pungent *Eucalyptus* and the highly tannic acacias, the black locust, and all kinds of fruit-trees and shrubs, including the *Citrus* tribe: when hard-pushed, it will even be content with grass and weeds for a while. Being enormously prolific, and thus far apparently free from any effective enemy but man, its spread is very rapid, and its attack most formidable and quickly fatal, even to large trees. It is very tenacious of life in all its stages of development. Its eggs, stowed away in thick masses of white wool, are very difficult to kill, as most insecticide-washes will rebound harmlessly by capillary repulsion.

The most fatal work of the *Icerya* has been done in the orange-groves of Southern California, where even the most persistent fight against it, with every variety of insecticide-washes, has only partially checked its ravages, and has nowhere succeeded in extirpating it entirely from an orchard, in consequence of the difficulty of reaching effectively both surfaces of every leaf in the dense-topped evergreen-trees. Even when the foliage, and therefore at least one crop of fruit, has been sacrificed by the use of caustic alkaline washes, success has not been complete.

The use of gaseous insecticides within a gas-tight tent lowered over the trees, has long been suggested against this, as well as other insects infesting evergreen-trees; but experiments made, e.g., with vaporized carbon bisulphide, have not given satisfactory results in practice. Either the insects were not completely destroyed, or the foliage was seriously harmed when the treatment was long continued.

The repression of the *Icerya* having at last become a life-and-death question for some of the older citrus-orchards, it was determined by some orchardists in the neighborhood of San Gabriel to have the feasibility of gaseous insecticides thoroughly tested. At their request, Mr. F. W. Morse, assistant in charge of the agricultural laboratory at the University of California, was detailed for this purpose; and the experiments made by him during nearly two months have furnished some scientifically interesting results, while demonstrating that cyanhydric gas can be made fully effective without harm to the foliage, and that seven other gases tried were either too slow in their action on the insect, or caused severe injury to the foliage. These other gases were chlorine, sulphuretted hydrogen, ammonia, carbon monoxide, oxalic and formic acids, and carbolic acid. A summary statement of these experiments is given in Bulletin No. 71 of the California Experiment-Station, just published.

Several interesting facts are thus brought out. One is, that apparently no practically adequate insecticide effects are produced when these effects depend upon the respiration of the gas by the insect; the respiratory action being so very slow, as compared with that of the higher animals, that anæsthetic rather than toxic effects are produced within the practically admissible limits of time: while within these limits the foliage also suffers, as a rule.

Cyanhydric gas, acting directly upon the nervous system through the nerve-ends, is quickly fatal, independently of respiration, and even in very small amounts. It is slow in affecting the insects' eggs inside of their woolly casings; but an effective insecticide dose also acts very injuriously on the leaves of the trees.

To prevent the latter effect, intermixture with some other gas beside air suggested itself. Experiments with sulphuretted hydrogen gave unfavorable results. This gas seemed to mitigate only the action on the insects (by anæsthesia). Complete success was, however, attained by the use of carbonic gas, evolved from sodic bicarbonate at the same time that the cyanhydric gas was evolved from potassic cyanide. The insects were killed as promptly as when air alone was present, but even a lengthy application did not affect the foliage in the least. The minimum proportion of the bicarbonate required for full protection was, for the case of a tree having a top twelve feet in diameter covered by an air-tight tent, a pound and a half, ten ounces of the cyanide being used at the same time.

It is not easy to conceive the exact cause of the protective action of the carbonic-dioxide gas upon the leaves; but there can be no question as to the fact, and it is hoped that further investigation will throw light upon the problem. The board of supervisors of Los Angeles County having requested a further elaboration of the details of the process by Mr. Morse, the latter will have full opportunity for testing the conditions and limits of the action of both gases, and upon deciduous as well as citrus trees. The high value of the latter renders the process perfectly available for them, even if, on account of the later hatching of unscathed eggs, the operation should have to be repeated. Whether the same will hold good of other orchard-trees, and whether their leaves will experience the same adequate protection from the presence of carbonic gas, remain to be seen.

E. W. HILGARD.

University of California, June 13.

University of New Zealand.

I HAVE just received your issue for June 3, with the 'New Zealand Letter' therein, dated Dunedin, April 20. As the agent in London of the University of New Zealand, permit me to supplement the exceedingly inadequate account of that body given by your correspondent. He states correctly that the university, like its prototype in London, does not teach; but he only hints at powers to confer degrees, and says not a word about any examinations. As a matter of fact, so anxious is its senate to make its degrees worth having, that the whole of its degree-examinations are conducted by English examiners, who are instructed that their standard of examination is to be at least as high as that of the University of London, for corresponding degrees. At the present moment I am seeing through the press no fewer than eighty-six degree-examination papers, set by fourteen examiners, all men of the highest standing, and present or past examiners in either Oxford, Cambridge, or London Universities. These papers will be worked in New Zealand in November, and the answers transmitted to me. After their revision by the examiners, a meeting of these gentlemen will be held in London, and the results will be transmitted to Wellington by cable. This has been going regularly on for more than seven years, and there are now nearly one hundred candidates for degrees every year of both sexes. This, from a total population of not exceeding half a million, speaks well for the colony. The degrees conferred as yet are in arts, laws, and science, but provision is made for degrees in medicine and in music.

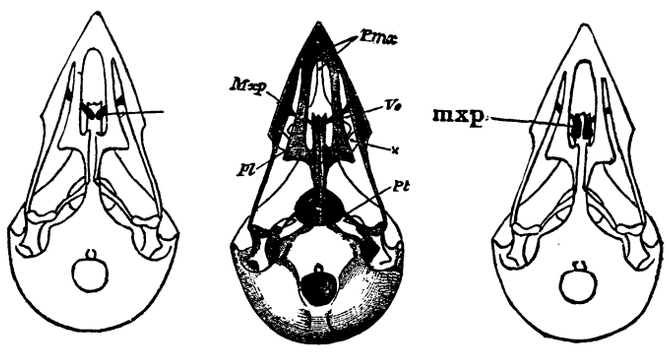
The examinations are, I believe, held in different towns in the colony simultaneously. The 'peripatetic annual session' of which your correspondent speaks, is simply the annual meeting of the university senate. Its members are scattered over a very large area (travelling-facilities are not great), and hence the senate usually does all its work for the year at one sitting, which lasts for several days.

WM. LANT CARPENTER.

London, June 13.

The Maxillo-Palatines of Tachycineta.

IF Dr. Shufeldt will consult my note in *Science* for May 13, he will find that neither the accuracy of his figure, nor the entirety of the specimen from which it was drawn, is there called in question. It is evident, to one acquainted with the palatal region as it is found in the swallows, that Dr. Shufeldt's figure represents a skull with mutilated or abnormal maxillo-palatines, in either case not perfect.



Since Dr. Shufeldt says his specimen is not broken, it must be abnormal. The extent and importance of the alterations Dr. Shufeldt charges me with having made in hastily tracing this figure, can best be understood by comparing the tracing (Fig. 1) with a reproduction of the original (Fig. 2). Fig. 3 shows the maxillo-palatines approximately correct.

FREDERIC A. LUCAS.

Washington, D.C., June 15.