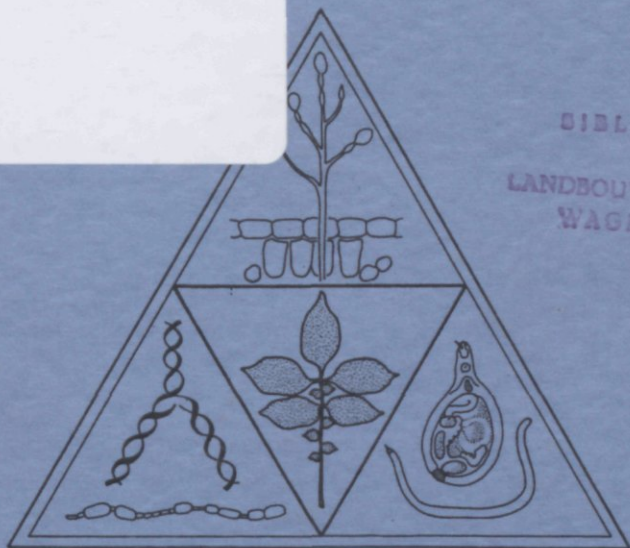


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Some " highlights " in the history of Phytopathology

A small display of works and books from the early
beginning up till the 20th century

VS49458



Arranged in the Library of the
Centre for Phytopathology and Entomology

This catalogue is a guide to a small exhibition showing some highlights in the history of phytopathology. Works and books are displayed which are of historical significance in the development of phytopathological thinking.

The exhibition has been arranged on the occasion of the International Symposium on Physiological and Biochemical Aspects of Host-Pathogen Interactions and the official opening of the Laboratories of Phytopathology and Entomology.

G. de Bruyn.
Librarian

Pests and diseases of plants have been sweeping the world from time immemorial. References to them can be found in some of man's earliest writings. Already in the Bible mention is made of rusts and mildews and of locusts, the frequency of which is suggestive of the fear in which these pestilences were held. The Greeks - Aristoteles, and particularly his pupil Theophrastus, the father of botany - described diseases of a number of cultivated plants.

The Romans were so concerned about rust on their grain that each spring they tried to appease Robigus, the god of the rust, with a feast of Robigalia, in which they supplicated him for staying his hand so that rust would do less damage to their crops.

In Shakespeare's time discussion of the damage caused by rusts and smuts reached parliament. In 1660 a law was passed in Rouen, France, to the effect that barberry bushes, which had been shown to be associated with cereal rusts, were to be eradicated.

The notorious epidemic of late blight on potatoes in 1845 and following years caused a severe famine in Ireland and later also in other parts of Western Europe. It took a heavy toll of human life. Moreover thousands of families left Ireland and emigrated to the U.S.A. Other famines have occurred from time to time because of failures of wheat, rice and other food crops brought about by plant diseases.

Not only in food crops, however, devastating diseases were found. For instance, in the United States the american chestnut was practically wiped out following the introduction of the chestnut blight fungus in 1904. And in Western Europe, since 1918 Dutch elm disease nearly caused the disappearance of the elm.

Also many horticultural crops have suffered heavy losses from time to time before being brought under control. Violent fluctuations in crop yields, caused by plant diseases, of course often had large economic effects: when the crop was in short supply, prices sharply rised. When as a consequence of this the areas planted were increased, there was a superabundance of crop with a corresponding fall in prices and disturbance of the economic balance. Still, plant diseases are a continuing threat of the economic crops.

Fortunately, the microorganisms causing diseases of plants are not agents of disease in animals and man; however, some of the plant pathogenic fungi, are poisonous, if eaten. For instance, ergot infected rye, often used in bread until the poisonous nature of the infected grain was under-

stood, often induced gangrene : epidemics caused by severe ergot poisoning ravaged France nine times in the 17th century and seven times in the 18th century.

Many of the plant diseases, formerly threatening the crops and therefore the very existence of mankind, have since been brought under control by adequate measures. It is evident, however, that man for ever has to continue this never lasting fight, aided by an increasing knowledge as a basis for better means and methods of control.

