third chapter, "The golden age of individual bibliographers," that is so interesting to the bibliographer of today. For here are described the various problems confronting the 19th century bibliographer who was trying to index a rapidly expanding literature. The importance of this period is that we are today mainly following the same principles of indexing and we are encountering the same difficulties that Plocquet saw and tried to overcome. In conclusion, the author points out that the problems which beset medical bibliography in the past are the same today, only the quantity has changed, not the quality. Notwithstanding the development of mechanical aids, it has not been possible to work out methods for solving the index requirements of modern medical science. The individual bibliographer is still the key to indexing.

The work closes with a list of references and medical bibliographies published since 1500. A well organized author index to bibliography and a general index concludes the monograph. In very readable style and well documented, it gives an excellent comprehensive picture of medical bibliography, both past and present, the difficulties encountered, how they were solved, and the meaning this has for those who are trying to solve the problem of medical indexing today.

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***Physics and Applications of Secondary Electron Emission.*** H. Bruining. McGraw-Hill, New York; Pergamon Press, London, 1954. xii + 178 pp. Illus. $5.

This is a survey based in large part on 393 papers related to the emission of electrons from different kinds of substances in the solid state, from the discovery of the phenomenon in 1902 through 1952. The first seven of the 10 chapters are on physical aspects and the last three are concerned with application aspects. These three chapters are on electron multiplication, disturbing effects that arise from secondary emission, and desirable effects produced in electronic tubes of various kinds. It is evident that a complete theory of the mechanism of secondary electron emission does not yet exist, and that the author has surveyed the various approaches that have been made.

The monograph fulfills its primary purpose quite adequately. It falls a little short of being an elementary textbook since part of what is said in chapter 1 assumes knowledge of the terminology and ideology of later chapters, and in a few spots the sentences lack the details desirable in a textbook. As a reference for the researcher and a guide for the advanced seminar student, the book is excellent.

The chronological list of 393 references appears to be exhaustively complete. The references published during the first 30 years after discovery of secondary electron emission are almost all American or German, about equally divided. The first Japanese reference is dated 1933. It is interesting to note that the Russian references begin abruptly with six in 1936, marking the start of a period of intensive activity that yielded 40 papers in 6 years. These references drop as suddenly to a low rate of occurrence, and none are listed after 1947.

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***The Infrared Spectra of Complex Molecules.*** L. J. Bellamy, Methuen, London; Wiley, New York, 1954. xvii + 323 pp. Illus. $7.

In recent years infrared spectroscopy has assumed an increasingly important role in the industrial research laboratory and has taken its place along with other physical methods of analysis, such as optical spectroscopy, x-ray diffraction, and mass spectroscopy. It has been adequately demonstrated that, as a method for the recognition of structural groups in compounds, for the recognition of compounds in mixtures, and in quantitative analysis, it is applicable to classes of problems not easily, if at all, handled by other methods. So widespread are the applications of infrared spectroscopy to allied fields that many investigators with various backgrounds are finding it advantageous to employ infrared methods and to learn the basic methods of interpretation of the spectra obtained. With the exception of the general and elementary discussion by Barnes, Gore, Liddel, and V. Z. Williams, and the more recent and fuller account by Randall, Fowler, Fuson, and Dangl, there has been no single work to which the investigator could go for information on this subject. To be an effective worker in this field demands a wide knowledge of and experience with the absorptions by a great many compounds containing the same or similar structures. Since the literature is scattered over many journals and years, this knowledge is difficult to come by. It is, therefore, my opinion that there has long been a need for a book such as this one, and that present investigators and students alike owe a debt of gratitude to Bellamy for having correlated and reviewed critically this great mass of empirical data.

