

The Department of Plant Pathology, University of California, Berkeley A Pioneering Department

The Department of Plant Pathology at the University of California, Berkeley, was founded in 1903 by Ralph E. Smith, who became one of the most influential plant pathologists in the world during his time. He claimed the department to be the first in the United States. In his memoirs, entitled *The Beginnings of Modern Plant Pathology in California* (2), he wrote, “As far as I know, I was the first to bear my new title [Assistant Professor of Plant Pathology] in any American College,” and “Mine was the first department of Plant Pathology in existence.” The events leading to the establishment of plant pathology at Berkeley, and the subsequent development of the discipline in California are well documented (1,2).

Smith was an assistant professor of botany at the Massachusetts Agricultural College when he read a California experiment station report by E. Hilgard on the appearance of asparagus rust that threatened the asparagus canning industry in the state. Smith offered his services, was immediately hired, and thereafter became a gifted teacher, researcher, and leader. He taught a course on plant disease in the fall of 1904. After Smith developed a control for asparagus rust, grower groups learned of his program at Berkeley and requested help with other diseases that were damaging crops. In 1904, there was a disastrous epidemic of pear blight, and other very serious diseases were walnut blight, shot hole of peach, lemon brown rot, and curly top of sugar beets. Industry pressure on the state legislature brought results. In 1905, Smith requested and received funds from the state legislature to establish the Citrus Experiment Station at Riverside and



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at Riverside and

the Southern California Pathological Laboratory at Whittier. In that same year, the University Farm at Davis was established. While Smith resided at the Whittier laboratory from 1906 to 1912, his sister, Elizabeth H. Smith, who had a master's degree, ran the department, probably the first woman chair (although acting) of a plant pathology department in the United States. In 1909, W. T. Horne was hired and given the responsibility of organizing the teaching program for the entire division; he taught courses for many years.

E. J. Wickson, Dean of the College of Agriculture, wrote in his report of 1912 on the experiment station, "The plant disease work of the station expanded into a broad professional status and in 1907 the specialist who came to California in 1903 alone had 12 field and laboratory assistants, with laboratory and headquarters in Berkeley and two laboratories in southern California."

The department at Berkeley grew rapidly because of the urgent need for experiment station research and because of its industry support. The staff numbered about 20 in the early 1930s. In 1927, Smith located James B. Kendrick at Davis, and other faculty were soon hired and organized into the Davis Division of Plant Pathology. All were members of the Department at Berkeley. The Davis staff grew, and in the 1950s the numbers of staff members at Berkeley and Davis were approximately equal, with 15 to 18 faculty and extension specialists at each location. In 1952, the Division of Plant Pathology at Davis was granted departmental status but remained linked to the Berkeley department through a rotating chair/vice chair arrangement. When Smith retired as chair at Berkeley in 1936, he was succeeded by M. W. Gardner. Upon Gardner's retirement, Kendrick at Davis became department chair and J. W. Oswald transferred from Davis to become vice-chair at Berkeley.

During this time, the department at Riverside was also growing. California is a very large state with extremely diverse agriculture, and some degree of coordination and information exchange was needed to facilitate the efforts of the northern and southern divisions. For many years, there was an annual statewide conference, held on a rotating basis on one of the three campuses. These conferences were a combination of professional and social activities and were very important in keeping faculty abreast of the teaching and research programs, problems, and achievements of their colleagues.

After ending the system of revolving chairs in 1963, the first chair of the now totally autonomous department at Berkeley was W. C. Snyder, followed in succession by D. E. Schlegel, A. R. Weinhold, J. G. Hancock, Jr., and M. N. Schroth. In the early years, programs at Davis tended to have a more applied, crop-based orientation, whereas Berkeley was organized more along the lines of the causal agent with a basic research emphasis. This allowed faculty on the two campuses to bring a somewhat different perspective to bear on the same problem and fostered cooperation. In the years following the separation, this distinction disappeared, but the statewide conferences continued for many years and there were a number

of cooperative programs involving faculty and extension specialists from both campuses.

