arose in the manner already indicated, but it violates two principles of the metric system: (1) The placing of a subsidiary unit on the same plane as its primary; (2) the introduction of two symbols to indicate the same thing. For these reasons its use should be discontinued.

It is difficult to see how the use of the correct symbols can lead to any misunderstanding, as they fit into a well-known and orderly scheme. Even if one suspected that a writer had used μμ incorrectly, the context would usually show unambiguously what he meant, and if it did not, then the writer should be given the benefit of the doubt and be made to bear the burden of any error so resulting. The only difficulty in discarding the incorrect use of μμ arises from the human disinclination to break a bad habit.

Mr. Camp seems to imply that the Bureau of Standards is primarily responsible for the use of mμ to indicate the thousandth part of a micron. Were that true, it would be one more reason for the citizens of this country to be proud of the bureau, for it is a move in the direction of order and simplicity. Sixteen years ago, Ch. Ed. Guillaume, who is the director of the International Bureau of Weights and Measures, stated,[2] "La notation μμ, souvent employée, est défectueuse et doit être abandonnée," and gave mμ as the proper symbol for the thousandth part of the micron.

To conclude: In the symbolism of the metric system, the prefix μ denotes the one millionth part, and the prefix m denotes the one thousandth part; a micron (μ) is the one millionth part of a meter and, consequently, is equal to 0.001 mm; a thousandth part of a micron is called a millimicron, it is the one thousandth part of a millionth of a meter, its symbol is mμ; a millionth part of a micron is called a micromicron, it is the millionth part of a millionth of a meter, its symbol is μμ. Any departure from this is a violation of principles identified with the metric system and is to be deprecated as leading to disorder and confusion.

N. ERNEST DORSEY

NATIONAL RESEARCH COUNCIL,
DECEMBER 3, 1929

## THE EFFECTIVENESS OF A PLANT QUARANTINE

THE actual degree of effectiveness of plant quarantines in preventing the spread of insects is not known. Proponents of these quarantines will maintain that the presumption of effectiveness should be allowed them. The fact that the Mediterranean fruit-fly has not yet appeared in California will be ascribed by them solely to the vigilance of quarantine officers. The fly is not here. There has been a quarantine against it. Consequently the absence of the fly is to be credited to that quarantine. Opponents of the quarantines may doubt—or even sneer—as much as they please, but they can prove nothing.

Undoubtedly there are many peculiar factors entering into and influencing the spread of insects, even under natural conditions. Why, for example, should a single, isolated plant—as has been observed by the writer in field collecting—be heavily infested with a certain scale insect, while whole thickets of the same plant less than a hundred feet away have none of it at all? Why has the Mediterranean fruit-fly been so unexpectedly considerate as to confine its efforts in Florida purely to cultivated fruits, as is reported to be the case? We may agree whole-heartedly with a recent investigating committee which has remarked, "That infestations have not been found in adjoining states where much fruit was shipped previous to the discovery of the infestation [in Florida] is difficult to explain."[1]

One example which affords a clean-cut test of this matter is at hand. A mealybug (*Pseudococcus brevipes* Ckll.) occurs abundantly upon pineapples in the Hawaiian Islands. This insect is a general feeder and is established on various hosts in Florida, where it is quite common, and also in Texas, but is not known to occur in California. There is no reason to suppose that it will not live in at least some part of this state and upon some plants that are grown here, but although I have been identifying mealybugs for various county commissioners of horticulture for several years, it has never come to me, and it may be assumed that it is not in the state.

This insect is not supposed to pass the quarantine barriers and it is one of the insects that have commonly been reported as among the "pests intercepted" by the quarantine officials. The presumption would therefore be that its absence from California is due to the vigilance of these officials.

Yet I have several times taken this insect alive on bananas and pineapples in markets in this state. In order to check up once more I looked for it in a market a few days ago. The one pineapple in this market had several living specimens upon it.

The facts of the matter, then, are that this insect must have come into California alive many thousands of times since the quarantines were instituted. Yet it is not established in the state. Whatever credit the quarantine officials may assume to themselves for the exclusion of other pernicious species, they can not lay claim to such credit in this case. The presumption of their effectiveness can not be maintained. The

[2] "Recueil de Constantes Physiques," page 5, Gauthier-Villars, Paris, 1913.