Bellamy's treatment of this complicated subject is orderly and clear. The knowledge that is necessary in structure recognition and correlation is, to a large extent, empirical in nature. Bellamy has made a critical survey of the existing data on which such correlations are based, and he has drawn conclusions that will be of aid to new and old workers alike in pursuing independent recognition researches. He has divided the mass of information into four parts consisting mainly of the following topics: part I, C—O and C—H linkages; part II, C—O and O—H linkages; part III, C—N and N—H linkages; and part IV, vibrations involving other elements or elements of inorganic origin. Each part is then further broken

down into chapters covering specific groups. In these chapters he discusses in considerable detail typical regions of absorption of the various groups and the way in which interactions between groups affect the absorption regions. In the book he follows what is coming to be standard practice among infrared spectroscopists—using wave numbers for band positions rather than wavelength in microns. The book contains a table of reciprocals for the convenience of those who prefer to think in terms of wavelength. Each chapter begins with a convenient outline of the correlations subsequently discussed and ends with a bibliography of the specific papers referred to so that the reader may go to the original source if he prefers. The bibliography is complete enough to permit the location of every significant contribution. At the beginning of the book there is a set of correlation charts, extending from 3750 to 650 $cm^{-1}$, that are more complete than any this writer has seen published heretofore. The book is quite well illustrated at the end of each main part with examples of prism spectra, although it would have been worthwhile to make reference to these figures at appropriate places in the text.

Both the persons beginning to acquire knowledge in this field, as well as persons already versed in it, will find this book indispensable.

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***Weather Modification: Past, Present and Future.*** Kenneth M. Arenberg *et al.* Weather Modification Group, Wollaston, Mass., 1954. 50 pp. Paper, $3.

Expanding interest in weather modification is manifest in this pamphlet report which can best be described as a digest summary of current literature coupled with the conclusions of the six authors.

A short discussion of the history of weather modification precedes a summary of the physical basis of modern cloud-seeding attempts and a brief outline of the Bergeron-Findeisen ice-crystal hypothesis. The process of rain formation without the involvement of ice was apparently unknown to the authors. The chapter on verification, highly colored by claims of various commercial cloud seeders, cannot be accepted as more than a selection of some of the current arguments.

The role of government and commercial enterprise is outlined, including a list of some government-sponsored projects and pertinent quotations from their reports. A fairly concise notion of the operation of a typical rain-making firm is given.

The best written and least controversial chapters deal with the potential application of weather modification and government regulations thereof. The authors feel that detailed federal regulation is unnecessary and that some of the cited Congressional bills are actually undesirable. They suggest that the government require cloud seeders to be licensed, require full reports of weather-modification activities, and assume the liability of private contractors on government-sponsored projects.

The authors have successfully combed a difficult and controversial subject to prepare this acceptable report. However, it has several features that detract from its value. After explaining the "ice-crystal" precipitation hypothesis and showing that Dry Ice and silver-iodide seeding act in supplying missing ice nuclei to supercooled clouds, the authors ignore the problem of the frequency of clouds in need of such nuclei. The fact that precipitation often forms at temperatures warmer than freezing is overlooked. Much of the information concerning research projects at universities and in government is marginally factual. One gets the impression that the authors believe the best evidence for the effectiveness of cloud seeding is the fact that many persons are willing to pay for such services. Although this may be a perfectly valid test, many readers will prefer a conclusion based on more scientific evidence.

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***Synthetic Methods of Organic Chemistry.*** vol. 8. An annual survey. W. Theilheimer. S. Karger, Basel; Interscience, New York, 1954. xv + 508 pp. $18.90.

This work is an attempt to make new or improved synthetic methods readily available to the organic chemist. The series began with the literature appearing in 1942, and the present volume is drawn mostly from papers published from 1951 to 1953. The arrangement of the methods is based on an arbitrary system that takes into consideration the chemical bonds formed, the type of reaction, and the chemical bonds destroyed. For example, HC\||/OC represents the hydrogenation of a carbonyl group, the symbol between the chemical symbols indicating that the process occurs by addition. Although such a system easily builds up resistance in many chemists, it not only offers a basis for classification, but, more important, it facilitates thoroughness since the reactions of a functional group are found under the group and not, as is so often the case, under the numerous compounds containing the group. It should be added that the system can be avoided by using the extensive index (for vols. 6, 7, and 8) of more than 100 pages that list reactions by name, general topics, starting materials, and end products.

It is my opinion that this survey fills a definite need. The limited number of syntheses that are checked in the present volume appear to be properly recorded and give essential facts, such as the number and nature of the reaction steps, the yield, and the important literature. In spite of the many aids available to the organic chemist, this one offers a particular appeal, largely because the syntheses described are so recent. The author promises greater promptness in the volumes yet to come.

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