and abnormal cases in a center where such cases have already been collected and classified. An equivalent training will require 5 or 10 years if the beginner tries to collect the requisite normative and pathological data for himself. He will certainly encumber and embarrass himself if he places major reliance on any type of electromechanical frequency analyzer.

It should not be concluded from these remarks that electromechanical analysis of the EEG is altogether unprofitable. For special purposes and under limited conditions quantification of certain aspects of the EEG is desirable. New types of electromechanical analyzer will doubtless be developed which will be as useful or possibly more so than the one which we have employed or the one devised by Walter. However, experience has shown that in electroencephalography great significance attaches to transient wave forms, wave patterns, and differences in phase relations between leads; for the analysis of this type of data even a supermachine is defective as compared with a trained eye and mind.

Addendum: Since the completion of this manuscript two monographs on frequency analysis of the EEG have been received from France. The first, by Bertrand and Lacape (*1*), discusses the advantages of graphic Fourier analysis. The second, by Drohocki (*6*), deals with the electrical activity of the cortex as reviewed through band-pass frequency filters of the type originally used by Loomis, *et al.* (*3, 10*). Nothing in these reports requires a modification of the point of view expressed in the present article. Both are valuable contributions but do not consider the limitations of the method employed, nor does either give sufficient credit to the resolving power of the human eye and intellect.

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Book Reviews

Science, liberty and peace. Aldous Huxley. New York-London: Harper, 1946. Pp. 86. $1.00.

In the second half of the 18th Century and throughout the 19th, many scientists and political philosophers believed that liberty and peace were so linked to science that they must always advance with it. This belief has become constantly harder to hold as the succeeding years have shown a great advance of science with little gain for liberty and less for peace. In the opinion more often expressed today, science is a powerful but morally indifferent engine, which can be used as well to enslave men as to make them free, to kill as to make alive.

This is the opinion of Mr. Huxley in the book here reviewed. But he adds a further and more somber judgment, that the social system under which scientific research began in Europe and, even more, the conditions the world over in which it is practiced today imposed and still impose a tremendous bias toward the use of science for oppression and war.

The book begins with a quotation from Tolstoy: "If the arrangement of society is bad (as ours is) and a small number of people have power over the majority and oppress it, every victory over Nature will inevitably serve only to increase that power and that oppression. This is what is actually happening," to which the author adds: "On many fronts Nature has been conquered; but, as Tolstoy foresaw, man and his liberties have sustained a succession of defeats." To account for this, he says that in the early years of modern science economic power was already maldistributed. Those who held the greater share of it naturally employed inventors and technologists to apply scientific discoveries in a way to increase their profits and their power. In this way the methods of mass production were improved and those of small production neglected. Consequently, mass production now has an advantage, partly inherent, partly artificial, but able in either case to consolidate more and more power in fewer and fewer hands. Unemployment is both a result and a secondary cause of this concentration. There is now, as there was in the precarious days between the fall of Rome and the rise of feudalism, "a general wish to exchange freedom for protection, independence for guaranteed subsistence in the service of the holders of great power."

Whether this power is held by a ring of financiers or an oligarchy professing socialism is, in the author's view, beside the main point, because the excesses of power will in time mold all oligarchies to a common likeness. And because the craving for power is never satisfied, every such power group will be menaced by every other, and, when it controls the state, it must maintain an armed society. In this its social resources are a hypertrophied industry and fluid labor force, in which both machine parts and people are interchangeable, so that the industry may be quickly converted to the making of munitions and the people readily conscripted and subjected to the mass propaganda of state-worship, an idolatry with practices as revolting as the worship of Moloch.

"The existence of powerful armaments constitutes for their possessors a standing temptation to resort to violence .... And so long as governments and manufacturers continue to subsidize research into the science and technology of armaments, these temptations will remain...."

Even the fascination of power over the inanimate forces of Nature has, in Mr. Huxley's opinion, contributed to the world's trouble, by leading people to mistake for final reality the restricted aspects of experience, by the study of which scientists have shown how to attain this power. Where scientists, properly for their own purposes, have ignored a part of experience, general opinion has gone farther and denied its existence altogether. This has led to what Mr. Huxley calls "nothing-but" thinking: that "values are nothing but illusions that have somehow got themselves mixed up with our experience of the world; mental happenings are nothing but epiphenomena, produced by and entirely dependent upon physiology; spirituality is nothing but wish fulfillment and misdirected sex." So human values have been debased and the moral forces which might oppose the encroachment of power have been, by this much, weakened.

