emission, (5) emission (general), (6) instrumentation (emission), (7) instrumentation of absorption methods, (8) ultraviolet absorptiometry, and (9) infrared spectroscopy. The emphasis in all is upon the applications of spectroscopic methods to chemical analysis and taken together they give an excellent picture of the state of the art in this important field of spectroscopy throughout the world. These biennial meetings, of which the seventh was held in Liége in September 1958, constitute the most important opportunity for an international meeting of spectrochemists. It is of interest to note from the literature citations at the end of each article that spectrochemistry recognizes no national boundaries and that most of the articles indicate the familiarity of their authors with the work done in other countries. The volume is well edited and printed and constitutes an important reference work in the field of analytical spectroscopy.

**Structure and Evolution of the Stars.** By Martin Schwarzschild. 296 pp. Princeton U. Press, Princeton, N. J., 1958. $6.00. *Reviewed by C. C. Kiess, National Bureau of Standards.*

The life history of a star, including our sun, begins with its genesis in distended nebular matter consisting of dust and meteoric material embedded in gas, chiefly hydrogen. As the nebula shrinks under gravitation, heat is generated and the temperature of the nebula rises from a few degrees above the temperature of interstellar space to one high enough to render the object visible as a red star of large volume, but of low density. Thus a supergiant star has come into being. As the internal temperature rises, through further contraction, there comes a time, not too long after the process started, when the temperature is high enough to bring into play another procedure for generating stellar energy, the transmutation of hydrogen into helium. As this process gains in yield the contraction slows to a halt, while the energy of hydrogen-burning takes over completely the job of maintaining the luminosity of the star and holding its size in balance against the loss of its energy through radiation. At this stage of its career the star will find itself among normal stars of luminosities and spectral classes determined by their masses.

The length of time during which a star is normal depends on the rate at which its internal hydrogen is consumed—faster for massive stars, slower for less massive ones like the sun. But there comes a time when the hydrogen is depleted; contraction sets in again; the temperature rises to a point at which helium-burning can take over the task of keeping up the star's appearance as a normal one. For a while the increase of energy will increase the luminosity of the star, with consequent expansion of its outer layers, and it will take its place among the red giants. Finally, however, when the sources of nuclear energy are exhausted and a series of cataclysmic events occurs, the star will descend to the white-dwarf stage, as one of small volume, of extremely high density, and of low luminosity, drawing on the thermal energy of its core to keep the spark of life going.

Is all this guesswork? The astronomer cannot dip into a star to get samples of its material for analysis. All he can do is to examine its light with photometer and spectrograph to determine its amount and quality, and then theorize as to the nature of the source. To do this he sets up model stars of assigned mass and composition, and by applying the physical laws relating to gas characteristics he determines the nature of the star's light. And the test of a model is the way it fits into the Hertzsprung-Russell and mass-luminosity relations.

All these matters are discussed in detail in Professor Schwarzschild's book. The first three chapters give the observational data available for the problem, the physical principles governing the behavior of gases at various temperatures and pressures, and the mathematical tools needed for the job. Then come four chapters in which the details are given for setting up and calculating model stellar structures for the initial and subsequent phases of the star's life cycle. In the last chapter the results of the previous chapters are summarized and their bearing on the problem of stellar evolution is described.

This is a good book. It is written in a simple and pleasing style, which at no time leaves the reader in doubt as to what the author is explaining. Mathematical formulae appear on almost every page, yet their physical meaning is explained and the results derived from them are illustrated with diagrams and tabulations. Although written for students of astronomy at the graduate level, the book may be read with profit by a wider group of readers with some preparation and interest in the physical sciences.

**Foundations of Modern Physical Science.** By Gerald Holton and Duane H. D. Roller. Edited by Duane Roller. 782 pp. Addison-Wesley Publishing Co., Inc., Reading, Mass., 1958. $8.50. *Reviewed by James MacLachlan, Earl Haig Collegiate Institute.*

"Every Ptolemy is challenged by a Copernicus, every Kepler and Galileo must be made meaningful by a Newton, the insight of every Dalton eventually has to be transposed to a new plane by the work of a Mendeléeff or a Bohr . . . science is an unending quest for wider horizons." The pathways of the quest of physics are opened wide for freshmen in this text by Holton and Roller. An understanding of the developments cited in the quotation is unfolded in an accurate, readable account of physics.

The authors' approach is an effective antidote both to specialized, compartmentalized introductory physics courses and to broad, shallow physical science survey courses. It is all pure physics, though reference is made to aspects of astronomy and chemistry which are required to illuminate the structure of physics. The treatment is unified by the use of historical sequences—