter distance is often sufficient to give relief.

Special legislation for the destruction of the hay-fever weeds has recently been considered of great importance.

The noxious character from a health standpoint has only recently been recognized in respect to the hay fever weeds, and many of the states are now enacting laws for their eradication. Of the Pacific coast states, Oregon is the only state having an such legislation. It calls for the destruction of Russian thistle, Canada thistle, Chinese thistle, Cocklebur, burdock, and quack grass.

A thorough education of the public regarding the noxiousness of hay-fever weeds, reinforced by adequate legislation, should soon result in removing hay fever from among the list of common-diseases.

Bibliography as used for this article:

Medical Record Vol.92 1917. p 230.

"Hayfever and its relation to 100 of the most common plants, trees and grasses". W. Scheppregrell.

Calif. & Western Med. Vol. 22.#7, Jly.1924 p.317.

"Hay fever in the Sonoran Belt of the Intermountain District".
J. Templeton.

Hygeia. Vol 1. #5. Aug.1923.p.291.

"Hay fever: The Late Summer and Fall Type". Walker.

Ar. A.M.A.Vol 82 #12 Mr.22 1924. p.939.

"A botanical survey of Kansas City and neighboring rural districts".Duke and Durham.

Jr. A.M.A.Vol 82 #1.Jan.5,1924.p.12

"Vasomotor Rhinitis". Hansel.

Jr. A.M.A.Vol 82 #11.Mr.15,1924.p.871.

"Botany of S.W.Texas, with reference to Hayfever and Asthma",
Kahn.

Public Health Report Vol 32.#29 Jly.1912.p 1135.
Hay fever-Scheppregrell.

Weekly Public Health Reports Vol.31 Pt 2. 1916.p1907.
Hay fever and its prevention-Scheppregrell.

Colorado Med.Vol. 20 #14 Anr.1923.p 96.
"Pollen and Hay fever. Mullin.

Annals of Clinical Medicine Vol.2 #2.Sept.1923.p.75.
"The Newer conception of Asthma and Hay fever". Kern.

Public Health Report Vol. 35. Pt.#2.1920 p. 2241.

Public Health Reports. Vol. 37.Pt. 1. 1922p. 803.
"Hay fever plants of California."

Nelson's Loose Leaf Vol. 3.p.487.

Jr. A.M.A. Vol 67. 1916. p. 861.

Direct and Indirect Hay fever-Scheppregrell.

Arch. Ine Med.vol.19. Ju 1917.p.959.

Hay fever and Hay fever pollen. -Scheppregrell.

Calif.State Jr.Med.vol.16 #4.1918. p.164.Apr.

"Spasmodic Vasomotor disress"of the Respiratory tract with
specific reference to Hay fever".

Am. Jr. Public Health Vol. 8. 1918.p437.

"Hay fever as a Nat. Prob.-Scheppregrell.

Jr. A.M.A.vol.71.#7 p.253.Aug 1918.

"Hay fever- resorts in the U.S. and Canada".-Scheppregrell.