1.

Some Bible Texts dealing with plant diseases and pests. Genesis 41 : 22/23. Deuteronomy 28 : 22. 1 Kings 8 : 37. 11 Chronicles 6 : 28. Amos 4 : 9. Haggai 2 : 17.

2.

Theophrastus (370 - 286 B.C.), notes the occurrence of crop maladies and speculated on their cause and cure.

3.

Plinius the Elder (23 -79), wrote on the diseases of trees and cereal grains. His work is little more than a translation of that of Theophrastus and other agricultural authors of previous time.

4.

Ibn - Al - Awam (12th century), (his real name was Abou-Zakaria-Jahia-Ibn-Mohammed-Abou-Ahmed-Ibn-Al-Awam) from Sevilla, Spain, in 1153 wrote an encyclopedic work " On Agriculture". Besides original observations he refers to very old and mostly lost works. One chapter deals with the therapy of fruit trees and one with plant diseases and pests. He made short but very exact notes about the symptoms of plant diseases.

5.

Gaspard Bauhin (1560 - 1624), one of the predecessors of Linnaeus. His famous work " Phytopinax " (1596) gives a rather complete survey of that time's botany. The first picture of Claviceps purpurea.

6.

Ern Andream Seydelern, a priest living in the vicinity of Dresden (Germany), wrote a booklet about fruit trees in 1596. One chapter deals with curing apple and other trees, with an embrocation made of cow manure and loam. Probably cankers were involved in the symptoms observed.

7.

John Ray (1627 - 1705), whose most important work is Historia Generalis Plantarum (3 vols. Lodon 1686-1704), was the first who used the word "ergot" in the English language. In a publication of 1683 he wrote : " That malignity breeding in the ears of corn certain black grains call'd in Sologne ergots and in Gastinois bled cornu".

8.

Petrus Nylandt (17th century). Dutch herbalist. Author of "the Dutch herbarius or Herbal". Several editions were printed.

9.

Joseph Pitton de Tournefort (1656 - 1708) in France occupied an authoritative position somewhat similar to that of Ray. From 1683 till his death he was a professor at the "Jardin des Plantes" in Paris.

His chief work, the *Institutiones rei Herbariae* (1700) has considerable significance as foreshadowing the rigid way of thinking that coloured 18th century biology.

De Tournefort, in 1705 - probably for the first time - distinguished diseases with internal and external causes.

10.

Mathieu du Tillet (+1730 - ?). Director of the Mint in Troyes, France, published in 1755 his study about bunt of wheat. For the first time in phytopathological history he used experimental methods to prove that the brown powder in the kernels is infectious.

11.

Jean du Vivie (End 17th - beginning 18th century), was a horticulturist who lived in Leyden. He wrote the first guide in Dutch for gardeners.

One chapter deals with pests and diseases of fruit trees. Also a part dealing with vegetable growing is added.

12.

Giovanni Targioni Toszetti (1712 - 1783), in 1767 published his "Alimurgia" in which he says in tome 1, chapter V: Rust on the stem and on the leaves of wheat, is an internal, very tiny, parasitic plant, which does not arise except between skin and skin, so to speak, of the wheat, as do the pellicles, and the worms of the mange of animals". This has been written in a time that phytopathology was still obscured in a cloud of hypothesis or indeed was dominated by superstitions that had prevailed from very early times. He deserved to be considered, therefore, a predecessor of modern phytopathology.

13.

Felice Fontana (1730 - 1805), developed many physical and astronomical instruments. He wrote various articles in both Italian and French, also a few on plant diseases. The article : " Observations on the rust of grain" is very important, for it is one of the earliest contributions to the true causal nature of the stem rust of wheat (*Puccinia graminis*).

14.

Johann Christian Fabricius (1745 - 1808), a pupil of Linnaeus, published in 1774 " Attempt at a Dissertation on the diseases of Plants". It is an essential contribution to the early development of phytopathology.

15.

Isaac Bénédict Prévost (1755 - 1819), in 1807 published a memoir on the real cause of bunt or smut of wheat. His work contains the first recorded adequate experimental demonstration and interpretation of the role of microorganisms in plant diseases.

