ing types" showing either unidirectional or bidirectional incompatibility; that is, the hybrids are inviable in one or both reciprocal crosses. Laven has shown the incompatibility to depend on the interaction of the cytoplasm of one with the chromosomes of the different crossing types. The causes of this phenomenon are obscure; Laven rejects as improbable the hypothesis that the properties of the cytoplasmic races may be determined by virus-like or other symbionts, but the alternative suggested by him seems no more probable.

Houseflies have also yielded interesting data, which are reviewed by R. Milani and G. Saccà. Milani's article gives a list of some 130 mutants observed in *Musca domestica,* linkage maps of its chromosomes, and data on the sharp decline of fertility that results from inbreeding. Most interesting, but still puzzling, are the observations reviewed by Saccà on the forms of the housefly, which have been variously considered separate species, subspecies, or just individual variations, and given the names *Musca domestica, vicina, nebulo, calleva,* and *curviforceps*. The first three seem to be in part phenotypic modifications induced by the environment. However, this is not the whole story; it is possible by artificial selection to obtain strains showing all these phenotypes in the same environment; strains of different geographic origins retain their different characteristics when bred in the laboratory for several generations, and converge and become similar only gradually. The other two forms, *calleva* and *curviforceps,* are restricted to Africa, and occur usually in different habitats. They produce fertile hybrids in laboratory experiments and apparently also in nature, but for some reason the gene exchange does not cause their populations to merge into a single one. More work on this is obviously needed.

The chapter by A. Spielman and J. B. Kitzmiller ably summarizes a mass of data on population genetics, and there are comparable summaries in chapters by H. A. Bender and R. E. Gaensslen on physiological genetics and by A. W. A. Brown on the genetics of insecticide resistance in many insect species studied in these respects. Theoretical and practical problems of control of populations of injurious insects by genetic methods are discussed in the three chapters of E. F. Knipling, L. E. LaChance, and C. N. Smith. The principle on which these methods are being developed is induction of enough genetic damage in the insect populations to make them decrease in size or even become extinct. One possible technique is to release in the natural habitats of a population numbers of artificially reared and sterilized individuals sufficient to have a significant impact on the reproductive potential of that population. Another possibility is induction of sterility in a large enough fraction of the individuals in the natural population itself. The sterilized individuals then compete for mates with the remaining fertile ones. Genetic control has been proven effective against some species of insect pests, but how wide its applicability may eventually be remains to be seen.

In sum, the book under review is clearly indispensable to medical entomologists, and is a mine of interesting information for other entomologists, geneticists, and evolutionists.

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Looking for Drugs That Affect Behavior

Ethnopharmacologic Search for Psychoactive Drugs. Proceedings of a symposium, San Francisco, Jan. 1967. DANIEL H. EFRON, BO HOLMSTEDT, and NATHAN S. KLINE, Eds. National Institute of Mental Health, Chevy Chase, Md., 1967 (available from Superintendent of Documents, Washington, D.C.). xxiv + 468 pp., illus. $4.

One of the uses of symposia is to expose people to types of scholarly endeavor they would ordinarily miss or actively avoid. Attendants at the symposium sponsored by the Psychopharmacology Research Branch of NIMH in January 1967 were treated to historical research, anthropological research, botanical research, chemical research, and pharmacological research. In this proceedings volume there are title pages of old books, pictures of snuff pipes and of a never-before-photographed Amazonian tribe, pictures of plants, mass spectrograms, dose-effect curves, and a few words on the history of medicine in San Francisco. Surely there was for everyone in the audience and is for all readers of the volume something of a kind they would otherwise skip.

When so diverse a group of contributors is assembled, it is important for its members to remember that its audience will be at least as diverse. In any field, most of the audience can hope to get only a glimmering of the nature of the information and the gist of the argument supporting a thesis. The definitive proof rightly demanded by specialists is for technical papers in specialty journals. To attempt too much in a symposium contribution is not to enlighten but to bore. Picking, invidiously, a single example from the present volume where this was forgotten I offer the 19 pages of gas chromatograms, mass spectograms, and captions which document the presence of indole alkaloids in South American plants.

By far the most disappointing aspect of the book is the paucity of information on the actual behavioral effects of the putative psychoactive compounds. Although D. X. Freedman gives an excellent account of the psychopharmacology (as distinct from the behavioral pharmacology) of LSD, and P. G. Waser presents his results on muscimol, and there is some information on behavioral effects of Kava, nutmeg, and some indoles, these all add up to a small part of the volume. One cannot criticize the organizers and contributors for not including information that does not exist. Yet a symposium such as this should draw attention to aspects of its topic in which ignorance is greatest and the need for more work most urgent.

The unbiased reader finishes several of the chapters wondering whether the drugs discussed really did anything to the subjects other than perhaps cause nausea or comparable malaise. Subjective descriptions and accounts of self-administration are not going to fool a scientist into believing he knows anything about the effects of a drug. No serious analysis of the behavioral effects in animals of any of the drugs referred to in the book has been attempted, and no contributor or editor seems to lament the fact. Presumably the attitude is that studying a psychoactive drug in a monkey is rather more difficult than studying it in an illiterate deaf-mute, so why work with monkeys when literate and verbal subjects are available? But all literate and verbal subjects have had a long, uncontrolled, largely unknown, and very powerful cultural training before they became subjects for drug experiments. The manifest effect of a drug is, as it were, the reflection of its direct action by an irregular mirror whose contours are determined by past or present circumstances. The distortions

may be so gross that even lactose can project a substantial image. Animals, on the other hand, can be subjected to a long and precise training so that the salient features of the situation when the drug is given can be known. In terms of the mirror analogy, the effects of the drug are seen in a mirror whose contours can be mapped and sources of distortion identified. Knowledge of the effects of the drug in such favorable circumstances will make it possible to devise experiments in human subjects that will minimize, or permit identification of, the distortions due to individual characteristics.

