AN AMENDMENT TO THE LAW OF MULTIPLE PROPORTIONS

THE chemist's law of multiple proportions, already defying succinct statement, demands a codicil, since even standard text-book problems may fail to meet the integral number test. It is possible to solve the familiar oxides of nitrogen problem correctly without obtaining values which stand to one another in the ratio of small whole numbers. The values so obtained, to be sure, bear a simple relationship to each other, but this relationship is neither necessarily obvious nor provided for by the law.

The five oxides of nitrogen obey the law when, as is usual, a definite weight of nitrogen is selected. If this weight is 28, the values for oxygen become 16, 32, 48, 64, 80, and stand to one another in the ratio of 1, 2, 3, 4, 5.

The same oxides fail to obey the law when a definite weight of oxygen is selected. If this weight is 16, the values for nitrogen become 28, 14, 9.33, 7, 5.6, and stand to one another in the ratio of the reciprocals of 1, 2, 3, 4, 5.

All that is needed, therefore, to make it effective is to amend the law of multiple proportions to read "the ratio of small integers or of their reciprocals."

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THE INDUCED OXIDATION OF LACTIC ACID BY ASCORBIC ACID AND THE CANCER PROBLEM

OUR researches on induced oxidation[1] and the earlier publications mentioned there have led us also to attempts to oxidize lactic acid.

The purpose of this investigation[2] was to find a method by which it might be possible to oxidize in cancer tumors the lactic acid formed there in large quantities, which acid is regarded by several authors as injurious to the surrounding cells and will perhaps further the extension of the tumor.

We observed that, for instance, sodium sulfite and also phosphorus (dissolved in castor-oil) are able to induce the oxidation of lactic acid during their own oxidation. For the above-mentioned purpose, however, our experiments with glucuronic acid and especially those with ascorbic acid (vitamin C) are promising.

In vitro a solution of lactic acid (the hydrogen ion concentration of which was brought by means of phosphate to the desired value) appeared to undergo a considerable oxidation in the presence of oxidizing ascorbic acid.

As vitamin C is a substance not strange to the human body (it is found in the adrenal cortex) and is being applied already as a remedy in connection with its anti-scorbutic activity, the question arises whether application *per os* or (and) by syringe could bring about salutary results in case of cancer.

As the oxidation of the ascorbic acid is reversible, it is possible that in the cells this substance may act as an oxygen carrier.

Of course, experiments with cancer cells cultivated in solutions and with tumors of mice are being made in the first place.

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REPORTS

THE EFFICACY AND ECONOMIC EFFECTS OF PLANT QUARANTINES IN CALIFORNIA[1]

THE appearance of Bulletin 553, of the Agricultural Experiment Station of the University of California, marks an important step in the study of the problems of plant quarantine. If it be not actually the very first attempt to evaluate these measures as they apply to any particular area, it is at least one of a very few such studies and by far the most comprehensive of all. In the words of the report, its scope is "the efficacy and economic effect of interstate plant quarantines promulgated by the State of California, and the efficacy of federal plant quarantines in the protection of California." Thus limited, the report avoids some of the most difficult problems, the "rather delicate subject" of the effect of these measures on international trade relations on the one hand and the absurdities of the inter-county quarantines on the other. Thus provided with a middle road to follow, the writers have been entirely consistent throughout and have held rigidly to the prescribed course.

The report includes a sound and reasoned statement of the biological bases of plant quarantines and throughout the necessity of compliance with these bases is insisted upon. An analysis upon theoretical grounds—which are the only ones available—is made of the economic effects of such measures. The history, problems and present status of plant quarantine

[1] *Rec. trav. chim.*, 48: 711–725, 1929.

[1] Report of a committee consisting of Harry S. Smith, *chairman*, Edward O. Essig, Howard S. Fawcett, George M. Peterson, Henry J. Quayle, Ralph E. Smith, Howard R. Tolley. University of California, College of Agriculture, Agricultural Experiment Station, Bulletin 553, pp. 1–276. 1933.

