THE PHYLLOXERA QUESTION
Saturday 18 August 1883

The following reports on the phylloxera question have been received from Messrs. Bosisto and J. Harris, M.L.A.'s:—

Richmond, July 24,1883.

To the Honourable J. F. Levien, M.L.A., Minister of Agriculture.
Sir - In compliance with the request contained in your communication of the 17th (July), I have now the honour to report on the visit paid to the Geelong district on the 8th of June last, in company with yourself, Mr. J. Harris, M.L.A., the Hon. Dr. L. L. Smith, and the Secretary for Agriculture.

I have abstained from forwarding an independent report before this date in anticipation that the late Chairman of the Phylloxera Board, Dr. L. L. Smith, would have called the members of that body together in order that a joint document might have been drawn up. That gentleman has, however, furnished you with his own views on the subject without having consulted his fellow members, and I am therefore under the necessity of adopting a similar course.

The Moorabool Valley, near Geelong, was visited on the date named, that being the place where the phylloxera vastatrix first made its appearance in Victoria, as nearly as can be ascertained about the year 1875.

The land formerly occupied by vineyards known to be infected with phylloxera was inspected, the object being to ascertain whether the insect still existed underground. The first spot examined was that on which a vineyard had been cultivated for some years prior to 1877. In that year the vineyard was found to be infected with phylloxera, and in 1878 was uprooted under the Vine Diseases Act.

During the latter end of 1877 the Board examined this vineyard, it being then in full fruit-bearing, and an opportunity was therefore afforded for examining the leaves, the wood, and the roots of the vines. On the leaves neither the fly nor the galls were met with, but many of the leaves were fringed with a yellow band, indicating, first, that the phylloxera were at the roots of the vines; and, second, that it was their first year of attack. On examining the roots, it was further found that the phylloxera were present in great numbers and full of activity, and in different stages of development, from the egg to the fully matured insect.

When the vineyard was uprooted there was left in the ground a number of roots and rootlets.

In the year 1880 the Board visited the same place and dug up some of the remaining pieces of the roots, some of which were found at a depth of 18-24in. (45-60cm) below the surface. The phylloxera were still present, but less in number and in stages of growth, no eggs being met with. The roots when broken were succulent, but had changed from a light yellow colour to a light brown, thus indicating feeble vitality. The rootlets had decayed and were entirely absent.

On the occasion of the late visit in June last, I made another examination at the same place of both the lands trenched and untrenched and the remaining vine roots. The latter were found some 6-8in. (15-20cm) deeper than before, and in a complete state of decay. The phylloxera were entirely absent; the shriveled shells of the body of the insect were adhering to the decayed root. My investigation on each occasion was conducted on the spot under microscopical examination, and afterwards confirmed by further investigation on the dead subject in my own laboratory.

The history of this vineyard has been given in order that it may serve as a basis for the full consideration of this difficult problem.

On proceeding up the valley, some ground formerly occupied as a vineyard, twenty-five acres in extent, was also examined. The vineyard was destroyed under the Vine Diseases Act in the year 1879. The roots, and rootlets left in the ground were still perfect, and on being fractured were found to be alive, capable if any wood bud was attached to the roots of sending up to the surface good vine shoots. Both on the roots and rootlets the phylloxera were alive and present in great numbers, but in a state of hibernation. On being exposed to the sun's warmth they became active and moved about. One peculiar circumstance was noticed, viz, that although the phylloxera remained on the rootlets yet the usual swelling was absent. This induced the conclusion that the rootlets were failing in their work of suction from the soil, being evidently in their first stage of decay.

The visit was extended further up the valley to the Moorabool Viaduct, a distance of over five miles from the place visited. A vineyard, which was situated near the viaduct, was destroyed by the proprietor before the Compulsory Compensation Act came into force, in consequence of the phylloxera being detected among the vines by the vigneron himself, but for this laudable act he received no compensation. Only a few roots were found in the ground, and these showed signs of decay. A few phylloxera: in scattered groups only were found.

The whole of my observations in connection with this matter confirm me in the opinion that the insect is the veritable phylloxera vastatrix, and that we have a subtle enemy of viticulture to deal with.

Entomologists of the present day are trying to unravel the peculiarities of this interesting but devastating family of the aphis tribe, but there is nothing certain to guide us in arriving at conclusions as to the ultimate end of the underground phylloxera after one species in the cycle of evolution has been destroyed, as is the case in the destruction of the winged insect by uprooting.

