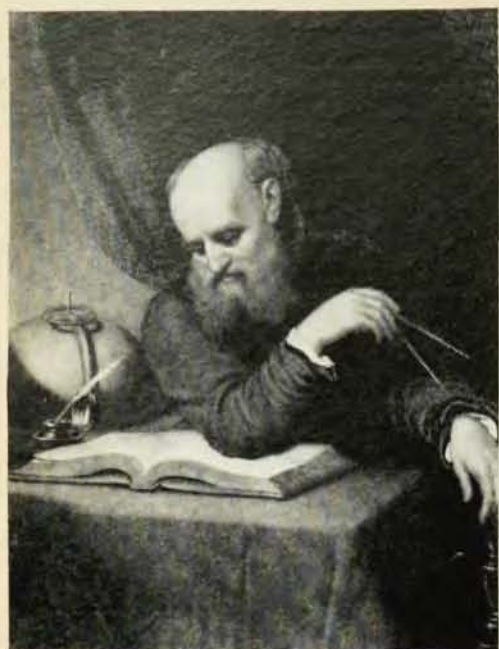




NEW YORK PUBLIC LIBRARY

GALILEO

German translations of commentaries on Galileo's life and troubles.

A brief review of the contents reveals at the outset a four-page introductory note by the editor, E. Brüche, the well known industrial physicist and authority on electronics. This is followed by three main sections devoted respectively to Galileo as a man, as a scientist and finally to his rather poignant fate. F. Klemm, director of the library of the Deutsches Museum in Munich, opens the first section with an edited condensation of an old German translation (18th century) of the first life of Galileo, namely that by Vincenzo Viviani, his faithful pupil. The emphasis here is mainly on the astronomical discoveries. Next H. C. Freiesleben, astronomer and geophysicist at the University of Hamburg, discusses Galileo's personal character, his relations with his contemporaries, his position as an adherent of the Roman Catholic Church, etc. Here included is a critical analysis of Bertolt Brecht's somewhat dubious interpretation of Galileo, which may interest devotees of the dramatic works of this modernist. The German philologist Franz Rauhut of Würzburg University contributes an essay on the relation between Galileo and the Italian language in which he stresses the significance of Galileo's two greatest treatises not being in Latin, as was the rule with scientific works at the time, but in the vernacular. The

contribution of the scientist to the development of Italian as a language for scholarship presumably has not been sufficiently stressed heretofore and would appear considerable.

Klemm opens the second main section of the book with a commentary on Galileo's earlier works in mechanics, *De Motu* and *Le Mekaniche*, in which he was still struggling to fit observations on the motion of bodies into the Aristotelian tradition. This is followed by an essay of Hans Schimank, prolific Hamburg writer on the history of science, discussing Galileo's experiments on the pendulum and free fall during his stay in Bologna. The emphasis here on the work of G. B. Riccioli (1598-1671), although interesting, seems rather exaggerated. Two articles by Freiesleben and the astronomer and historian of science, J. O. Fleckenstein, on Galileo's astronomical discoveries complete this section. The latter feels that Galileo paid too little attention to Kepler's great contributions though he was perfectly acquainted with them.

The third section of the book is devoted entirely to Galileo's difficulties with the inquisition over his adherence to the Copernican theory, his trial and abjuration. Here Brüche reproduces the details of the trial as they were set forth in the introduction to E. Strauss's 1891 German translation of Galileo's treatise on the two great systems of the world, the work whose publication in 1632 became the immediate occasion of the persecution of its author. All this is, of course, well worn material. There is a final article by H. Dolch, in which this theologian presents some theological reflections on the case of Galileo, referring specifically to his troubles with the church. This will arouse interest and probably controversy among those who like to see science mixed with theology, but on the whole it would appear to shed little useful light on the trial of Galileo.

