## MOLECULAR SPECTRA

*The Identification of Molecular Spectra.* By R. W. B. PEARSE and A. G. GAYDON. 221 + viii pp., 8 plates. New York: John Wiley and Sons, Inc. 1941. $8.00.

THE essential features of this book are (1) a "Table of Persistent Band Heads" arranged in order of wave-length, (2) a compilation entitled "Individual Band Systems" containing rather complete lists of band heads arranged according to molecules. In addition there are very helpful brief discussions on the purpose and method of use of the tables and on the spectroscopic sources from which band spectra are obtained. There are a useful appendix and an excellent set of plates showing reproductions of important band spectra. The book fills an important gap for research workers in the field of molecular spectra, who hitherto have had no systematic guide for the rapid identification of known bands. It may also help to make possible the use of band spectra in spectrochemical analysis.

The tables cover the range λ2,000–10,000. The attempt has been made to include all diatomic spectra and some of the simpler polyatomic spectra, but spectra of solutions, liquids and solids are excluded. In the Table of Persistent Heads, bands "of particularly frequent occurrence as impurities" are marked with asterisks. Here one might disagree somewhat with the assignment of asterisks, and also with the choice of spectra included in and excluded from the table. The strong short wave-length $SO_2$ absorption bands near λ2,200, which are not included, ought to be included and with an asterisk; the writer knows of at least three instances where these bands have turned up very deceptively as impurities, in the absorption spectra of such diverse substances as ICl, HF and AgBr. However, the table as it stands will be exceedingly useful in identifying bands, particularly since it gives an indication of the probable intensity of occurrence of each band in each of a variety of different types of sources.

The section on "Individual Band Systems," which forms the heart of the volume, gives a very helpful survey of the spectra of each molecule listed. Selected references are given, not necessarily to the latest work, but particularly to articles containing reproductions. Methods of excitation, and classification of the electronic states involved, when known, are also given. No attempt is made to give data or references on rotational structures of bands. Multiple band heads, when present, are, however, usually listed. For most molecules, all known bands are listed; for some, only the strongest bands; in a few cases, notably the halogens, where the number of bands is large, the list is omitted. A rather casual sampling indicates that there are a number of omissions in the diatomic list. Thus, four systems of AgI and AgBr bands[1] and one system of CuCl bands[2] are unmentioned, though certain $SH^+$ bands published slightly later[3] in the same journal are included. (Some references up to 1940 are included.) The red system of $Br_2$ is not mentioned, although the reference in which it was published[4] is given. The occurrence of BiCl bands in emission,[5] and the latest work on the λ2314 $C_2$ band, with a photograph, are also overlooked.[6] Deuteride spectra are entirely omitted. On the other hand, a number of spectra which have not yet appeared in other compilations are listed. The Herzberg bands of $O_2$ and the Finkelnburg-Steiner bands (probably $O_4$) are described as a single system. Continuous spectra, although mentioned in some cases (*e.g.*, $H_2O$ and $Cl_2$ absorption) are usually (*e.g.*, $H_2$ emission, $F_2$, HCl, ICl and BrCl absorption) omitted. The coverage of triatomic spectra, while not intended to be complete, is good. The selection of polyatomic spectra presented seems somewhat arbitrary.

Thus while one can not rely on these tables for completeness, they will be exceedingly useful, both for the identification of unknown bands and as a survey which will be stimulating for further research. The general plan and arrangement, and the text in general, are excellent. The typography and appearance of the book are very attractive.

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# REPORTS

## DEFENSE WORK OF THE CARNEGIE INSTITUTION OF WASHINGTON[1]

IN accordance with authorization from the trustees, the services of staff members and the use of laboratory facilities of the Institution have been made available to the government. In some cases staff members have been given leave of absence in order to enter the rolls of governmental organizations; in others, their services have been made available while they remained on salary with the Institution, working either in our own or in governmental laboratories. At the present time

[1] From the Report of the President of the Carnegie Institution, Dr. Vannevar Bush.