That the underground phylloxera continues to live, lays eggs, and propagates after this has been accomplished for more than four years is certain from my own observations. It must be remembered that the roots left in the ground are deprived of the means of supplying a sweet and vigorous sap, by the destruction of the superstructural parts of the vine. This sap is evidently their primitive food, the genesis of their vigorous evolution.

The microscope reveals existing in these detached underground root pieces a vast storehouse of a clear orange-coloured gummy substance, produced by the sluggish movement of the sap. The underground phylloxera lives on this substance. The proof for this statement rests on the following observations:

(a) The phylloxera rest in groups around and in the fissures found in the bark of the root;
(b) On removing carefully one of the insects from its place, the proboscis or sucking tube will be found imbedded in this gummy substance through the cracks or fissures of the bark, and the tube has fairly to be drawn from it;
(c) The canal or stomach of the insect is found full of this gummy matter, and its whole body partakes of the colour.

So long, therefore, as the root remains succulent or undecayed it will continue to be the means for maintaining the underground phylloxera. The removal of the superstructual vine has apparently ended the life of the fly family belonging to this terrible pest, viz., the winged insect and the gall nests on the vine leaves.

What period will have to elapse before we announce the complete clearance of the underground phylloxera in the Geelong district is quite uncertain. Such a welcome result would appear to depend in the first instance on the complete decay of the roots in the soil, or the thorough overhauling of the old vineyards to a considerable depth, probably from 4-5ft. (1.2-1.5m), every shovelful of earth being carefully sifted. Even then there will be some doubt still remaining as to the complete eradication of the tainted roots. The extent of the danger to which we are still subject from the underground phylloxera is mere conjecture; but I feel certain that there is danger, and would urge

vigilance and close supervision over the whole Moorabool Valley and the surrounding district. In a recent work by Dr. Riley, one of the foremost authorities on this matter, I find the following remarks:— "If all winged individuals were destroyed as fast as they issue from the ground we have the spectacle of an underground insect possessing the power of continued existence. Even when confined to its subterranean retreats it spreads in its wingless state from vine to vine and from vineyard to vineyard, when these are adjacent, either through passages in the ground itself or over the surface. At the same time the winged individual migrates to much more distant parts."

It is a matter for regret that greater care has not been taken by those employed to uproot the vines. Too many pieces of the roots were left in the ground, and these will considerably prolong the time before the valley can be pronounced clear of the phylloxera.

Of the origin of the disease in the valley nothing is known beyond mere conjecture. The systematic close pruning of vines is, in some cases, supposed to have a close connection with the appearance of the disease, and it would be well for the vignerons to carefully weigh this phase of the question.

With reference to the utilization of the lands formerly occupied by vineyards, I cannot recommend the growth of fruit trees at present. In my opinion it is a moot point whether in the stress for food the underground phylloxera might not attack other rootlets of a succulent and woody character. This might, however, be decided about September or October next, when activity in the insect in question sets in. The information could be obtained by careful inspection of the roots of fruit-trees now growing in the vineyards of the Moorabool Valley.

After all the investigations of myself and of the Board, extending over the past six years, and reviewing the whole subject as now presented, I would recommend as follows:—

(1) That the Moorabool Valley be visited periodically, say every three months, by experts, for the purpose of watching any change in the insect, and noting their migratory propensities.
(2) That strict surveillance be exercised over the old vineyard grounds in the valley. Under no pretense should vine shoots be allowed to exist above the ground, or vines cultivated within the limits now existing under the Act, for at least two years and a half. A close inspection of the area might then be possibly made, with the view of reducing or varying the present proscribed district, unless experts should report to the contrary.
(3) That the infected grounds should be cultivated with bulb or root crops only, such as turnips, carrots, parsnips, marigolds, beet, onions, etc. or else be allowed to lie fallow.
(4) Should the foregoing recommendations be rigorously carried out, I am of opinion that the phylloxera pest will not spread, and further, that these measures will shorten the time of quarantine for the Geelong district.

Should you be desirous of trying what will be probably a more expeditious plan of clearing the infected lands of the phylloxera than any yet adopted, I would suggest that dynamite be employed. The advantages of employing such an agent are obvious. Small charges might be inserted in the centre of 10ft. (3m) squares, and as this explosive strikes chiefly downwards as well as latterly, it would have the effect of thoroughly loosening and turning up the soil to a great depth, while possibly the fumes generated by each explosion would have effect of destroying all insect life. The cost of this process as compared with ordinary trenching would be nominal, and as the infected lands are away from habitations the experiments might be made without danger, provided the work is placed under the control and direction of persons thoroughly acquainted with handling dynamite—I have the honour to be, Sir, your most obedient servant, Joseph Bosisto, Member of the Phylloxera Board.