



THE NEW ELITE is not so new in some of its aspects. The motto of a Renais-

sance alchemist might have run: As long as you're up, find me a prince.

and molecules with metal surfaces—absorption, and the nature of the binding forces, surface reactions, accommodation coefficients studies and measurements, and reflections. There follow long chapters on surface ionization and sputtering of metal surfaces (author's interests). The remaining four chapters deal with ion scattering at metal surfaces, electron emission due to the incidence of ions at metal surfaces (potential and kinetic emission), and electron emission due to the incidence of metastable atoms at metal surfaces.

Starting with a detailed contents list (six pages), and ending with more than 800 references up to 1963 (39 pages), the book contains a wealth of information, and has a nice balance between theory and experiment. However, because of the reference in the text to so many papers, in parts the discussion on some papers must of necessity be cursory in order to limit the size of the monograph to 402 pages.

I consider that this book would be an ideal introductory text for a student about to embark on a research project within the stated contents. With the help of the detailed list of references, he would quickly expand his knowledge on his chosen topic. For the more seasoned research work-

er, working in a narrow field within the content of the book, it will serve to enlarge and coordinate his knowledge in associated fields. Again, the book is a most useful handbook in this field, the more so because of its detailed contents list.

One or two small points need to be mentioned. The author has decided to use wolfram in the text for tungsten. This has naturally led to some difficulties where results of other authors are quoted in diagrams, for example, pages 8, 60, 64. These are understandable, but on pages 269, 272 and 274 the word tungsten appears in the text, tungsten in the diagram, and wolfram in the caption. One or two spelling mistakes have crept in, for example page 17, "work function", and page 32, "occurrence" have been misspelt.

The book is well bound, nicely printed, and has clear though small diagrams, and represents good value at the published price.

The reviewer, who is reader in physics at the University of Keele in England, is particularly interested in the secondary ionization processes that occur in the electrical breakdown of gases at low pressures, and the influence of the work function of cathode surface on the emission processes at the cathode. He has published several papers on these topics.

A playground for the new elite?

SCIENCE: U. S. A. By William Gilman. 499 pp. Viking Press, New York, 1965. \$7.95.

by Robert L. Weber

The author of this book has been an analytical chemist, associate editor of *Popular Science*, and designer of the course in science writing at Columbia University. Mr. Gilman says he visited 126 laboratories from Maine to California in preparation for writing *Science: U. S. A.* The reader may well marvel at the broad scope of the book, the author's apparent total recall of conversations and documents, and his flair for presenting the complex interactions of science, business, and government.

Perhaps even better than the preface, the final two paragraphs in the book indicate the author's purpose in writing it. A reader would do well to start with these paragraphs before setting out through the book's maze of data, opinions, politics, personalities and dilemmas: "Consider our discontent with the usurping picture of today's science—the unhealthy corpulence stumbling under its overload of incompetents, pred-

ators, presumptuous politicians, pursuers of the bitch goddess; the recklessness, arrogance, and petulant demands of a self-anointed aristocracy; the social irresponsibility for which it is damned twice over: for the things it does and the things it fails to do. What can be set in the opposing column? Simply refusal to allow the pursuit of knowledge to degenerate into this. Science can change again, and this need not be forced by rough hands. Science can still turn to its responsible men who believe that the best of controls is self-control, and to its wise counselors for the young whose minds are still bright with curiosity."

The table of contents shows that part I of *Science: U. S. A.* is concerned with the state of the establishment, part II with the state of the art. In 15 chapters there is presented a view of today's laboratories, the new elite, genetics, drugs, automation, the military and peaceful atom, the "new" physicists, the "practical" chemists, and a warning about choices that will soon have to be made on how to spend lives and dollars among the attractive, competing paths open to science. The reader is not strongly aware of the structure of the book, for its style suggests conversation and free association.

