

SCIENCE

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Introduction to the MECHANICS OF STELLAR SYSTEMS

By Dr. RODOLF KURTH, Department of Astronomy, University of Manchester

This book is based on the notes of lectures given by the author at the Universities of St. Andrew's, Bern, and West Berlin, and is intended to serve as an introduction to the subject for advanced students. The author has confined himself to matters which are reasonably well settled and has endeavoured to bring out the essential parts of the subject. Little previous knowledge is required by the reader beyond the elements of the differential and integral calculus, and of analytical geometry. Many examples are included to stimulate the reader into thinking critically. The text was written in German and was translated by Dr. Kahn of Manchester University.

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Edited by Dr. A. BEER, The Observatories, Cambridge

The idea of Vistas in Astronomy was conceived as a tribute to Professor F. J. M. Stratton at his retirement from the chair of Astrophysics in the University of Cambridge. As plans progressed, the scope and extent of the work was widened considerably owing to the splendid co-operation which Dr. Beer received from leading scientists from all countries, and long before publication it was evident that this was to be something more than the usual type of 'Festschrift'. The two volumes contain 192 articles by 219 internationally famous authors, and provide a complete survey of contemporary astronomy and allied sciences, emphasizing the particularly active lines of research, new techniques and methods.

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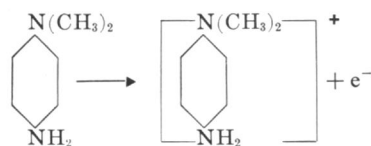
oxidation and the ills of the spirit . . . photographic materials for looking up

Crazy!

During the past spring we noted a sharp upturn in the volume of our correspondence with psychiatrists. They all wanted to know whether we could supply the compound N,N-dimethyl-p-phenylenediamine dihydrochloride. In accordance with practice in the retailing game when you don't have exactly what the customer asks for, we replied to each that we would be happy to supply the monohydrochloride at \$2.20 for 25 grams. This rejoinder got us nowhere.

Thus rebuffed (and deservedly so), we dipped a little into the fast-breaking literature of the borderland between chemistry and the ills of the spirit.

We learned about ceruloplasmin. It's an oxidation-promoting enzyme, a protein that accounts for most of the copper in the body. In *Science* for January 18, 1957 (125, 117) appeared evidence that ceruloplasmin runs high in serum of schizophrenic patients, as adduced from an increased rate and depth of color development in the *in vitro* reaction



Here we found a region with landmarks familiar indeed to anyone who has thought deeply about photographic developers. p-Phenylenediamine is parent to a numerous family of aromatic amines that assume color when oxidized. Stability is enhanced by various substitutions and in the dry crystalline state by conversion to some salt or other.

If, in this case, the author chose to have two methyl groups on one of the amine nitrogens and, instead of one, two molecules of HCl to preserve his reagent on the shelf until ready for use, that was his privilege. So also is it the inalienable right of any neurophysiologist who wishes to pursue this line of laboratory investigation to be able to buy this dihydrochloride ready made without bothering to add the appropriate quantity of HCl to a solution of the base or the monohy-

drochloride. (The right may be exercised by purchase from us of N,N-Dimethyl-p-phenylenediamine Dihydrochloride (Eastman 7423) at \$3.05 for 25 grams.)

And now, alongside one group of wise men who explain the tension of the times in terms of socio-economic forces and another group of wise men who watch the war between the id, the ego, and the super-ego, there stands huddled in stimulating talk a new group of wise men who point out that the tranquillizing chlorpromazine and Rauwolfia alkaloids are potent oxidase inhibitors. But even they seem largely to agree that anybody who at this time would depend solely on these enzymatic measurements for a positive diagnosis of schizophrenia is crazy.

"Eastman Organic Chemicals, List No. 40" contains a long catalog of many substances other than ceruloplasmin for which we offer reagents and abstracts on their use. This alone is worth the space in your bookcase. For a copy of List No. 40 (which also catalogs some 3600 available compounds) write to Distillation Products Industries, Eastman Organic Chemicals Department, Rochester 3, N. Y. (Division of Eastman Kodak Company).

A hobby for clear nights

The following proposal offers little prospect for fame, advancement, or even succor to suffering humanity. All it offers is a chance to add a few grains to the mortar in the edifice of science. Here and there are a few happy people who enjoy that sort of thing.

Why not celebrate the International Geophysical Year by gathering some data for the IGY Auroral Data Center, Rockefeller Hall, Cornell University, Ithaca, N. Y. (or, if you are Canadian, for the IGY Auroral Centre, National Research Council, Ottawa)? Write them for instructions.

The sun is now at the stormy stage of its cycle. It sends forth bursts of electrons and ions which set the night sky ablaze with the rayed arcs, homogeneous arcs, pulsating arcs, pulsating spots, glows, rays, coronas, and flames of the aurora. On clear, moonless nights when the show is on, in places without overwhelming competition from smog-scattered illumination emitted

by certain atmospheric gases when they are excited in glass tubes for the greater glory of hot dogs and horsepower, it is worth looking up in the sky for.

