

**MEMOIRS OF THE TORREY
BOTANICAL CLUB, VOL. XIV,
NO.2. OBSERVATIONS ON THE
CALIFORNIA VINE DISEASE, PP.
111-153**

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MEMOIRS
OF THE
TORREY BOTANICAL CLUB

VOL. XIV

NO. 2

OBSERVATIONS ON THE
CALIFORNIA VINE DISEASE

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W. G. FARLOW

BY *Rourke*
ORMOND BUTLER, 1877-

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Observations on the California vine disease

ORMOND BUTLER, 1877

(WITH PLATES I-5)

I

Introduction

In the height of the summer of 1886, the grape-vines in Los Angeles and bordering counties, in California, began to show very marked and alarming symptoms of disease. The vineyards in the environs of Anaheim, then a flourishing viticultural center, were the most seriously affected. In fact, Anaheim is generally considered the birthplace of the scourge that had thus suddenly appeared and was, within the next few years, to devastate Los Angeles and Orange counties. The Anaheim disease, as the new malady was called before it received the name of California vine disease, gradually decreased in violence in each succeeding year after 1886, and, today, one may say that it is little feared by the growers. To be sure, Anaheim is no longer a viticultural center, but the vine is nevertheless extensively grown in places where the malady existed in 1886, and there are vineyards in Los Angeles County that have passed through the years of the epidemic without serious loss.

But if the California vine disease is a malady of little economic importance in 1910, it was a very grave problem to face in 1886. In August of that year F. W. Morse began an investigation of the malady, under the direction of the director of the Agricultural Experiment Station, University of California, and published, a few months later, the first description that we have of the California vine disease.

From this author we gather: that the disease first became apparent by a failure of the vines to bud, or, as occurred more generally, in a noticeable backwardness in starting, which often extended to six weeks, the foliage of the vines thus late in leafing

out soon becoming blighted; that the disease might affect the vine at any time from early spring until the autumn; that it was reputed to be, in some cases, very rapid in its action, affecting an apparently healthy vine in the space of a day. Morse himself had observed no such rapid changes, the changes noticed being only "such as one may frequently note in any vineyard where sudden variations in meteorological conditions occur, and sunburn or scald follows";¹ predominantly, however, the progression of the disease was gradual.

The malady was characterized, to continue our quotations, by a "drying up, and apparent burning of the foliage at all times, up to the time of ripening of the fruit. . . ."² The leaves in general have the very decided appearance of sunburn. When the vineyard is seen as a whole the foliage looks withered, leaves partially dried and wrinkled, and large parts of them have become red, the affected part of each leaf assuming no regular shape or particular position. The canes having the most upright growth and those most exposed have the leaves the worst affected; low growth is less troubled."³

"Among the several varieties the Mission is, undoubtedly, the worst affected. . . . Other varieties such as Golden Chasselas, Sultana, Semillon and Sauvignon are affected to a greater or less extent, and in about the order named."⁴

Morse believed that the mortality of the vines was "due to more or less accidental and local peculiarities of climate, soil, moisture conditions, etc."⁵

In a report⁶ submitted to the State Board of Viticultural Commissioners in 1890, Dowlen described the California vine disease with care, and added some remarks on the anatomy of the canes of affected vines which I shall have occasion to quote later. This

¹ Morse, F. W. Report of an examination into the phenomena and causes of a supposed vine disease in Los Angeles County. Report of the viticultural work during the seasons 1885 and 1886, College of Agriculture, University of California, 176, 177. 1886.

² *Loc. cit.*, 176.

³ *Loc. cit.*, 177.

⁴ *Loc. cit.*, 178.

⁵ *Loc. cit.*, 183, 184.

⁶ Report California Viticultural Commissioners for 1889-90, 57 et seq.

author did not advance any opinion as to the nature of the disease.

Pierce's important memoir¹ on the California vine disease appeared in 1892 and contains many facts and figures of interest. In describing the disease he says: "In the majority of diseased vines, although not in all varieties, the leaf presents distinct characters. They may be mentioned as *constitutional* and *localized* characters."²

The general, or constitutional effects are "due to a failure in the formation of chlorophyll, or dègeneration of that once properly formed, in those portions of the leaf supplied by the finer spiral vessels. These general effects are found to some extent in nearly all varieties. . . .

"The *localized effects upon the leaf* are most clearly seen in the white varieties, and are especially distinct in the Muscat." The leaves become more or less covered with yellow spots "in that part of the parenchyma supplied with the finer spiral vessels. These spots are often well defined, the outline being very sharp and distinct. . . ."³

"The cane usually becomes bare of leaves before the wood is properly ripened. The end of the cane, being last to ripen, is most immature, and soon after the leaves fall the unripened parts turn black and become dry. This progresses more rapidly and the dying is more complete when the leaves drop early. . . . The peculiar and unequal ripening of the cane is very marked."⁴

In the roots "among the first signs of disease is a discoloration and shrinkage in diameter of the finer root fibers, the root hairs and cap. This progresses until the tissue begins to decay. . . . The root, at last becoming wholly rotted, passes into a brown, loose, amorphous mass."⁵

The fruit of diseased vines is markedly affected. "If the first attack of the disease be violent the grape will sometimes fall from

¹ Pierce, N. B. The California vine disease. U. S. Dept. Agr., Div. Veg. Path. Bull. 2. 1892.

² *Loc. cit.*, 41.

³ *Loc. cit.*, 42.

⁴ *Loc. cit.*, 46.

