consistent with theory on such assumptions is only a demonstration of consistent analytical operations.

The error is unfortunately introduced in the assumptions necessary for derivation of the first constant in the system. It enters the calculation of k_2' for carbonic acid and k′ for boric acid as determined by Buch (1933).

There are so many uncertainties in the application of the law of mass action to the dissociation of weak acids that it is better to remember that the whole system is only empirical and that it is only significant as far as the analytical procedure is directly appropriate. The statement that

$$\text{Total } CO_2 = \frac{\alpha P}{760}\left(1+\frac{k_1}{[H^+]}+\frac{k_1k_2}{[H^+]^2}\right)$$

affords the chance for direct determination, since at pH 7.0 the last term is negligible and all others but k_1 can be determined analytically. As determined in that way the value of k_1 and its derivatives k_1' and k_2' would have empirical significance corresponding to the accuracy of analytical procedure.

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HOST RESPONSES TO HAUSTORIAL INVASION OF CUSCUTA SPECIES[1]

WORKING on the host responses to haustorial invasion of *Cuscuta* the writer noted, in 1931, that galls were frequently formed by the host plants. Extended observations in the field during the past three years, and controlled experiments in the greenhouse, show that infestation of a given host plant commonly leads to marked hypertrophy of adjacent tissues, resulting in gall formation. Large, primary galls are characteristically formed at the point of initial attack, similar swellings at points of secondary infestation, and other types of hypertrophy at various points of haustorial entry on the same plant.

In all, 334 galls have been collected by the writer, 107 from field stations in Iowa and West Virginia, while 227 were formed following experimental greenhouse infestations. Four species of *Cuscuta* have been observed to induce gall formation, namely, *C. Gronovii* Willd., *C. glomerata* Choisy., *C. rostrata* Shuttlw., and *C. Polygonorum* Englm. The following seventeen genera (containing 21 host-species) have been listed as gall-forming hosts to one or more of the above-named dodders, *viz., Hibiscus, Salix, Solidago, Stachys, Cucurbita, Glycine, Fagopyrum, Helianthus, Cucumis, Chelone, Medicago, Trifolium, Cephalanthus, Impatiens, Myriophyllum, Nicotiana* and *Bidens*.

Young galls consist mainly of hypertrophied cortical tissues; later stages involve an increase in volume of both cortex and xylem, the latter often enlarging greatly and frequently making the galls quite woody. The surface of the older galls is commonly cracked, roughened or fissured and frequently supports a superficial fungus growth. However, no traces of fungi or bacteria have been found in the inner tissues of any gall examined by the writer.

In previous studies of *Cuscuta* primary attention has been given taxonomic and agricultural phases with, of course, a few critical studies on the structure and penetration of the haustoria. Galls apparently have escaped previous notice because of their usual occurrence low, on the host stem, within a few inches of the ground. However, Peirce[2] reported an example in which the petiole of *Solanum jasmoides* showed a general enlargement due to haustorial entry. In the same article he stated that host plants of *Cuscuta* did not form new structures or exhibit new growth as a consequence of haustorial penetration.

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[1] Preliminary report.

BOHEMIUM—AN OBITUARY

THE sensational announcement[1] by Odolen Koblic that he had found in pitchblende a new element, atomic number 93, atomic weight circa 240, created a considerable stir in the ranks of chemists and physicists. However, "bohemium" lived only about one month, and the undersigned was in some measure responsible for its speedy demise. My teacher, Seubert, had studied under Lothar Meyer, who shared with Mendeléeff the honor of formulating the periodic system of the elements. Brought up in this school I was, of course, greatly interested in the report that the family of our chemical building stones had been once more increased and that the newcomer represented an extension of the periodic arrangement.

Frankly, I was skeptical, and I made a special trip to Joachimstal, C. S. R., visited Koblic in his laboratory and persuaded him to give me some samples of "bohemium"-bearing material. These were taken to the Physikalischtechnischen Reichsanstalt in Berlin and turned over for investigation to that gifted couple, Walter and Ida Noddack, the discoverers of rhenium and masurium.

The x-ray spectrographic study gave absolutely negative findings. Neither the Noddacks nor their expert collaborators could detect the slightest indication of the presence of a new element in the "bohemium" concentrate. The optical spectroscopic tests revealed nothing in favor of Element 93. Chemical tests showed that the specimens consisted chiefly of tungsten, vanadium, etc. Later work showed that

[2] G. J. Peirce, *Ann. Bot.*, 8: 53–118, 1894.

[1] *Chemiker Zeitung*, July 18, 1934, page 581.