For the purpose of brevity, it is not possible to summarize the significance of the many thousands of publications that have emanated from the Berkeley-based faculty, with the exception of some early work. In the first decades, most of the effort was directed toward solving major disease problems. Later in the 1920s and 1930s, there were many contributions of basic research, such as the determination of the rod-shaped particulate nature of *Tobacco mosaic virus* with stream birefringence (W. N. Takahashi and T. E. Rawlins); the discovery that sectoring of *Botrytis cinerea* cultures was caused by the sorting-out of different nuclei, giving rise to different cultural phenotypes; the discovery of the phenomenon of heterokaryosis (R. E. Smith and H. N. Hansen); and the elucidation of the genus *Fusarium* (W. C. Snyder and H. N. Hansen).

Over the years, faculty members have received many awards and honors and held key administrative posts. These include 10 fellows, two elected to the National Academy of Sciences, three presidents of APS, two presidents of major universities, and numerous elected officers in the Pacific Coast Division of APS. In addition, since the 1960s, faculty, while continuing to do teaching and research, have also served the campus and statewide Division of Agricultural Sciences (DANR) as associate deans, deans, assistant directors, director, and special assistants to the vice president of DANR. Many graduate students have received their M.S. and Ph.D. degrees in plant pathology, and they along with numerous post-doctorates greatly contributed to the character and success of the department. They settled throughout the world and pursued an array of distinguished careers. The scientific environment of the department also was enriched by numerous visiting scientists, who were attracted to the institution, the environment, and the facilities. Many books had their genesis at Berkeley, in part because of the reputation of the department's library for having the finest collection of plant pathology and related materials in the world.

In 1993, as a consequence of an ill-advised and shortsighted reorganization of the College of Natural Resources at Berkeley, the Department of Plant Pathology was eliminated. The departments of Entomology, Forestry and Resource Management, and Soils and Plant Nutrition were either substantially altered or also eliminated. Although the original Department of Plant Pathology in California no longer exists, the efforts that it began will live on at Davis and Riverside, hopefully long into the future.

1. Hewitt, W. B. 1987. R. E. Smith: Pioneer in phytopathology. *Annu. Rev. Phytopathol.* 25:41-50.
2. Smith, R. E. 1953. The beginnings of modern plant pathology in California. Archives, Bancroft Library, U.C. Berkeley.

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- 1973 W. J. Moller et al: occurrence and nature (M. N. Schroth et al, 1979) of resistance to streptomycin of *E. amylovora* in field.
- 1978 B. Zoller, 1980 E. Billing, 1990 P. W. Steiner, 1993 T. J. Smith: forecasting systems evolving into commercial use.
- 1984 S. Lindow: first commercialized biological control (BlightBan A 506™).
- 1987 S. V. Beer and M. A. Barny labs: discovery of genes determining pathogenicity (*hrp* and *dsp* genes) and of harpin proteins (D. W. Bauer and S. V. Beer, 1987; Barny et al, 1990; Steinberger and Beer, 1988; Wei et al, 1992).
- 1989–1996 D. J. James and E. Chevreau labs: genetic transformation of apple and pear.
- 1992 J. N. Cummins and H. S. Aldwinckle: fire blight-resistant apple rootstocks developed.
- 1994 H. S. Aldwinckle and E. Chevreau labs: fire blight-resistant transgenic apple and pear cultivars (Norelli et al, 1994; Reynoird et al., 1999).
- 2006 Sanger Institute with S. V. Beer et al.: full genome of *E. amylovora* sequenced.

REFERENCES

- Malnoy, M., and Aldwinckle, H. S. 2007. Development of Fire Blight Resistance by Recombinant DNA Technology. *Plant Breeding Reviews* 29:315-358.
- Oh, C.-S., and Beer, S. V. 2005. Molecular genetics of *Erwinia amylovora* involved in the development of fire blight. *FEMS Microbiol. Letters* 253:185-192.
- Vanneste, J. L. 2000. Fire Blight. The Disease and its Causative Agent, *Erwinia amylovora*. CABI Publishing. 370 pp.
- van der Zwet, T., and Keil, H. L. 1979. Fire Blight: A Bacterial Disease of Rosaceous Plants. USDA Handbook 510, Washington, DC. 200 pp.
- http://www.sanger.ac.uk/Projects/E_amylovora/