Continuous spectra are treated in the second contribution, by Wolfgang Finkelnburg and Theo Peters. This article (in German) is well organized, covers the field with admirable completeness, and is a reliable source of information.

The third chapter, on crystal spectra, is written (in German) by Eugen Fick and Georg Joos. It excels throughout in clarity and thoroughness, whether it is dealing with the description of phenomena, the presentation of results, or the exposition of theory.

The Zeeman-effect is the subject of the fourth article (written in English). Its author, J. C. Van Den Bosch, is a member of the staff of the famous Zeeman laboratory in Amsterdam. This chapter covers most of the material which is essential for the experimenter. The theoretical discussions are based upon the vector model. The quantum mechanical treatment is found in volume 35 of this encyclopedia. This rather concise article would have gained by the addition of a detailed list of publications relative to the different elements.

The last chapter (in French), on natural optical activity, is by Jean Paul Mathieu. The presence of this chapter in a volume of spectroscopy is rather peculiar but must be justified by interpreting the term *spectroscopy* in a rather broad sense. This article is a thorough, clear, and attractively presented contribution. Historical remarks and general laws, methods of measurements, and optical activity of isotropic and anisotropic media are the main subject-divisions.

Subject indexes in German-English and English-German and a table of contents, in French for the last article, conclude the volume.

K. W. MEISSNER

Purdue University

Synthetic Methods of Organic Chemistry. vol. 10. With reaction titles and cumulative index of vols. 6 to 10; vol. 11. W. Theilheimer, Ed. Karger, Basel, Switzerland; Interscience, New York, 1956, 1957. 746 pp.; 494 pp. $25.25; $20.

In volumes 10 and 11 of this series of annual publications, the editor has continued the important compilation of new synthetic methods and of improved old procedures in the field of organic chemistry.

The tenth volume contains a cumulative alphabetical index for volumes 6 to 10 and, in the body of the text, all reaction titles of these volumes. Most of the entries in the tenth volume deal with publications which appeared in the years 1953–1955. Each abstract enumerates starting materials, products, reaction conditions, and yields. In addition, the original literature and, sometimes, supplementary references are given. This pattern is continued in the eleventh volume, which contains abstracts from papers published between 1954 and 1956. A total of 1679 abstracts are published in these two volumes. They should be of great value to chemists who wish to keep up to date on important developments in synthetic organic chemistry.

HENRY FEUER

Purdue University

The Direction of Research Establishments. Proceedings of a symposium held at the National Physical Laboratory, 26–28 Sept. 1956. National Physical Laboratory. Her Majesty's Stationery Office, London, 1957 (order from British Information Services, 45 Rockefeller Plaza, New York). Four sections. $4.50.

That skillful blend of scientific freedom, wise leadership, and selective allocation of resources which constitutes good research management is a major objective of research directors in industry and government. Many conferences devoted to the problems of research administration have been held in the United States under the sponsorship of various host institutions but without a formal continuing organization. The present book contains the proceedings of the first such conference to be held in Great Britain, one of the series of symposia regularly held by the National Physical Laboratory.

The six sessions included 20 papers by as many authors—14 British, two Canadian, two American, one German, and one Dutch—together with extensive discussion by those in attendance. The first session included papers on the relations between basic and applied research and on the choice and termination of research projects, by J. D. Bernal and Willis Jackson, respectively. The lively discussion ranges from such topics as optimum size of research establishments to the pros and cons of financial awards to individual scientists for particular research successes.

The second session dealt with the problem of creativity, with papers by Morris Stein and D. J. van Lennep. Stein describes a study, carried out by the University of Chicago, of the psychological and sociological factors related to the creativity of American chemists. Creativity, defined as the process resulting in "a novel work that is accepted as tenable or useful or satisfying by a group at some point in time," was determined by the judgment of supervisors, corroborated by that of colleagues and subordinates. Van Lennep studies chemists and physicists from the point of view of applied psychology. In both papers, and in the discussion, creativity seems to be regarded as a quality, probably inherited, which men possess to a greater or lesser degree and which can be brought to its highest expression for a given individual by a suitable environment.

The second session closed with a paper on budgets and administrative controls, by D. R. Willson—a topic which is certainly involved in any consideration of the environment that influences creativity. The author begins by quoting Thomas Jefferson—"The least government is the best government"—an opinion which every research man will heartily endorse. The roles of budgets, project cost accounting, control services, and expenditure controls were debated with as much vigor as in our conferences in the United States.

The third session consisted of four papers on general organization. E. S. Hiscocks describes the growth of scientific research from a craft to a large-scale industry, from the one-man laboratory to team research, and the concomitant necessary changes in organization. He believes, as I do, that "the business of a scientific establishment is to achieve products of scientific thought, and since the spearhead of such an activity lies in the scientists themselves, all other staff are in a sense the tools of the scientists and work to ease their job."

R. Vieweg discusses "Science and the Workshop," coming to the fairly generally accepted conclusion that both a central workshop and small auxiliary shops are required. F. M. Lea and H. A. Snow give advice on the design and provision of buildings in which research is carried out.

The research staff was considered in the fourth session, with five papers: "Selection and Personal Assessment of Staff," by W. S. Bristowe; "Staff Selection and Assessment," by F. T. Rosser; "Superiors and Subordinates in Research," by H. A. Shepard; "Staff Groupings and the Flow of Authority," by C. R. Harington; and "Incentives," by S. Mayne. The first two papers describe the selection and rating procedures in an industrial laboratory (Imperial Chemical Industries) and a governmental laboratory (National Research Council, Canada), respectively. The differences in practice with respect to interviews and weighting of personal factors such as leadership, cooperation and loyalty, power of expression, and personal acceptability are perhaps typical of the two samples rather than representative of characteristic differences between industrial and governmental research laboratories.