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.

LAURENCE IRVING

MARINE BIOLOGICAL LABORATORY,
WOODS HOLE, MASS.

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.

H. L. DEAN

STATE UNIVERSITY OF IOWA

[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.

tungsten was responsible for the observations that had led Koblic into his statement. He admitted his error and withdrew his claims.[2] The Noddacks deserve the gratitude of the scientific world for the decisive manner in which they proved the falsity of these claims.[3]

MAX SPETER

BERLIN

SCIENTIFIC BOOKS

A HISTORY OF FRENCH SCIENTIFIC SOCIETIES

Scientific Organizations in Seventeenth Century France (1620–1680). By HARCOURT BROWN. xxii + 306 pp. History of Science Society Publications, No. 5. Baltimore: The Williams and Wilkins Company, 1934. Price $3.00.

THIS is primarily a history of the scientific societies, that is, of private assemblies of the amateurs of the natural sciences rather than of the Académie Française and the Académie des Sciences in the seventeenth century in France. These constituted a succession of associations, clubs, conferences and assemblies long known but whose influence and meaning has hitherto been unanalyzed. From them came a multitude of essays and publications forming the bulk of the popular scientific literature of their day. Their history lies in the archives and manuscripts of Western Europe, often in other countries than France. They are the heirs of the Platonic tradition of free assembly and corporate activity outside of political control or governmental origination and support. To the tradition of the academy, museum and lyceum of the philosophic schools of classic period they added cooperation in the practical arts. This appears in an active interest in discoveries and inventions, the provision of a place for the trial of new methods, for experimentation, for the accumulation of the comforts and conveniences of life and sometimes for the secrets of the practitioners of the arts from astrology to ship-building. They thus avoided some of the opposition which the greater and more intellectually powerful academies were arousing in royalty, the church and in organized medicine, such as Dr. Henry Stubbs' assaults on the Royal Society of London, inspired and perhaps paid for by Dr. Harvey, patron of the College of Physicians. The membership of these minor societies in France not infrequently exercised their freedom in criticism of their compatriots in the more august academies. Under their fostering care they gave a widened diffusion to the sciences and the arts, stimulated thought, inspired criticism and contributed to the progress of the standards of living and culture between the Renaissance and the Encyclopedia of Diderot. The turmoil of war after 1680 interrupted their contacts abroad, restricted their activities at home and effectually obliterated their further influence.

The impetus to the interest in science originated in the skepticism of Montaigne, but the organization followed Italian models and gained power through the prestige of the city of Paris. The chief link with Italy was Peiresc (1580–1647), a student at Padua, a traveled scholar and patron of the arts. He had five telescopes, collected plants, fossils and crystals, carried on dissections, discovering the chyle ducts, distrusted astrology; was a patron of letters, but his discoveries remained in manuscript.

The brothers Dupuy, historians, librarians and lovers of books, were the founders of the Cabinet Dupuy. Its library, the Fonds Dupuy, is now in the Bibliothèque Nationale. This cabinet was the center of free discussion of the intelligentsia of France. Its members sought in its meetings intelligent and authoritative reports of the world at large. It established the tradition for the patrons of learning later followed by Ménage, Justel and others.

The weekly pamphlets published (1633–1642) by Renaudot, and reported as *Conférences du Bureau d'Addresse,* originated in a popular enterprise combining the features of a pawnshop, auction house, free clinic and information bureau. This is reported to be the first serial of scientific nature; though scoffed at and criticized by the learned professions, it nevertheless afforded a free medium of information and a form for the discussion of current ideas. The serial was translated and published in London in 1664–1665 in an obvious response to the public interest in the newly founded Royal Society and stimulated the opening of the Office of Intelligence in London in 1638. The hostility of the medical profession caused the legal suppression of the enterprise in Paris in 1644.

The Renaudot enterprise forwarded the decline of Latin as the medium of scientific publication in favor of the modern languages. Mersenne, the Huguenot monk, also forwarded this with his extensive correspondence, his conferences of physicists and mathematicians, and his liaison relationships between the more conservative forces of his time and the devotees of the new sciences. His Europe-wide relations, his liberalism and his rationalism did much to develop and maintain the freedom of discussion in his day, even though his cautious circumspection at times clothed the replies to his penetrating questions with a

[2] *Chemiker Zeitung,* August 22, 1934, page 683.

[3] Translated by Ralph E. Oesper, University of Cincinnati.