Of particular interest to scientist and taxpayer should be Gilman's contrast of tax-paying and tax-exempt research and development corporations including such names as Aerospace, Arthur D. Little, Bell, Cornell, General Electric, IBM, Jackson, Lincoln, Mitre, Sandia, etc. Comments are offered on a range of controversial topics: President Eisenhower's warning against "acquisition of unwarranted influence . . . by the military-industrial complex," Mohole ("Mo-Ho-Ho and a Barrel of Funds"), Dr. Oppenheimer, MURA, Project Ozma, etc. On page 316 we are told that the government owned 512 lie-detecting machines (computers) that cost \$428 000 and that the annual salaries of their operators came to \$4 million. The significance of that, and some of the other figures offered, is not obvious.

In places, the writing tends to be

flowery. The spectrograph is the "queen of scientific instruments," the electron microscope is the "young king," . . . the second law of thermodynamics is Thanatos. Some statements are puzzling: "Though the average statistician cannot be held responsible for the announcement that 50 per cent of the nation's schoolchildren are below average, he cannot escape blame for leveling creativity down to an average mediocrity." How? A few statements are misleading: "E. O. Lawrence invented his cyclotron at Berkeley" (p. 124), or a suggestion for a bomb to be "dropped" from a space-platform satellite (p. 366). Some criticism seems pointless. Twice Gilman berates Yale for having "disdained" and "expelled" its center of alcohol studies (p. 109, 111), apparently ignoring the university's stated academic policies applicable in this change. A little farther on (p. 205) Yale appears in an odd comparison: "Counting one suicide every twenty-six minutes, the mental health people triumphantly name suicide as America's ninth (and Yale's second) 'most preventable fatal sickness'".

While a reader may take exception to individual statements he will welcome Gilman's book if he believes, as Gilman does, that (1) the powers given science carry responsibility, and (2) the money poured into science carries obligations—it must not build merely a playground for the new elite.

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The reviewer is professor of physics at The Pennsylvania State University.

A practitioner's handbook

FORMULAS FOR STRESS AND STRAIN (4th ed.). By Raymond J. Roark, 432 pp. McGraw-Hill, New York, 1965, \$12.50.

by Jacques E. Romain

Professor Roark, emeritus professor of mechanics at the University of Wisconsin, has gained a wide experience in stress analysis and design in the course of some forty years of consulting work. He felt the need for a handbook of stress and strain design form-

ulas, in which the design engineers would find, in a compact form, data that are otherwise scattered in an extensive literature. This concern was the origin of the present book, whose first edition goes back to 1938.

This is no textbook. The sole emphasis is on the extreme values needed by the design engineer (critical stresses and deflections in structures). The description of stress distributions (e.g., isostatics patterns) is outside the scope of the book. No derivation is given, but numerous bibliographic references are mentioned for the benefit of the reader who requires additional or more detailed information on a given problem.

An introductory part (amounting to some 70 pages) contains a glossary and a list of general symbols (the particular notations are indicated at the head of each table) and a brief statement of the essential facts of materials behavior under stress, of the main principles of mechanics likely to be useful in applying the formulas, and of experimental methods in stress analysis.

Two general purpose chapters contain formulas on geometrical properties of a plane area and on the general relationships between stresses and strains in a material element. The bulk of the book consists of formulas (mostly in tabular form) on the following classified topics: beams in flexure, torsion, flat plates, columns and other compression members, pressure vessels and pipes, bodies under direct bearing and shear stress, elastic stability (buckling), dynamic and temperature stresses. In each section, in addition to the typical case, a variety of special cases is considered, representing peculiarities of form, proportions and conditions of loading. The book is concluded with miscellaneous tables of design factors and of properties of materials. A detailed subject index will help the reader to retrieve a specific piece of information.

As compared to the previous editions, this revised fourth edition contains new material on such subjects as: allowable stress and factor of safety, fatigue, simultaneous axial and transverse loading, plastic analysis and mechanical vibrations (table of proper frequencies for a number of