⁵ *Loc. cit.*, 51 et seq.

the bunch. This dropping of the fruit is not so strongly marked and is less important than the drying of the berry upon the bunch. . . . In some cases the growth of the berry is retarded. . . . The drying of the fruit upon the vine is a leading effect of the disease and is very general in all varieties and under all conditions."¹

Pierce states that the California vine disease has a period of incubation. He says "In the affected district it is common to find a vineyard of one variety looking perfectly healthy and the adjoining vineyard of another variety badly affected or killed by the disease. It may be that the vines are of the same age and upon like soil. When we see a sharp line of this kind," he continues, "drawn between varieties it is folly to say that the disease has affected one and not the other, for it may occur that the dying variety is found on all sides of the living one. It must be admitted, then, that the disease has produced its effect upon vines not yet showing those effects." Again, "it is also common to find a few Mission vines scattered here and there in vineyards of other varieties, they having been planted through oversight and the mixing of cuttings. Where this has been the case, these Mission vines have been singled out and killed by the disease as surely as if they were by themselves in adjoining vineyards. . . . The truth is, that all the vines have felt the same influence of the disease, but on account of difference in hardiness some show this influence earlier than others."² Another, and more striking feature of the malady is the overbearing of the vines "while the disease is incubating." But overbearing is not a constant symptom. Pierce notes the fact, and at the same time remarks: "That overproduction has not always been noticed is but negative evidence, and its well-attested occurrence in a reasonable number of cases is of more value than much negative evidence."³

The California vine disease appears also to be transmitted in cuttings.

Pierce does not come to any conclusion regarding the nature of the disease.

¹ *Loc. cit.*, 53.

² *Loc. cit.*, 57.

³ *Loc. cit.*, 58.

In 1892 Viala and Sauvageau also published a note on the California vine disease in the *Comptes Rendus*, and a memoir on the Brunissure and the California vine disease in the *Journal de Botanique*, which was republished later in the *Annales de l'École Nationale d'Agriculture de Montpellier*. These authors described the anatomical features of the California vine disease very accurately, as I shall have occasion to point out later, and concluded that this malady was produced by a myxomycete very similar to the organism causing Brunissure (*Plasmodiophora Vitis*), but as it was infinitely more destructive they gave it specific rank under the name *Plasmodiophora californica*.

In recent years Ravaz¹ has advanced the opinion that the California vine disease and the Brunissure are one and the same malady, both being due to overbearing, but the description I give of the latter disease in chapter III will show that this view is incorrect. If we modify, however, Ravaz's opinion to read that the Brunissure killed a number of the vines during the epidemic of 1886 in southern California, I think that it can then be supported on grounds. But I shall not attempt to advance the arguments in favor of this modification of Ravaz's view; it would lead me too far to do so adequately, and a brief presentation is, in the nature of the subject, impossible.

II

Description of the California vine disease

A. MORPHOLOGY

The California vine disease affects primarily the leaves, fruit, shoots, and canes. The arms and trunk reveal nothing of diagnostic value, and an examination of the roots is fruitful in contradictory results.

The leaves, fruit, shoots, and canes show symptoms that are constant from one variety, or species, of vine to another, the observable discrepancies being due to the fact that the virulence

¹ Ravaz, L. Influence de la surproduction sur la végétation de la vigne. *Ann. École Agric. Montpellier*, II. 6: 5-41. 1906.

Remarques sur le dépérissement de quelques vignes en Tunisie et en France. *Progress Agricole* 44: 41-50, 71-73. 1905.

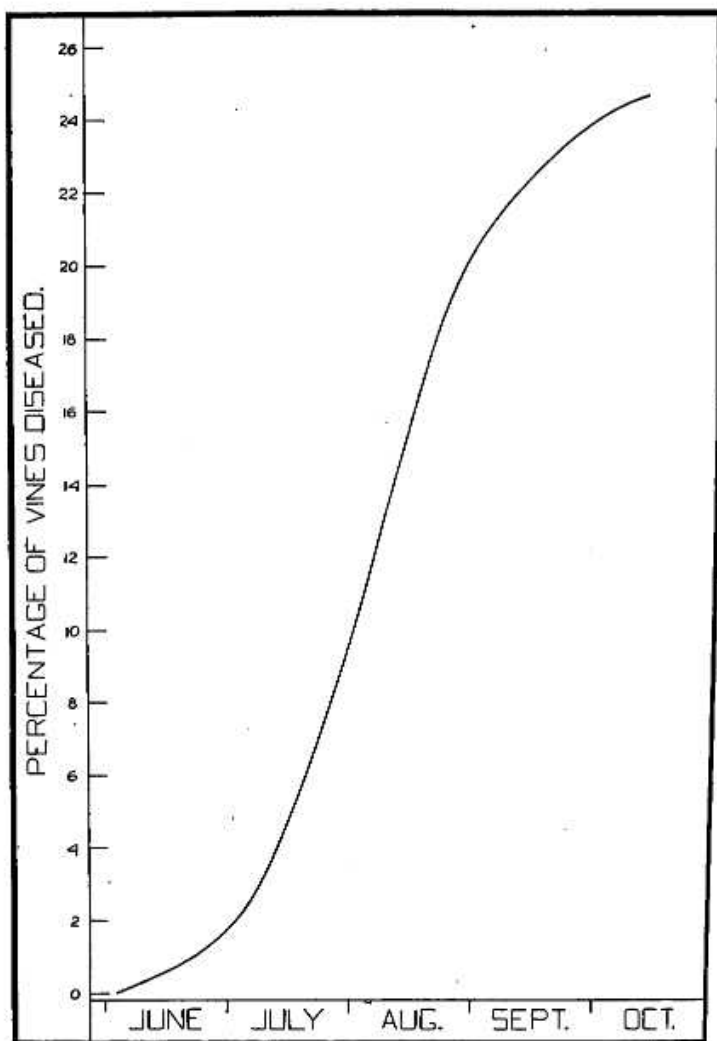


FIGURE 1.—Curve showing the general course of development of the California vine disease.