16.

Franz Unger (1800 - 1870), was trained in medicine but at middle age turned to botany. He published in 1833 a book entitled : "Die Exantheme der Pflanzen". He believed that the fungal organisms associated with diseases were endophytes but not parasites. The interpretation of plant diseases was still strongly influenced by the ideas of human pathology.

17.

Miles Joseph Berkeley (1803 - 1889), the pioneer British mycologist, in 1846 claimed that *Botrytis infestans* was the primary cause of the blight and tuber rot of potato. Further, he supposed that wheat bunt was caused by a fungus.

18.

Franz Julius Ferdinand Meyen (1804 - 1840), was a professor of botany in Berlin. Although primarily concerned with plant anatomy and physiology he wrote a book on plant pathology which was published in 1841, the year following

his death. He followed Tournefort's system of classification of plant diseases. His erroneous concepts were characteristic of his period.

19.

Louis René Tulasne (1815-1885) and Charles Tulasne (1817-1884), botanists at the museum of natural history in Paris, began extensive morphological studies of the fungi. Their excellently illustrated descriptions of rusts, smuts and Ascomycetes are classic in mycology.

20.

Petrus Harting (19th century), was the first Dutchman who made investigations on potato late blight (*Phytophthora infestans*). His publication (in French) dated of 1845.

21.

Julius Gotthelf Kühn (1825 - 1910), whose early background was associated with agriculture, in 1868 published his epochal textbook: " The diseases of cultivated plants, their causes and their control". This was the first text to be published in which fungi were regarded as causal factors in plant diseases.

22.

Anton de Bary (1831 - 1888), trained in medicine, early turned to botany. When he was 22 years old he published, " Untersuchungen über die Brandpilze und die durch sie verursachten Krankheiten der Pflanzen mit Rücksicht auf das Getreide und andere Nutzpflanzen". He critically studied several pathogenic fungi and their effects on plants, among which *Phytophthora infestans* deserves special mention. His investigations led to a general acceptance of the germ theory. Many of de Bary's students became prominent leaders in the field of modern plant pathology. (Woronin, Brefeld, Millardet, Farlow, Ward).

23.

Pierre Marie Alexis Millardet (1838 - 1902), was the first to use Bordeaux mixture against downy mildew of grapes (*Plasmopara viticola*)

24.

Heinrich Witte (1829-1917). Hortulanus of the Leyden Hortus Botanicus. Author and translator of several guides for amateur gardeners.

25.

Michael Stephanovitch Woronin (1838-1903), was a productive worker in the field of plant pathology from the time of his association with de Bary at Freiburg. The clubroot disease of cabbage had caused trouble in Europe for centuries, but nothing was known of its cause. Woronin discovered, by careful observation, the unusual type of parasite, new to science, which he placed among the slime molds and named *Plasmodiophora brassicae* (1878).

26.

Jan Hendrik Wakker (1859 - 1927) in the Netherlands and Burrill in the U.S.A. were the first to discover bacteria as causes of plant diseases : Wakker investigated yellow slime disease of Hyacinth (*Xanthomonas hyacinthi*) whereas Burrill studied fire blight of pear (*Erwinia amylovora*).

27.

Adolf Mayer (1843 - 1942), professor at Heidelberg, in 1876 was made director of the Agricultural Experimental Station at Wageningen, Holland. Was the first to do anything about the tobacco-mosaic disease in the modern sense of research. He artificially transmitted for the first time a plant disease, the causal agent of which he demonstrated could not be seen or cultured.

28.

Martinus Willem Beijerinck (1851 - 1931), most famous as a soil microbiologist. In 1898 published his work : " About a contagious living fluid, cause of the tobacco-mosaic". Twenty-five years had to pass, before the importance of this discovery could really be evaluated. Only then, the study of what proved to be the viruses, was taken up again.

29.

Johannes Govertus de Man (1873- 1930), curator at the Leyden Museum, was a pioneer in the field of agricultural helminthology.