

## BOOK REVIEWS

**Progress in the Chemistry of Organic Natural Products—Volume 35:** edited by W. HERZ, H. GRISEBACH and G. W. KIRBY. Springer, Vienna, 1978. 589 pp. DM 258.

Either by accident or design, the editors of this annual series have here produced a volume which will be of especial relevance to research workers in the phenolics field. Thus three of the five chapters are devoted to phenylpropanoids: to neolignans, cinnamic acid derivatives and coumarins. Nevertheless these three specialist reviews are balanced by two more general articles on 4-ylidenebutenolides (a cumbersome name to pronounce!), which have representatives among a variety of natural product classes, and on aroma components, where most of the compounds are terpenoids or simple aliphatic molecules. In general, the emphasis in this volume is strictly on organic chemistry (structure and synthesis), although biosynthetic origins are considered in most chapters and the organoleptic properties of organic molecules are particularly considered in the aroma chapter.

Neolignans are a relatively new class of natural product and are dimers formed from carbon-carbon coupling of propenylbenzene and/or allylbenzene precursors. Nearly all have either potential (methoxy) or actual phenolic hydroxyl substitution and some are valuable pharmacologically as antitumour agents. Already, some 120 structures have been isolated from 13 plant families and it is therefore highly appropriate that O. R. Gottlieb, who has himself described many of these compounds as new natural products, should present here a compre-

hensive review of their chemistry. The second phenylpropanoid chapter by K. Herrmann is also very timely, since so many new bound forms of hydroxycinnamic acids have been described over the last ten years. This review is thorough and complete, and includes data on the melting point and rotations of most compounds described. The main aim of the third phenylpropanoid chapter on natural plant coumarins by R. D. H. Murray is to provide an up-to-date listing of the 502 known structures and this occupies some 11 tables and nearly 200 pages of text. Useful cross references are also available in terms of formulae and trivial name indexes. The need for such listing is only too apparent in the duplication of trivial names for a number of structures, where workers have isolated apparently 'new' compounds without realising that the same new compound has been described earlier. Some of the duplicate names, however, are also due to simultaneous discoveries being made in the same year from different sources by different workers. This excellent and accurate review will provide an essential checklist for anyone reporting a new coumarin from natural sources in the future.

In summary, this volume once again has achieved its avowed purpose of providing timely reviews of new and expanding areas of natural product investigation. It is impeccably produced and exhaustively indexed and should be widely available in libraries.

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Phytochemistry, 1979, Vol. 18, pp. 707–708. Pergamon Press. Printed in England.

**Alkaloid Biology and Metabolism in Plants:** by G. R. WALLER and E. K. NOWACKI. Plenum Press, New York, 1978. xvii + 294 pp. \$22.50.

Waller and Nowacki have attempted to pull together scattered information about the more botanical aspects of alkaloids. The coverage of the literature is thorough and up-to-date with at least one reference into 1977. Particularly useful are references to a number of Eastern European publications which are difficult to obtain in the U.S.A. Author and subject indexes are exhaustive and accurate. There are quite a few dense tables of data taken directly from original publications; in my view, these would be better left out in a work such as this. The overall style impresses me as bordering on disorganization, with some sections being out of place and others overly repetitive. In most cases this style does not defeat the understanding, but some examples where it does will be cited below. I detected only about ten errors in struc-

tural formulae, and most of these were trivial. The text is virtually free of typographical errors. Several ecological generalisations that appear in various contexts seem to reflect an anthropocentric bias or are not unequivocally supported by the evidence. It is not true, for instance, that animals always avoid high alkaloid plants. Studies have shown that lethal diets may be accepted. Compounds tasteless to people (e.g. canavanine) cannot be assumed to be tasteless to insects (whatever that means). The sensible belief that alkaloidal plants are more prevalent in unfavorable habitats is contradicted by the extensive data assembled by D. A. Levin which show that the most productive habitats have the highest percentage of alkaloidal plants.

Chapter I is a discussion of chemotaxonomy that seems to cover all the pertinent literature in an appropriately critical way. There are a few small errors that interfere with the understanding, e.g. p. 33, 1.4 (–)-sparteine should be (+)-sparteine; p. 44, (+)-reticuline

should be (—)-reticuline. The most serious confusion comes in discussion of morphinan metabolism because incorrect structures are given for orientaline, reticuline, and oripavine, while isothebaine is incorrectly stated to yield oripavine on demethylation. Chapter II on genetic control is probably the most valuable one in the book, because the genetic information has been widely scattered and much of it in unfamiliar journals. Nowacki is a leading authority on alkaloid genetics, and the discussion reflects his expertise. One aspect that could have been included here is a more explicit consideration of the effect of ploidy on alkaloid production. This variable is touched on with regard to *Nicotiana*, but available data on *Atropa* and *Datura* are not mentioned.

Chapter III considers environmental influences on alkaloid production and is valuable for pulling together in one place a lot of information published since reviews of James (1950) and Mothes (1960). The discussions of *Skytanthus* and *Delphinium* are strange. For the former it is said that "results were obtained" but those results are not given, and later on it is stated that "alkaloid compositions are not known". For the latter, the strangeness comes from the inclusion in this chapter. It is said that "alkaloids . . . can vary with the environment", but none of the data presented show that they *do* vary with the environment. Rather, there is a presentation of ontogenetic and anatomical distribution, which belongs in Chapter IV. This is entitled "Sites of Alkaloid Formation" and is a very useful compilation of almost all the data I am aware of in this area, except that included under tissue culture results. Some of the work with *Catharanthus* should have been mentioned since it seems most likely to give commercially useful products.

Chapter V is surely the most interesting and controversial one because what everybody really wants to know is its subject, "The Role of Alkaloids in Plants". The leading hypotheses are presented and considered critically in the light of observations and experiments, with the conclusion that protection against enemies is the most likely function, although this function is far from as obvious as folk wisdom would have us believe. Some important papers bearing on the protection hypothesis have not been mentioned, e.g. Dolinger *et al.* [(1973) *Oecologia* 13, 191] and Levin [e.g. (1976) *Annu. Rev. Ecol. Syst.* 7, 121]. The final chapter constitutes the first review in an area that until about five years ago was hardly recognized as containing any information, "Alkaloid Modification by Plants". As a first gathering together of the pertinent data, this will be a good chapter to have for reference; but I have some disagreement with what it contains. There is a section on subcellular localization that surely belongs in Chapter IV and a section on regulation that is worthy of a chapter to itself. Several doubtful results are presented without sufficient caution, such as the conversion of nicotine to nicotinic acid or to anabasine, and the use of morphine as a methylating agent.

I have read this book with great care and enjoyment. It has its faults, but for anyone interested in alkaloids, it will be an indispensable book. The confusion and intractableness of the subject matter itself makes the alkaloid field fascinating, and a great value of the book may lie in its pointing out how much remains to be done.

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