[2] *Chem. Weekblad*, 28: 337, 1931; 30: 618, 1933.

legislation in California are discussed. A review of the present interstate quarantines applying to California is presented, together with recommendations as to the maintenance or abolishment of each measure. There is an extensive bibliography and a thorough index.

It is an admirable report. Nevertheless the reader will do well to bear in mind the background from which it has emerged, not only as a justification for at times interpolating a bit between the lines, but as a basis for appreciation of what the committee has accomplished. The agricultural authorities of the state of California were pioneers in the development of the idea of plant quarantine and the application of quarantine legislation. As a result of years of such training faith has been deeply implanted and firmly rooted in the minds of California agriculturists that such measures are vital to their very existence. Under such circumstances, for an officially appointed California committee, composed of members who have imbibed a belief in quarantine almost with their mothers' milk, to have presented an unfavorable report would be almost unthinkable. On the other hand, it is a tribute to the intellectual honesty of the members of the committee that the reviewer—an avowed enemy of the quarantine system—can think of no critical phrase to apply to the report more condemnatory than "unduly cautious."

An uncompromising critic may be justified in pointing out that by the initial limitation of subject-matter the committee escaped the necessity of dealing with some disagreeable things and that in making their recommendations they have at times stopped somewhat short of entirely logical conclusions and have expressed themselves with much less emphasis than might reasonably have been employed.

For example: The principle that quarantines must depend upon natural barriers is definitely recognized (p. 94) in the remark that ". . . ordinarily a plant quarantine can be considered sound only when supported by an effective barrier to natural dispersal." It is clear that few existing interstate quarantines are supported in any considerable degree by such barriers. The logical conclusion that such quarantines should be placed in the hands of a federal agency and established along natural lines of defense rather than along purely artificial political boundaries is discussed (p. 117). But the committee goes no farther than to recommend (p. 253) that interstate quarantines be subject to review and disapproval by the Federal Secretary of Agriculture.

One other such case: The state of California has long maintained a quarantine against the alfalfa weevil, a quarantine that was not long since lauded by a former state director of agriculture as having stopped the insect at the state line. But the weevil has been found in California, widely distributed behind the quarantine lines and has probably been in the state for some time. It is evident that, coordinate with the quarantines, there should be set up an extensive and effective scouting service if the quarantines are not at times to assume a more than faintly ludicrous aspect. Attention is called to these circumstances (p. 136) and such a service is recommended, but not—in the reviewer's opinion—with the emphasis and prominence that would have been justified. In fact, one can not escape the feeling that the conspicuous failure of this quarantine, a failure that was inevitable and that now appears unimportant, has been "soft pedalled" just a wee bit in the report. It was an impossible quarantine to begin with and should frankly be jettisoned without the qualifying "if . . . within a few years . . ." (p. 197).

But criticisms such as this should not be allowed to detract from respect for the important work that the committee has done. Opponents of the quarantines at least can no longer say that no careful study has been made. Nor can they say that supporters of the quarantines never recommend the rescinding of a measure that has proven unnecessary. The committee has definitely recommended the abolition of three and is evidently lukewarm about some others. This is making progress.

Furthermore, the committee has recognized the need for deeper study of the problems of plant quarantine and has urged that such studies be made. Their report should serve as an excellent beginning, for they have touched in at least some degree upon practically every phase of the subject that one can suggest and have to at least some extent illuminated each.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

A METHOD FOR STUDYING DROUGHT RESISTANCE IN PLANTS

THE best measure of the drought resistance of a plant according to Maximov,[1] is its capacity to withstand permanent wilting. It is practically impossible to use this criterion for the study of drought resistance of plants having leathery, sclerophyllous or needle-like leaves. For conifers it is not only difficult to recognize the incidence of wilting but even impossible to determine the onset of death. Any one can

[1] N. A. Maximov, "The Plant in Relation to Water." Translated by R. H. Yapp. London, 1929.