

its weak points, it presents reviews on virtually all aspects of nuclear structure and function research. The fact that the material that appears in these three volumes is normally scattered through a variety of sources argues persuasively for the value of the work.

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## Chemical Communication

**Pheromones.** MARTIN C. BIRCH, Ed. North-Holland, Amsterdam, and Elsevier, New York, 1974. xii, 496 pp., illus. \$42.30. *Frontiers of Biology*, vol. 32.

In 1959, P. Karlson and M. Lüscher proposed the new term "pheromone" to replace and redefine the rather wide concept "ektohormone" of A. Bethe (1932). In their definition "Pheromones are substances which are secreted to the outside by an individual and are received by a second individual of the same species in which they release a specific reaction, for example, a definite behavior or developmental process." Some later authors found the term etymologically incorrect or too narrow, but on the whole it was accepted, not least because research on these substances was starting to flourish on a scale unknown a few years before. The main driving force behind pheromone research in insects was without doubt the expectation that these miraculously effective secretions would be a panacea to overcome the silent-spring effect of an often crude use of insecticides. The other animal groups in which pheromones have been intensively studied are the rodents, some primates, and a few other mammals. Here, pheromones have been found to regulate social life and reproduction.

The present state of pheromone biology is well demonstrated in this book: With insects we know comparatively many pheromones chemically but nearly nothing of their biosynthesis, have some information on the receptor mechanism, are ignorant of the central information processing, and know little of the details of the behavioral effects. With the mammals we know something of the behavior, very little of the pheromone composition, and nearly nothing of the biosynthesis, receptive mechanism, and central processing. Pheromone studies of other animal groups

are few in spite of the reasonable assumption that most animals use the very basic means of chemical communication by pheromones.

The aim of Birch and his 28 co-authors is to present our knowledge of pheromone biology, which has not been well covered in some of the recent books and reviews that have emphasized the chemistry of pheromones. In section 1 of the book, 12 chapters deal with insect pheromone systems, from gland structure and pheromone production to the still-confusing multitude of pheromones and pheromone effects in social insects such as the honeybee. Section 2 treats the vertebrates. A chapter on fright and alarm pheromone responses in fish and amphibians is followed by four chapters on the rodents, one on the primates, and one on the "likelihood of human pheromones" (a reprint of A. Comfort's challenging and stimulating essay first published in *Nature* in 1971). The third and final section, Pheromones in Manipulation of Populations, is a concise treatment of problems of the use of pheromones in the control of agricultural and forest pests. Except in some special cases, the chances of effectively suppressing a pest population by the use of pheromones alone are dim, but the probability of success becomes much greater when pheromones are used as one of several factors in an integrated control program. On the other hand, survey of the development of a pest population, and thus proper timing of a necessary minimum dose of an insecticide, has already been found to be possible.

Birch and his colleagues have written a very useful book. The only major omission is a much-needed overview of the many known or suggested pheromone effects in organisms other than insects and vertebrates, beginning with bacteria, algae, and plant spermatozooids. For a multiauthor book, there is surprisingly little overlap or redundancy. Any investigator who deals with the pheromones will without doubt welcome this book, for it fills a gap in the literature. Pest control agents and perhaps some narrow-minded scientists who for one reason or another press prematurely for a quick and simple biological recipe against pests should try to understand its message: signal production and signal processing in biological systems involve a number of functions. In parallel to biochemical and biophysical research, an analysis of central processing and the details of

behavior is badly needed. For this patient observations and quantitative and analytical studies must be performed. It seems to be difficult to make the trivial fact understood that the study of animal behavior is not a simple branch of biology. This is particularly true with respect to the mammals, whose pheromone reactions are by far less uniform than those in many insects.

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## Polymer Chemistry

**Kinetics and Mechanisms of Polymerization Reactions.** Applications of Physicochemical Principles. P. E. M. ALLEN and C. R. PATRICK. Ellis Horwood, Chichester, England, and Halsted (Wiley), New York, 1974. xvi, 596 pp., illus. \$43.50. Ellis Horwood Series in Physical Chemistry.

The title of this book has already been used, in one form or another, for a fairly large number of books dealing with polymerization chemistry, and it may therefore come as a surprise to the reader to find that this is not "just another book" on this topic. The subtitle more aptly characterizes the book, which is an advanced and sophisticated physicochemical treatment of polymerization reactions. It is apparently intended for the specialist. In this respect, it is almost unique, the only predecessor that comes to mind being Flory's well-known earlier treatise.

The special character of this book is at once apparent from the way in which it is organized. The first two chapters do not deal with polymerization reactions as such, but they review the general physicochemical principles that govern reactions in the gaseous and liquid states, including some references to their applications to macromolecules. The chapters cover such topics as the thermodynamic and kinetic approaches, diffusion, equilibria, and reaction rate theories. They occupy about one-third of the book.