[1] Official Record, U. S. Dept. Agriculture, Vol. 8, No. 46, p. 8. November 14, 1929.

reasons for the failure of the insect to establish itself here are biological.

With definite examples of this sort before us, those of us who are unconvinced of the value of the plant quarantines—except as a substitute for a tariff—may be pardoned a certain amount of reluctance to concede that presumption of effectiveness to which the supporters of these measures are prone to appeal. We may with equal justice claim that in all probability there are other cases where biological factors and not the quarantine officers have been the effective barrier.

G. F. FERRIS

STANFORD UNIVERSITY

## THE DISTRIBUTION OF PAUROPUS

PAUROPUS HUXLEYI, a minute centipede-like animal with nine pairs of legs in the adult, was described by Sir John Lubbock. Specimens were found in England in 1866. Since then they have been reported from the continent of Europe, in the eastern states of this country and many other places. Actual records are from Sweden, Denmark, Germany, Austria, Italy, Chile, Paraguay, Argentina, Australia and Siam.

It was not until November, 1927, that I found them in California. Earlier records than this were of specimens in the New England region, Long Island, near Philadelphia and Indiana. The last record that I have found was by S. R. Williams and R. A. Hefner from Ohio.

In the summer of 1928 I found them in southern New York state. Since then I have collected them from a number of places. My first records were from southern California not far from Claremont in the college park under the live-oak trees, but I also found them in abundance in my own back yard or about a mile from the first location. I also found them near Laguna Beach in Orange County and in several situations in the San Gabriel Mountains, including one place among the pines at seven thousand feet altitude.

Two places in Mexico furnished specimens, although many other places were searched. One of these was from Lower California about a hundred miles below the border. Another lot was found not far from Mexico City. Several places were searched in Cuba without success. Neither were they found in Florida or other southern states, but in these last, at least, conditions were not favorable. Ideal places were found in many parts of California, Washington, Oregon, Utah, Montana, Wyoming and Idaho, but no specimens. However, several were collected in the deep coniferous forests on the slope of Mount Hood, Oregon, and some were found on Catalina and Santa Cruz Islands off the southern California coast.

Often, under certain conditions, it is not possible to find them in given localities, even though they are known to occur. If it is very wet or very dry they may not be seen, however abundant they may be at other times. We have not found them easily by means of funnels or sieves, and this may account for their apparent infrequency. The under-sides of stones or logs slightly dampened by recent rains seem to be the best situation to see them. Here they may be found among the more numerous small white Collembola.

After studying a considerable number of specimens from one place and comparing them with others of distant regions I at first came to the conclusion that there were about as many differences between individuals in one place as between specimens from widely separated localities, but more detailed study has convinced me that at least two distinct forms are in my collection. These, according to the descriptions of Hansen and others, are distinct genera. There is, then, a good chance of a number of species in my collection.

They are difficult to study in detail as they are neither small enough nor large enough for the usual methods to be employed in determining the distribution of the setae, proportions of the joints or other characters which aid in distinguishing one species from another. These that I have at present belong to the genera Pauropus and Stylopauropus.

I wish to have further material, and I should be glad if any collectors who may find specimens of these interesting forms will communicate with me as soon as possible.

WILLIAM A. HILTON

DEPARTMENT OF ZOOLOGY,
POMONA COLLEGE

## AN UNBOUND TEXT AND NOTE BOOK

THE writer has been trying an experiment which has worked out so satisfactorily in one direction for him that it has seemed others might be interested in trying the same thing, if they have not already done so.

At the time of publication of a recently issued book the publishers were requested to furnish one unbound copy with holes punched at appropriate places on the left hand margin. The intention was to use this copy in loose-leaf form for work in the classroom in a course involving material covered by the book. In such a case the primary advantage of a loose-leaf book lies in the fact that one can readily insert blank pages for notes concerning corrections, new material or anything else of value for the work in hand. In fields of science experiencing rapid developments and changes this seems particularly desirable. Such an