

example, that coal operators emphasized production and compensated miners on a tonnage basis, which led miners to hurry on "dead work" (such as timbering and cleaning up shale or loose rock), thus compromising their safety.

Another key theme is the lack of effective enforcement of safety legislation and the role of the federal government in eventually providing that enforcement. By the turn of the twentieth century, laws governing coal mining existed in all coal-producing states and territories in the United States. However, this legislation proved ineffective, even as fears ran rampant that such laws would impede economic growth. The root of the problem was the lack of uniform safety regulations. Federal control, many believed, could provide the needed uniformity, but would also squeeze out the small operator. Ironically, too, as Whiteside points out, production and competition influenced operators toward reform, especially large producers who could afford to enact safety measures.

Much of Whiteside's analysis, while dealing with five western states, is significant for the study of the coal industry nationally. By probing federal involvement in regulation and pointing to general trends in the industry, such as increased mechanization, Whiteside effectively places his discussion in a national context. Thus, *Regulating Danger* is a useful, probing study into a problem that touched small towns, individual states, and the entire nation: deaths in coal mining accidents. (Readers of Iowa history will be reminded that an explosion killed twenty miners at the Lost Creek No. 2 coal mine in Oskaloosa on January 24, 1902.) Whiteside stresses accidents due to falling rock and explosions—incidents with the best statistics. He basically ignores individual accidents and the deaths inflicted by maladies such as black lung, for which statistics are harder to obtain. Nonetheless, this book effectively illustrates that mine safety and its history are indeed critical issues. Thus, it is necessary reading for all who are interested in a historically significant industry that is changing and may be of even greater importance in an energy-starved future.

The Business of Breeding: Hybrid Corn in Illinois, 1890-1940, by Deborah Fitzgerald. Ithaca: Cornell University Press, 1990. xi, 247 pp. Illustrations, notes, bibliography, index. \$29.95 cloth.

REVIEWED BY JAMES W. WHITAKER, IOWA STATE UNIVERSITY

Deborah Fitzgerald has delved into the archives of the University of Illinois, the Funk Brothers Seed Company, the limited holdings of DeKalb Agricultural Research, and USDA Bureau of Plant Industry

records in the National Archives and supplemented the results with a wide-ranging bibliography of secondary literature to produce an interesting, helpful, but not fully satisfying study of the development of hybrid seed corn in Illinois to 1940. The first two chapters describe the theoretical and practical aspects of breeding corn—contrasting the traditional visual selection of seed and varietal crossing with the new genetics based on Mendelian principles, and comments on how this worked out at the USDA Bureau of Plant Industry. The next two chapters focus on the development of the University of Illinois College of Agriculture and the problems of doing scientific and extension work there up to 1935. The last two chapters discuss the rise of the major commercial seed companies in Illinois (Funk, DeKalb, Pfister) and their competition with the University of Illinois Experiment Station and Extension Service for the position of authority in helping farmers increase the yield of corn through the adoption of hybrid seed. The conclusion asserts that the way hybrid seed corn was developed in Illinois resulted in seed companies modeling themselves on the University of Illinois extension structure and that this destabilized the university's extension service by substituting the companies' authority for that of the university in the eyes of the farmers.

Receiving prominent attention in a rather disembodied way are the developers of the scientific basis of hybrid corn, E. M. East, George Shull, and Donald Jones; the agricultural administrators, C. P. Hartley and Frederick Richey of the Bureau of Plant Industry, and George Davenport, dean at the University of Illinois from 1895 to 1922; and the commercializers, Henry A. Wallace, Eugene Funk, J. R. Holbert, Lester Pfister, and Charles Gunn.

This is not straightforward narrative history. Rather, it is a history of science analysis that follows various overlapping themes. This leads to some confusion, repetition, and a sense of incompleteness. The book appears to have been written in disconnected batches which were not harmonized. Thus there are two different discussions of the rise of the DeKalb County Farm Bureau. Chapter one discusses the work of East, Shull, and Jones with inbred lines, but not until chapter two do we get the vital detail that Jones "invented" double-cross hybrid corn in 1918. Fitzgerald specifically rules out discussing Pioneer Hi-Bred of Iowa, but gives as much attention to its founder, Henry A. Wallace, as to the other leading personalities in the first two chapters. Yet one does not get a firm sense of Wallace's importance in the commercialization of hybrid seed corn. In addition, there is peculiar confusion over the relationship between Henry A. (the son) and Henry C. Wallace (the father). (It is wrong on page 67, right on page 184.) There are some editing lapses (on page 63 it says Hartley is not

dismissed, but page 64 refers to him as being dismissed; and single-cross/single cross is inconsistently hyphenated), but the footnotes are at the bottom of the page where they belong.

Instead of a narrative history of the development of hybrid seed corn in Illinois, the author is concerned with the complexity of the way science develops and with the impact of scientific development on scientists, the institutions that do science, and the society that accepts or rejects the fruits of science. So she is concerned with the culture of institutions: the Bureau of Plant Industry, the University of Illinois College of Agriculture, the private seed companies, and the experiment station organizational structure, which influences the way the staff saw its role, its work, and its opportunities connected to scientific discoveries. In this, she documents the complexity of the subject and offers valuable insight and information to historians of agriculture and science.

The United States Department of Agriculture in Historical Perspective, edited by Alan I Marcus and Richard Lowitt. *Agricultural History* 64 (Spring 1990). 351 pp. Table, illustrations, notes.

REVIEWED BY MICHAEL W. SCHUYLER, UNIVERSITY OF NEBRASKA AT KEARNEY

In 1989 the United States Department of Agriculture (USDA) celebrated its one hundredth anniversary as a cabinet department. As a part of its centennial celebration, the USDA's Economic Research Service, the Agricultural History Society, and Iowa State University's Center for Historical Studies of Technology, Department of History, and College of Agriculture cosponsored a symposium, "The United States Department of Agriculture in Historical Perspective," on the campus of Iowa State University in Ames. This volume, edited by Alan I Marcus and Richard Lowitt, professors of history at Iowa State University, is a collection of papers and comments presented at the symposium which examine the USDA's first one hundred years. The thirty-two essays included in this volume explore various aspects of the transformation of the USDA from a small agency, whose primary role was to serve farmers, into a large, complex organization with far-ranging scientific, economic, and social responsibilities for the society as a whole.

A major activity of the USDA, from its earliest years to the present, has been to promote scientific research to increase production and to make life on the farm easier. Essays on the history of agricultural experiment stations, efforts by regional research laboratories to

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