The remaining five chapters deal specifically with polymerization reactions, including such topics as the nature of these chain reactions, the thermodynamics of chain reactions, reactivity theories, and kinetics. There is also a short chapter on the kinetics of polycondensation reactions. Both free radical and ionic mechanisms are treated

in the discussion of chain addition polymerization. The authors manage to cover a surprising amount of territory in a relatively modest space and succeed in bringing the reader up to date on most subjects.

The book appears to cover the main principles required for understanding polymerization reactions. It is valuable to the serious research worker, less as a compendium of work done than as a guide to the handling and study of polymerization reactions. There is an ample supply of the former but too few of the latter, so this book should fill a real need.

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## Urban Time Allocation

**Human Activity Patterns in the City.** Things People Do in Time and Space. F. STUART CHAPIN, JR. Wiley-Interscience, New York, 1974. xxiv, 272 pp., illus. \$12.50. Wiley Series in Urban Research.

Analysis of the spatial distribution of social populations and activities has been a revealing approach to understanding urban growth and the organization of modern societies. The study of the temporal distribution of individuals and their activities has had almost an equally long history, but it has not attracted the same volume of research and has remained somewhat isolated from the central problems of urban sociology.

Chapin's *Human Activity Patterns in the City* attempts to integrate the temporal and spatial distribution of individual activities in order to enrich our understanding of urban life. The author hopes to provide a better understanding of different urban subgroups and to suggest more effective ways to deliver public services to these groups. The early chapters in this book dwell on these good intentions and are among the least effective in it. The key theoretical orientation is that individual activities are heavily restricted by a series of constraints imposed by an individual's work, sex role, child-rearing obligations, and bodily health, but that most people retain some discretionary time that they can allocate according to their personal concern with status, their career ambitions, their desire for neighborhood safety,

and their attachment to public welfare or "degree of alienation." This idea is scarcely new, and, while it is not "wrong," it does little to integrate studies of the spatial and temporal allocation of activities in urban areas. The discussion is not improved by a rather mechanical effort to combine a Meadian social psychological approach with a Skinnerian behaviorist approach.

The real contribution of this study is the data it makes available and some of the rather surprising findings it documents. It would appear that Americans differ very little in the way they allocate their time except as they differ in statuses such as age, sex, employment, or education that are not related to membership in a particular urban subgroup. Sample surveys from the entire nation, from Washington, D.C., and from two subcommunities within the Washington Standard Metropolitan Statistical Area show pretty much the same findings. The gross differences found in time spent on 12 categories of activities (job, eating, shopping, family activities, and so forth) are expectable. Those employed full time have less discretionary time than those working fewer hours, women have slightly less discretionary time than men, and working women with young children have the least discretionary time of any grouping.

Drawing on the sample survey of Washington, the author presents a detailed comparison of the allocation of time among blacks and nonblacks as well as among various occupational and income groups. The differences between the time allocations of racial groups are usually small: blacks spend somewhat more time watching television and less time eating, shopping, socializing, participating with family, and in recreation. These differences may be attributable to differences in income and education.

The author then turns to a sample survey of two low-income subcommunities in Washington, one an inner-city black neighborhood and the other a white community near the District line. Some ethnographic descriptive material is presented, indicating that the inner-city black community is heavily preoccupied with the day-to-day problem of economic survival. The second neighborhood seems to be dominated by southern whites who are sometimes a little better off and are given to a pattern of radical individualism. Even

so, there are few major differences in how the residents in the two communities spend their time. Once income differences are controlled, whites spend more time eating, shopping, socializing, and in recreation, while blacks spend more time watching television, resting, and relaxing. A subsequent stepwise regression analysis shows that neither obligatory duties nor personal concerns have much effect on separate discretionary activities. As the author points out, this may be an artifact of his categories for identifying discretionary activities, since some groups, such as blacks, may merge many activities into the same time period, which would lead to underreporting.

The final chapter reviews the value of these findings for social planning and comes to the reasonable conclusion that their use is premature until more effective research is done on people's opportunities to engage in various activities. The author goes on to suggest the inclusion in future studies of a number of additional variables that might provide a fuller account of how social groups spend their time. In some ways this emphasis is unfortunate. It detracts from explaining the mass of information presented here and integrating it into our findings on urban spatial distribution. Actually, very little attention is given in this book to spatial distributions of activities, and this may be one reason the study ends on such a tentative and inconclusive note. Attention to past research would show that the spatial segregation of social groups and their activities is often very great. Judging from the rather small differences this study finds in the temporal distribution of activities within subgroups, one is led to the conclusion that the fragmentation of urban life results primarily from the spatial segregation of ethnic groups, income groups, and economic functions. The counterweight to this fragmentation is that members of various subgroups are involved in a common set of activities that help incorporate them into a mass society. Chapin's study documents this involvement in common activities but does not explore its implications. The book does provide a wealth of data that will help open discussions of such broad social issues.

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