The author hopes that scientific people will give more care than they have given to the consequences of their work and that inventors and engineers will consciously devote their efforts to those applications of science which favor liberty and peace. Specifically, he hopes for more technical aid to small producers and cooperative enterprises and for research in applied science designed to relieve the economic tensions which menace international peace.

R. T. Cox

The Johns Hopkins University, Baltimore

Butalastic polymers: their preparation and applications. A treatise on synthetic rubbers. Frederick Marchionna. New York: Reinhold, 1946. Pp. vii + 642. (Illustrated.) $8.50.

Those familiar with the author's three-volume treatise, *Latex and rubber derivatives and their industrial applications*, are likely to be predisposed favorably to any publication in the field of rubber coming from his pen. The present volume is disappointing despite the worthy objectives which the author has set for himself (pp. 7, 8) and the pleasing arrangement of subject matter in certain chapters, notably Chapters 1, "Historical"; 2, "Butadiene and Its Homologues"; 3, "Halobutadiene Preparation"; 9, "Photochemical Polymerization"; 10, "Polymerization of Haloprene"; 15, "Plastic and Fluid Butalastic Compositions"; and 16, "Filming, Extruding, Coating and Laminating." The skillful rewriting of the patent literature into a volume of ready reference is undoubtedly useful, but this volume is noncritical in that it gives no adequate indication of the relative importance of synthetic rubbers, particularly those which have achieved paramount commercial importance during the present decade.

The book is organized into three major sections apart from an introduction and a brief historical review: Part I, dealing with the source and production of monomers; Part II, with polymerization mechanisms and processes; and Part III, with the properties, processing, compounding, vulcanization, and uses of *butalastics*.

The author chose the term "butalastics" at the suggestion of Ernst A. Hauser, a choice that met the approval of Gustav Egloff. With this concurrence on the part of specialists in the fields of latex and petroleum, respectively, the die was cast, and future readers of this book will have to struggle with a completely artificial nomenclature woven inextricably throughout the text. The use of terms such as "butalastics-1" for polymers of butadiene or its homologues, "butalastics E" for butyl rubber, "butalastics-3" rather than terpolymers containing one or more butadiene homologues, and "butalastics V" rather than butadiene-vinyl copolymers and homologues, seems confusing and complicated and omits or conceals the familiar names which have achieved wide commercial acceptance.

The reviewer was surprised both to find no mention of GR-S, the Government's styrene copolymer, which for many years has been the mainstay of the whole United Nations' rubber industry, the production of which has exceeded 2,000,000 tons, and to read (p. 8): "The author however, is of the opinion that no matter how good and useful these butalastics are and will be, and how much superior they may be to the natural product in several respects, they will never replace natural rubber in the production of tires which have absorbed for many years more than 68 per cent of the world's production of crude rubber." The facts are that, starting about 1944, 98 per cent of the rubber used in passenger tires was GR-S, and until recently at least 80 per cent of all of the rubber used in the industry has been synthetic.

The literature sources cited include no references subsequent to 1943, and many early patents in the field purportedly covered are omitted.

A United States patent list and three indexes (author, catalysts of polymerizations, and subjects) covering 43 pages have been provided, but the author index does not include all of the authors cited in the text. The subject index is extensive and, with experience, can be used effectively.

Despite the many miscellaneous and interesting items which have been brought together in associations which will provoke reflection and reference to the sources cited, "There are more things in heaven and earth, Horatio, than are dreamt of in your philosophy."

H.L. Trumbull

The B. F. Goodrich Company, Akron, Ohio

The production of tobacco. Wightman W. Garner. Philadelphia-Toronto: Blakiston, 1946. Pp. xiii + 516. (Illustrated.) $4.50.

This book is of world-wide interest and importance not only because tobacco is so extensively used and cultivated but also because of the place it occupies in world trade. The importance of tobacco becomes apparent if it is realized that the aggregate annual production of this crop is about 6,500,000,000 pounds, only about one-quarter of which is grown within the United States.

Since general treatises are available on essentially all other important crops, one may properly inquire why a comprehensive account on tobacco production has previously been lacking. That no one else except Dr. Garner has been qualified to write such a book constitutes the all-sufficient reason. This volume is the product of about 40 years of field and laboratory research and experience. It is truly a monument to the author's broad acquaintance with all phases of the industry, to his incisive scientific judgment, to his painstaking