Looking is all you need do. Either the Center or the Centre supplies free report forms carrying a printed protractor for measuring angles in the sky.

Photographic records, however, are also wanted. To make them one needs a camera lens faster than f/4.5. (The *Cine-Kodak K-100 Cameras* of the U. S. and Canadian official observing programs have f/1.4 lenses.) With *Kodak Royal Pan Film* or *Kodak Tri-X Film* at f/3.5, reasonable exposure times for medium to bright auroras run from 18 to 60 seconds. Much faster and better for the purpose is the phenomenal new *Kodak Royal-X Pan Film*, but it must be processed according to the package directions rather than through usual commercial channels.

All auroral photographs should be labeled with the observer's location, the double date (e.g. October 17-18), the exact time and time zone, the azimuth and elevation of the center of the photograph as close as you can (ideally by identifying any bright stars in your picture), and the usual photographic data. Aim along the meridian and start on the first minute of each five, first the southernmost part of the display because that is the most interesting scientifically, then the northernmost part, then anything else on the meridian, then prominent forms in the east, and finally toward the end of the five-minute interval, prominent forms in the west. That way there is hope for simultaneous coverage from widely spaced points. South of 40° N. in the eastern U. S. and south of 45° in the west, any aurora is worth photographing immediately, schedule or no schedule. A red one is worth photographing at once, anywhere.

At Cornell, if necessary, they'll put the graduate students' wives to work reading the flood of photos and reports that ought to come in.

Prices quoted are subject to change without notice.

This is another advertisement where Eastman Kodak Company probes at random for mutual interests and occasionally a little revenue from those whose work has something to do with science

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creasing growth of the field and the need for different books for different audiences. One might compare some of the strong points of these books (although admittedly the points are shared by all) by saying that Goodman and Gilman is particularly welcomed by medical students, Drill, by practitioners, and Sollmann, by serious workers in pharmacology, for it is an unequaled source of clear fact and detail. One turns to it automatically when specific information is needed. Although one hesitates to use the word *encyclopedia* because it sometimes suggests to students a forbidding tome, Sollmann is encyclopedic in the good sense and, at the same time, attractive to beginning workers. The device of large type and small type has always helped in this respect. All in all, this eighth edition is a worthy successor to the now almost legendary series of earlier volumes. The general content is the same—a systematic coverage of the field of pharmacology—and hardly needs further description.

It is impossible to close this review without a word about Torald Sollmann, the man. With Sollmann, the old quotation that "no man is the equal of his book" hardly applies, for he is truly the elder statesman of American pharmacologists, the very active chairman of the Council on Drugs of the American Medical Association, and the possessor of a legion of devoted friends.

WINDSOR CUTTING
Stanford Medical School

Progress in Low Temperature Physics.
vol. 2. C. J. Gorter, Ed. North-Holland, Amsterdam; Interscience, New York, 1957. xi + 480 pp. Illus. \$10.75.

This is the second, and last, volume of what amounts to a handbook of low-temperature physics. This volume consists of 14 separate articles, grouped in chapters, written by 22 people all of whom are specialists well known to the majority of workers in this field. The accounts are, accordingly, authoritative throughout and cover a considerable diversity of topics.

Authors of review articles (which these chapters are, essentially) are forced to be selective in their choice of material, especially in a swiftly developing and many-sided subject. Their choices are not always, and in fact not often, entirely pleasing to their colleagues. This is very likely to be the case with this book. Thus, some chapters appeared excellent to me, while others (I thought) might well have been deleted.

Specifically, the article by K. R. Atkins on the problems of the mobile helium film is first-rate and a pleasure to

read, and it ought to be useful to everybody interested in this rather bizarre phenomenon. The same is true of the article on a very different topic—semiconductors at low temperatures—by V. A. Johnson and K. Lark-Horovitz. This article contains a great deal of information that is very difficult to dig out of the extensive literature. The chapter by D. Shoenberg on the "de Haas-van Alphen" effect contains all the latest thinking on that subject and is excellently presented.

To illustrate the diversity of the work, there is a very good chapter by M. J. Steenland and H. A. Tolhoek on nuclear spin alignment, especially of radioactive nuclei, by means of magnetic cooling techniques. This is a fairly recent and interesting development, since it amalgamates two hitherto unconnected fields of physics—namely, cryogenics and nuclear physics. The book was published before the use of this method to test parity conservation was reported, but the basic ideas are here outlined.

The book includes many other topics, such as theories of liquid helium (J. de Boer), paramagnetic relaxation (C. J. Gorter), solid helium (C. Domb and E. S. Dugdale), transport phenomena in metals at low temperatures (E. H. Sondheimer), liquid helium below 1°K (H. C. Kramers), and half a dozen other topics. It closes with an expert discussion by H. Van Dijk and M. Durieux of the "temperature scale." In principle, the precise determination of the Kelvin temperature of a batch of liquid helium is one of the nastiest measurements imaginable. In practice, it could be carried out easily by any reasonably bright sophomore. This happy paradox is the result of the patient and skilled work which has been going on for many years, mainly at Leiden, relating the Kelvin scale to the saturated vapor pressure. A very usable p versus T table, embodying the latest results, is included, and the whole is condensed to one page, which makes it very handy for photographic reproduction.