The book is, in general, well produced though the lack of an index makes it of little use for reference purposes. Moreover the bibliography is wholly inadequate for even a popular book on the history of science. The reviewer would like to enter one more critical comment. Nowhere in the book is there an indication of the profes-

sional status or affiliation of the various authors. In a book intended for overseas distribution and for a popular audience this is an unfortunate and inexcusable oversight.

Astronomy and Astrophysics

EXPLORATION OF THE UNIVERSE. By George Abell. 646 pp. Holt, Rinehart and Winston, New York, 1964. \$9.50.

by E. J. Opik

The author became associated with the Mount Wilson and Palomar Observatories less than two decades ago and rapidly reached the astronomical news headlines. Having been intimately connected with the National Geographic Society-Palomar Sky Survey, he continues his extragalactic studies there while teaching at the University of California in Los Angeles. The book is the masterpiece of a teacher with a vast experience in research.

Research scientists usually turn to book writing toward the end of their careers, profiting from lifelong experience and more leisure. Here we have an author who, by astronomical standards, still must be counted with the younger generation, yet who has sacrificed four years of his weekends to produce a general introduction to the study of the universe that impresses by its maturity, completeness and balanced many-sidedness. It must be counted with the best textbooks in astronomy of our time.

Clear and brief in expression, it uses only elementary mathematics (not even trigonometry and calculus). It succeeds in making the most sophisticated achievements of modern and old research understandable to a reader with an ordinary high-school background, especially when helped by the "refresher" chapters of the appendices.

The fellow astronomer also will appreciate and enjoy this precise and critical presentation of the entire scope of his discipline; he may dis-

* * *

An active astronomer for half a century, Professor Opik divides his time between the University of Maryland and the Armagh Observatory in Northern Ireland.

HOW THIN THE FILM?

If you're doing research in solid-state physics and are investigating ultra-thin films, you'll be interested in Gaertner ellipsometers.

These instruments utilize the methods of Drude, Rothen, Tronstad, and others to permit precise measurement of film thicknesses from a few angstroms to several hundred angstroms. They are also used in the study of birefringence, index of refraction, and other thin-film and surface phenomena.

You can easily convert these ellipsometers to spectrometers. Just add two of our accessories: an entrance slit to the collimator, and a Gauss eyepiece and adapter to the telescope.

There are other accessories you can install yourself without loss of alignment: a Tronstad & Nakamura biplate assembly, a Babinet-Soleil compensator, and a photo-multiplier attachment.

Full information on Gaertner ellipsometers is contained in Bulletin 203-62. Send for your copy.

GSC-4-216

HOW MUCH THE CREEP?

Look through one of Gaertner's optical extensometers and you'll get accurate, consistent answers. These fine instruments are calibrated in either metric or English units, and are available with special polarizing eyepieces for high-temperature work. We make a full range of models to meet all standard environmental measuring problems.

Our people are quite proud of their ability to design and build instruments to meet special needs. When you list your requirements, be sure to include the desired precision, diameter of field on object, magnification, total anticipated dimensional change, working distance, orientation of sample, type of fiducial mark, illumination. Also, if two microscopes will be used, state the length of the specimen. Best time to tell us: right now. Want more information? Send for Bulletin 161-64.

GSC-4-217

WHAT'S THE WAVELENGTH?

Gaertner's monochromators permit rapid, direct measurements of wavelengths in the ultraviolet, visible, and infrared regions of the spectrum. In addition, they provide an exceptionally good monochromatic light source.

You'll find the high speed and the 1850 Å to 3 μ range of our quartz monochromator ideal for the study of absorption spectra, photosensitive materials, phosphorescence, and energy distribution of light sources. Add a special camera attachment and you've got a high-aperture spectrograph.

We have instruments for work in other spectral regions, too, including a high-dispersion spectrometer for the 3950 to 8200 Å range, and an infrared spectrometer for the 0.6 to 12 μ range.

You'll get more information on these fine instruments in Bulletin 158-63. Use the coupon to request yours.

