the effects of drugs thereon. The electrophysiologic presentations are particularly rewarding. These describe the effects of neurohormones and of various types of psychotropic drugs on electrical activities in various parts of the brain and attempt to relate these activities to normal and abnormal behavior.

The pharmacological papers accent the complexity of the pattern of effects elicited by psychotropic drugs. What makes these papers of particular value are attempts to relate pharmacological effects of the drugs to their effects on brain electrical activity and on behavior.

The clinical and psychiatric papers indicate the difficulty of determining the merit of drugs in the treatment of mental illness. Yet they leave the impression that certain of the "tranquilizing" agents are of definite aid in treating the symptoms, though not the basic defects, of mental illness.

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The Bacteriology of Tuberculosis. Egons Darzins. University of Minnesota Press, Minneapolis, 1958. xi + 488 pp. Illus. $10.

The effective treatment of tuberculosis with antimicrobial agents has led to the popular belief that this disease has been conquered. While great strides have been made in decreasing mortality (but probably not morbidity), many unsolved bacteriological problems still remain, and new ones have arisen. The purpose of this book is threefold: (i) to list in historical perspective the advances made toward the understanding of the tubercle bacillus; (ii) to present areas where further knowledge is needed; and (iii) to describe the newer experimental methods for the study of tubercle bacilli.

Basic theories and methods of general microbiology and specific problems pertaining to mycobacteria are described. Tubercle bacilli are discussed under the general headings of "Morphology and cytology," "Sources of energy and growth," "Isolation and identification," "Types and pathogenicity," and "Experimenting." In not all instances, however, are concepts and factual data accurately analyzed and presented. For example, the discussion of L forms of bacteria, on page 71, is misleading, and the tabulation of albumin as a nitrogen source for the metabolism of tubercle bacilli, on page 241, is incorrect. Nevertheless, an extensive subject index and a very comprehensive bibliography provide excellent access to the available literature.

A large section devoted to experimentation with the tubercle bacillus will be of value to the bacteriologist unfamiliar with the special techniques and precautions required in the laboratory.

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The Principles of Semantics. Stephen Ullmann. Philosophical Library, New York, ed. 2, 1957. 346 pp. $10.

This book is essentially a reprinting of the first edition with a supplement on recent developments in semantics and an expanded bibliography. For Ullmann, semantics is the scientific study of meaning, and meaning is the relation between name and sense, or, as some might prefer to put it, between sign and *designatum.*

Ullmann has described a variety of approaches to questions of change in meaning, semantic laws, homonymy and so on, and in the added chapter he correctly indicates that the most important new problem is that of whether a structural semantics is possible. A meaningful answer must be based on some explicit definitions of the terms *semantics* and *structure.*

A related and, in a sense, logically prior question is whether any semantic notions are essential, or indeed relevant to the syntactics—that is, the purely formal aspects of grammar, consisting of signs and of rules for their combination. If the two are not separable (and this seems to be Ullmann's view), then there is little point in discussing a structural semantics as distinct from a structural syntactics. If they are separable, then whether or not a structural semantics is possible obviously depends on what is meant by structure.

Structural is equated by some with *scientific.* If, as Ullmann suggests, semantics is the scientific study of meaning, then a structural semantics is possible by definition. However, there are some who are not convinced that meaning can be approached scientifically at all. Ullmann asserts that such a discipline exists but nowhere demonstrates that the meaning of a form is anything but an intuitive notion.

One not uncommon use of *structural* is as a synonym for *syntactical.* That is, the rules for the combination of signs are the structure of a language. In accordance with such a usage, structural semantics would seem to be a contradiction in terms.

Some students of language make a dichotomy between the structural elements (by which they mean inflectional endings like the plural *s* and the past tense *ed*) and the *lexical* elements, like *book, run,* and so on. From this point of view a structural semantics would presumably be the study of the meanings of these elements; such a study is not only possible but traditional in many schools of linguistics.

Ullmann quotes some linguists who use *structure* to mean symmetry or patterning and therefore make statements about certain systems or parts of systems being more highly structured than others. This would reduce the problem to the rather trivial question of how much symmetry one can discover (or impose) on the meanings of forms.

Other linguists have mistakenly used *structural* as equivalent to descriptive (as opposed to historical) studies. This is unfortunate, since surely one of the contributions of modern linguistics is to indicate how changes in language may be more clearly understood through a comprehension of the relationships of units to one another at any given time.

Now, if structure is used to express the notion that abstract units are defined in terms of hierarchical relationships to one another, as well as the fact that these relationships recur, then the conscious investigation and systematic description of these features in the area of semantics will be a discipline of increasing interest and importance.

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Toeplitz Forms and Their Applications. Ulf Grenander and Gabor Szego. University of California Press, Berkeley, 1958. vii + 245 pp. $6.

The study of spectral properties of matrices

$$[(C_{i,j})] = [(C_{i-j})],\ C_p = \overline{C}_{-p},\ 1 \leq i, j \leq n,$$

in the limit $n \to \infty$ has received considerable attention in the mathematical literature since the early days of this century.

More recently, analogous studies of integral equations of the form

$$\int_0^T K(x-y)\psi(y)\,dy = \lambda\psi(x),$$

$K(x) = \overline{K}(-x)$, in the limit $T \to \infty$, were also undertaken.

The present volume is an excellent and virtually complete summary of the work done on these and related problems up to 1955.

Toeplitz matrices and translation kernels occur in a wide variety of branches of pure and applied mathematics, ranging from the theory of analytic functions to crystal statistics and the theory of random noise. To present such wealth of material in the limited space of 240 small pages is a feat in itself. To do it