The printing leaves something to be desired. In my copy eight pages were blank, and the caption for one figure was several pages farther along.

C. T. LANE
Yale University

Pilot Plants, Models, and Scale-up Methods in Chemical Engineering.
Robert E. Johnstone and Meredith W. Thring. McGraw-Hill, New York, 1957. 307 pp. Illus. \$9.50.

There has long been needed a rather comprehensive textbook and appraisal of engineering models and scale-up methods. This book, written especially for

chemical engineers, summarizes well both the state of knowledge and the applications of dimensional analysis for predicting performance of large-scale operations from laboratory and pilot-plant data. All the important topics of chemical engineering—including reactor kinetics, combustion, and corrosion—are encompassed. Each chapter can be read independently of the others, with little more background than is contained in the first three introductory chapters.

Chapter 5, on differential equations, is exceptionally good and the methods outlined therein on the development of various dimensionless groups give a clearer insight to dimensional analysis than do the usual methods of unit homogeneity of Rayleigh and Buckingham.

In spite of the many dimensionless groups discussed in this book (and in others), I cannot help feeling that there are only three or four such groups which are basic and have physical significance. All others are derivable from these basic groups or are quite synthetic. Moreover, all suffer from rather serious defects. Dimensionless graphs are either extremely sensitive or relatively insensitive. They compound the errors of whatever measurements are involved in the variables employed. Actually, as used by most engineers, dimensionless groups are desensitizing, and many functional relationships derived by their empirical use in engineering data are deceptive. Although the authors have failed to stress these limitations, they have nevertheless taken great pains, in their discussions and examples of applications, to point out the significance of various dimensionless groups. This has been needed, and for this reason and because the book is well written, I am convinced that it should be added to the library of every practicing chemical engineer.

J. M. DALLAVALLE
Georgia Institute of Technology

New Books

New Research Techniques of Neuroanatomy. A symposium sponsored by the National Multiple Sclerosis Society. William F. Windle, Ed. Thomas, Springfield, Ill., 1957. 107 pp. \$4.75.

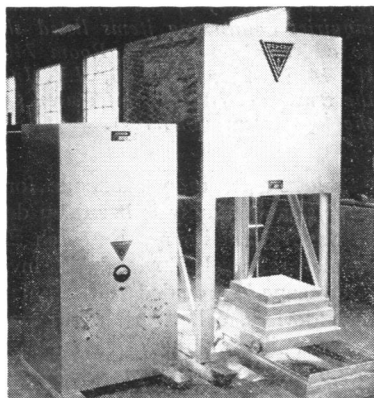
Scientific and Technical Translating. And other aspects of the language problem. United Nations Educational, Scientific and Cultural Organization, Paris, 1957. 282 pp. \$4.20.

Soil, the Yearbook of Agriculture, 1957. U.S. Department of Agriculture, Washington, 1957 (order from Supt. of Documents, GPO, Washington 25). 797 pp. \$2.25.

Vertebrates of the United States. W. Frank Blair, Albert P. Blair, Pierce Brodkorb, Fred R. Cagle, George A. Moore. McGraw-Hill, New York, 1957. 828 pp. \$12.

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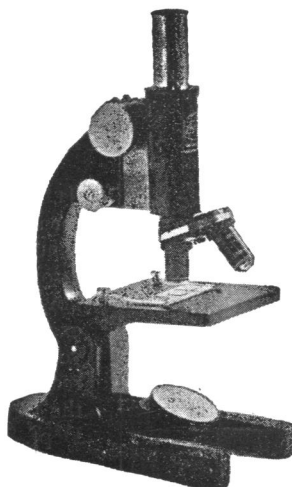
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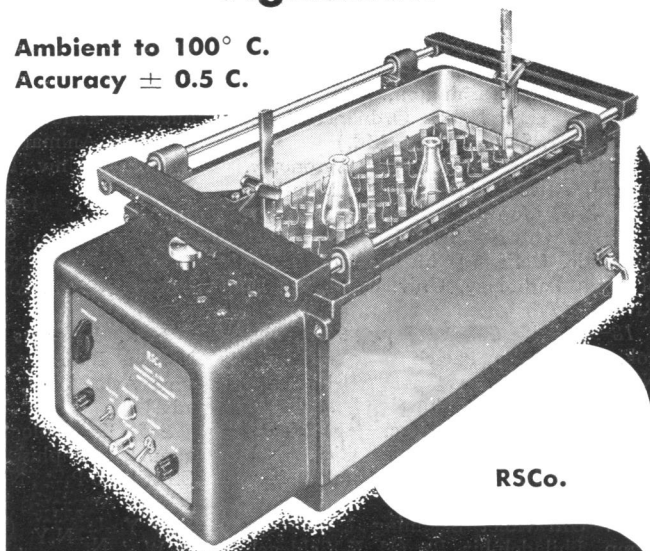
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