[1] *Phys. Rev.*, 55, 636, 1113, 1939.
[2] *Ibid.*, 54, 497, 1938.
[3] *Ibid.*, 55, 894, 1939.
[4] *Ibid.*, 38, 1179, 1931.
[5] *Ibid.*, 37, 1710, 1931.
[6] *Ibid.*, 56, 769, 1939.

eleven staff members are thus on leave, twenty others are giving full time to defense research in our own laboratories, and over forty more are devoting part time in connection with various advisory committees, as consultants to the Army and Navy, and in similar capacities. Much of the work in our own laboratories is carried on under contract with governmental agencies, the Institution being reimbursed for its added expenses in carrying out the work, but not for the regular expenses of the laboratory, the overhead or the salaries of scientists on the staff. This has allowed a greater expansion of the work than would have been possible had the Institution made the entire contribution. The heaviest burden has fallen on the Department of Terrestrial Magnetism, where nearly all the research is now on governmental problems, and the number of men in that laboratory in all categories has been more than doubled in order to carry it on. The Geophysical Laboratory, the Mount Wilson Observatory and the Nutrition Laboratory also have important efforts under way. The amount of the government funds made available for the added expenses of those programs has now reached nearly two thirds of the normal budget of the Institution.

This type of work is now being done in scientific laboratories all over the country; it was concentrated at first, of necessity, in some of the larger institutions, but gradually it is reaching out to others. The whole program is being enlarged to meet increased needs, especially in the field of medical research.

In order that the combined effort may be properly integrated, the President of the United States has, by Executive Order, created the Office of Scientific Research and Development as a part of the Office for Emergency Management, and has given this Office the task of coordinating all defense research, and, through its subordinate bodies, of supplementing the research of the Army and Navy in the development of instrumentalities of warfare and in medical research connected with defense. The president of the Institution is director of this office, and many staff members are members of its organization. Its main offices are located in the Administration Building of the Institution, under an arrangement whereby space, furnished at first to the government at nominal cost, is now made available for government purposes without charge. The chairman of the National Defense Research Committee, which is a part of the office, is now President James B. Conant, of Harvard University, and the chairman of its Committee on Medical Research is Dr. A. Newton Richards, of the University of Pennsylvania. The office has close relations with all governmental agencies and private organizations concerned with defense research. It has especially close relations with the National Academy of Sciences, which is the advisory body to all governmental agencies on their scientific programs, and of which our fellow trustee, Dr. Frank B. Jewett, is president; and with the National Research Council, with which many of our staff are associated, the important Medical Division being headed by Dr. Lewis H. Weed, of the Board of Trustees.

Many of the dislocations and stresses produced by the emergency are not pleasant. There is, however, one decidedly pleasant aspect of the matter. Owing to the close connection of the Institution with the defense research effort there is a continual succession of visits to the headquarters of the Institution from the outstanding scientists of the country, from members of our own staff from a distance, and from the many trustees of the Institution who are concerned with various aspects of the defense problem. When the emergency is over the scientists of the country will be better acquainted with one another, and they will also be better acquainted with the Institution. This should certainly be of a real benefit when our full normal program again occupies our laboratories, and when our aid and collaboration again become fully extended to those in other institutions whose research is closely allied to our own.

# SPECIAL ARTICLES

## A BASIC MECHANISM IN THE BIOLOGICAL EFFECTS OF TEMPERATURE, PRESSURE AND NARCOTICS

AN important property of isolated proteins and enzymes, heretofore not adequately recognized in studies on living systems, is that of reversible denaturation. Active native trypsin has been shown to exist in equilibrium with an inactive, denatured form.[1] The equilibrium may be influenced in diverse ways, *e.g.*, temperature, acid, alkali, alcohol. Evidence that such a reversible denaturation (RD) might be of major importance in controlling the intensity of bacterial luminescence led us to undertake a re-evaluation of certain factors—temperature, pressure and narcotics—in biological systems.

For this problem the luminescence of bacteria is ideally suited. Under given conditions, the intensity of luminecsence is proportional to the reaction velocity of the light-emitting enzyme, luciferase. Luminescence thus provides a unique and instantaneous measure of enzyme action within the living cell.

The influence of temperature on the luminescence

[1] M. L. Anson and A. E. Mirsky, *Jour. Gen. Physiol.*, 17: 393, 1934.