It is not that one does not need to study man; it is that studies in man require background information that can be permissibly obtained only in animals. To study only man is to ensure that psychopharmacology will progress mainly in the number of new drugs of whose effects we are largely ignorant, while for the older drugs we remain unable to improve on the descriptions of Shakespeare, De Quincey, and Huxley.

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Compendium

Handbook of Physics. E. U. CONDON and HUGH ODISHAW, Eds. Second edition. McGraw-Hill, New York, 1967. xxxii + 1626 pp., illus. $32.50.

Let us be clear what this book is: 93 chapters designed to cover almost every topic of physics. If you like, here is the poor (but not insolvent) man's one-volume condensation of the immense *Encyclopedia of Physics*. It bears testimony to the great effort put forth by the editors—especially Condon—in attempting to collect at once all that is meaningful in physics. About such compendia, we may ask: (i) Are such things useful, and in what way are they useful? (ii) Is this one useful?

Questioning usefulness categorically is a delicate matter. What do I read such handbooks for? Usually, it is not for anything in my own area of expertise—plasma physics—because I have more material in my mind or at hand, organized to suit. Usually, it is not in areas where I wish to gain additional real working knowledge—vacuum technique, or electronic circuits, for instance —because I discover that I would learn that way some dangerously obsolete arts. Rather, I should consult my colleagues, or do some work in the library. Usually, it is not in completely strange areas, because there is more news in a handbook than I can stand. Yet a handbook is useful: sometimes for numbers, if I have some feel for what is there; sometimes for basic ideas, even if I know that I must go elsewhere to be up to date; but mostly to give me some feel for what the topic is all about, in an interesting way, without committing me either to being an expert or to an institution. For example, in this handbook there is a delightful new chapter on glass. Surely it contains much less archival information than the old one in the first edition, and would be held in derision by some; but for me it is just right. All too often these real requirements of such a book—which differ from those of a text, or a review article—are not understood by contributing authors.

How does Condon and Odishaw fare, now revised, now ten years after publication of the first edition? I count 25 chapters totally unchanged, 29 slightly changed, 15 substantially so, and 24 fully modified or rewritten. Too many are unrevised. It must always be so in a book such as this, for original authors cannot or will not take on the unlively task of rewriting their old work; and others cannot be found to do the rewriting. Thus, in spite of Job's wish (19:23,24), the wisdom of an age dies in its original form, and to be most useful must rise quite anew.

All this is to say that the magnificent collection is starting to show its age, and hence to lose its value, in spite of the revisions. Some of the presumably more stable areas are well revised—for example, mathematical topics and nuclear physics. But many really fast-changing areas are out of date: mechanical control mechanisms; fluid mechanics, including waves therein; and so forth. Where are to be found modern electronics or transistor circuits, signal-to-noise concepts that are so important in many physics experiments, enough on fuel cells, new vacuum techniques, high-intensity optical sources, lasers, image reconstruction, recent applications for x-ray techniques? Nevertheless, these represent a minority of the topics, and the book is valuable for several years yet as a reference.

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Luminescence of Biopolymers

Fluorescence and Phosphorescence of Proteins and Nucleic Acids. SERGEI V. KONEV. Translated from the Russian edition (Minsk, 1965). Sidney Udenfriend, Translation Ed. Plenum, New York, 1967. x + 204 pp., illus. $9.50.

During the last ten years the continuing progress in optics and electronics has made it possible to study the fluorescence and phosphorescence of proteins and nucleic acids with increasing accuracy and with better spectral resolution. With the improved knowledge of the structure of macromolecules these spectroscopic methods have come into their own, for they provide some of the most sensitive and refined techniques that we possess for the observation of these molecules in solution. A book containing an exposition of the spectroscopic foundations and a critical survey of the vast and often unreliable experimental material is greatly to be desired.

Konev's book is a summary of the contributions of the Russian school to this topic, together with less emphatic consideration of the work done outside the Soviet Union. The first 50 pages, dealing with the excited states of tryptophan and tyrosine, provide a very good introduction to the subject. Unfortunately the succeeding chapters on fluorescence of proteins, energy migration, luminescence of nucleic acids, and luminescence of living tissues are of much smaller value. The author attempts to settle too many controversial matters on which a decision is not possible because of present-day technical shortcomings, to the detriment of honest exposition of the experimental material and its physical fundamentals. Very little is made of the heterogeneous origin of the fluorescence of proteins, which necessitates detailed consideration of each particular case on its own merits. Konev prefers to rely on easy and often erroneous generalizations. Thus by a demonstration of the constancy of the fluorescence spectrum of chymotrypsinogen with exciting wavelengths (p. 70 and fig. 28) he purports to show that in proteins containing tryptophan and tyrosine the fluorescence of the latter is not detectable. This general conclusion is contradicted —as it should be—when by the very same method the fluorescence of tyrosine is demonstrated in human serum albumin (p. 98 and fig. 34).

In general each succeeding chapter