GSC-4-218



Please send Bulletin 203-62 describing Gaertner ellipsometers.

Name _____

Title or Department _____

Company or Institution _____

Street _____

City _____

State _____

Zip _____



GAERTNER SCIENTIFIC CORPORATION
1234A Wrightwood Ave., Chicago, Ill. 60614
Phone: 312 281-5335 Cable: SCIENTA



Please send Bulletin 161-64 describing Gaertner extensometers.

Name _____

Title or Department _____

Company or Institution _____

Street _____

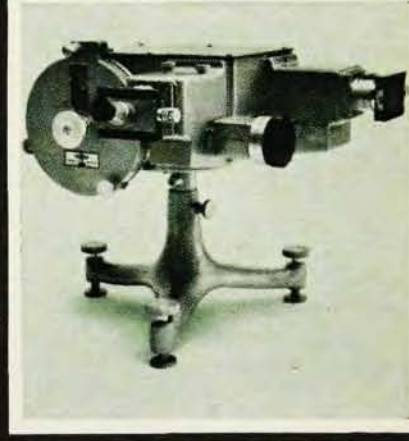
City _____

State _____

Zip _____



GAERTNER SCIENTIFIC CORPORATION
1234A Wrightwood Ave., Chicago, Ill. 60614
Phone: 312 281-5335 Cable: SCIENTA



Please send Bulletin 158-63 describing Gaertner monochromators.

Name _____

Title or Department _____

Company or Institution _____

Street _____

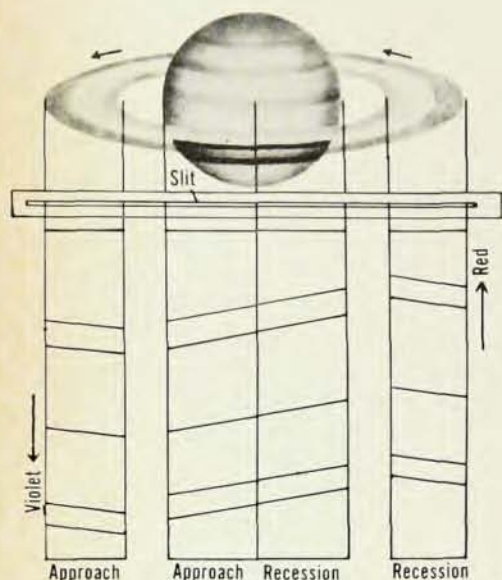
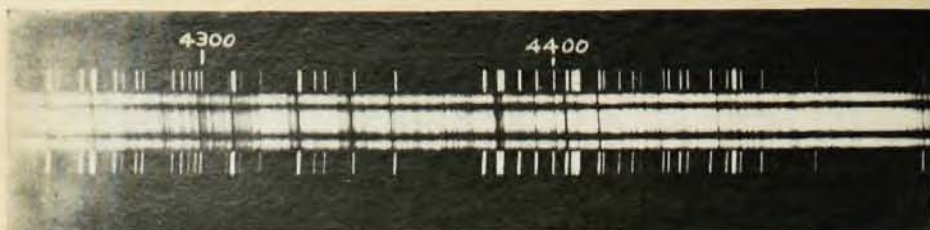
City _____

State _____

Zip _____



GAERTNER SCIENTIFIC CORPORATION
1234A Wrightwood Ave., Chicago, Ill. 60614
Phone: 312 281-5335 Cable: SCIENTA



LOWELL OBSERVATORY PHOTO

SPECTRUM OF SATURN showing effect of rotation. Lower diagram shows how rotation makes straight lines diagonal. From: *Exploration of the Universe*.

cover here a good many items of information that are outside his special line of research and of which he has not been aware.

Besides astronomical knowledge, the book outlines the physical, mechanical and elementary mathematical background with a great number of tables and copious illustrations, including color photographs of nebulae obtained with the 200-in. and 48-in. telescopes at Mount Palomar. A glossary, or miniature encyclopedia (22 pages) covers the special terminology, with proper definitions and numerical data. Monthly maps of the night sky are appended. The history of astronomy in the Old and New worlds (Maya calendar) is given a fair share, philosophical aspects are not neglected, and there are some sparks of humor in appropriate places. For the serious student, exercises are listed at the end of each chapter which require a good deal of independent thinking. The style is popular, yet masterfully precise and compact; as exemplary, chapters 17 (stellar motions), 25 (interstellar medium), 29 (stellar evolution), 31 (galaxies), 32 (cosmology)

can be mentioned. In the clusters of galaxies, the author in his own current research is reaching out to the farthest outskirts of the visible universe. With simplicity, the law of the red shifts in an expanding universe is explained by an ingenious three-dimensional model of baking raisin bread with too much yeast.

The book is almost free from typographical errors, but, on page 255, "Kozrev" stands for "Kozyrev." A few quite disturbing "organic" slips are nevertheless present. The error in the minimum mass of a meteor, obtained by equating visible light to kinetic energy, is not "small" (page 310) but amounts to a factor of 1000. Meteoroids of low density are slowed down at higher, not at "relatively lower," altitudes, and meteor showers have higher, not "lower-than-average," heights (page 310 again); here a persistent misunderstanding seems to have crept in. The chapters on meteors, comets and planets are less lucid than the others. The minimum age of the earth is not "2 billion" (page 83) but 3 billion years as shown by dated rocks. Comets are not "loose swarms of small particles" (page 237). The calculation of planetary black-body temperatures is incorrect; it refers to the subsolar point and not to the mean. The earth receives only one quarter of the solar constant per cm^2 , not the entire amount, and the mean black-body temperature of Saturn becomes not 107°K (page 243) but 76°K . The table of "approx. mean temperature" on page 247 quotes 330°K for the earth, 300°K for Mars, etc. These temperatures are obviously too high for the same reason. The important fact that Jupiter has a higher mean temperature than expected is therefore overlooked, and the apparent agreement between its measured and calculated temperatures as pointed out on page 266 is the result of the author's miscalculation. For Saturn, even this error could not conceal a tempera-

ture excess (page 270) although it is larger than stated. The mixed use of British and metric units is somewhat disturbing, despite the great care taken in producing correct figures; this probably is supposed to help popularization. However, the temperatures are usually in degrees centigrade and the dimensions of the microcosmos are all in cgs units. With the conversion tables at the end of the book, all could have been in metric units.

The book covers exhaustively all important sectors of astronomy and astrophysics and can be emphatically recommended as an undergraduate textbook, as well as for general reading.

Radiation and living cells

ADVANCES IN RADIATION BIOLOGY, VOLUME 1. Leroy G. Augenstein, Ronald Mason, Henry Quastler, eds. 285 pp. Academic, New York, 1964. \$11.00.

by Joseph G. Hoffman

The six articles in this first volume of a new review series are concisely written; each presents a review in the best sense of the word. D. E. Wimber's paper, "Effects of intracellular irradiation with tritium," discusses the state of the subject in 24 pages, points out the kinds of experiments that would help fill in critical gaps of knowledge and ends with a table summarizing quantitative results on 46 different biological materials. Another example of efficient reviewing is J. Liebster and J. Kopoldova's paper on the radiation chemistry of amino acids, in 65 pages (longest of the six reviews) exclusive of references. They consider all the amino acids and include data on peptide bonds. Their text moves rapidly by the use of factual material concentrated at the highest possible density consistent with the flow of ideas. In his paper on radiation chemistry of aqueous solutions, H. A. Schwartz gives a three-page summary of the properties of the hydrated electron. This, along

* * *

A member of the faculty of the State University of New York at Buffalo, Professor Hoffman has engaged in biophysical research for a number of years.