chromosomes of distinct species. In the strictest sense of the term amphiploidy, these species belong to distinct cenospecies. In the widest sense, amphiploidy would also include the addition of the chromosomes of ecospecies of one cenospecies, but these cases are transitional in character and generally less stable."

Ecospecies are defined as "species capable of a limited interchange of genes with one another," cenospecies as "species entirely unable to exchange genes with one another." This ability of species to exchange genes is considered by the authors to rest upon "constitutional barriers" which are "based in the genic structure." Hence the proposed classification rests primarily upon the degree of interfertility of the parents. The result is a bimodal segregation of the known examples, each mode being characterized by differences in cytological behavior, fertility and morphology and, in nature, by different spatial and ecological relationships to the parents.

The weakness of the proposed classification lies in the fact that ecospecies and cenospecies are defined by sterility barriers without reference to other isolating mechanisms. But the existence in nature of such mechanisms may prevent gene interchange despite a relatively high degree of interfertility. Hence it is legitimate to inquire to what extent ecospecies and cenospecies, defined thus, correspond to the realities of nature.

A case in point is furnished by two well-defined diploid species of *Delphinium* (Lewis and Epling, unpubl.) which produce fertile hybrids when crossed in the garden, and backcross readily to both parents. Their interfertility is of the order which would lead to their classification as ecospecies. Here would appear to be a channel sufficient to permit an appreciable exchange of genes between these species. They are sympatric over a large area and in places actually grow together. Their flowering periods overlap. Yet, there is no evidence that even F_1 plants occur in the mixed colonies. These species are seemingly able to exchange genes, but, so far as has been determined, they do not. Hence, the conclusion is difficult to avoid that barriers other than fertility are at play in nature and that rather than being "ecospecies," capable of a limited exchange of genes, as might be indicated by the breeding experiments, they are in fact, "cenospecies," as suggested by the facts of distribution.

Perhaps the question devolves in part upon the term "gene interchange." When fertile hybrids and their recombination products are formed in nature, genes are exchanged (or recombined) in a limited sense. But to become of consequence in speciation such hybrid products would either need to spread and establish themselves, or else they would need to become an actual channel for a flow of genes from one population to the other. Although fertile hybrids may provide such a channel, isolating factors may intervene and prevent a gene flow sufficient to modify either of the parent populations. *Salvia apiana,* for example, is known to hybridize locally with *S. mellifera,* forming local intermediate populations. Yet there is no certain evidence, as yet, that either species has been modified thereby.

Hence, the assumption made that, because fertile recombination products are formed in the frequently observed crosses of *Aquilegia formosa* and *pubescens,* these species are therefore "exchanging" genes and are no more than subspecies, and that the whole genus is a cenospecies, is open to debate. To establish this assumption it would seem necessary to demonstrate an actual absorption of genes from one to another. *A. pubescens,* a member of a section otherwise represented in the Rocky Mountains, is widely separated from its congeners. Its range in the Sierra Nevada is entirely encompassed by that of *A. formosa.* These facts suggest that the species have been in contact for a considerable period. If it can be shown that any appreciable part of *A. pubescens* is more like *A. formosa* than its Rocky Mountain allies, then, it would seem, a basis might exist for demonstrating an actual interchange of genes. So far as known, it maintains its identity. Again, it would appear that although these species are apparently able to exchange genes, they seemingly do not except in the sense of local recombinations.

It may be that, in the final analysis, the barriers are ecological and that these supposed species are in reality only "ecotypes." Nevertheless, before their actual status can be settled, the presence of other than sterility barriers must be reckoned with and the means by which they operate must be ascertained. Hence, the usefulness of the concepts ecotype, ecospecies and cenospecies would seem to be impaired so long as they are defined in terms which are potential, rather than those that are realized in nature. Defined in the latter terms, used for them as alternatives to the concepts subspecies and species might disappear, save in Turesson's original connotation.

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BEETLES IN STORED PRODUCTS

A Monograph of the Beetles Associated with Stored Products. By H. E. HINTON, I. viii + 443 pp. 505 figs. 20 pp. refs. British Museum (Natural History). London. £1-10s.

A WORK representing a series of very important investigations recommended by Professor J. W. Munro

and the Department of Scientific and Industrial Research which was undertaken by the Ministry of Food and printed by the order of the Trustees of the British Museum. It includes scientific studies of the identity, life histories and control of the numerous insects infesting and destroying stored food products which were so essential to the preservation of the British people and for the winning of the war.

This monograph is the most comprehensive of the very many works dealing with these insects. It is thoroughly scientific in its approach and follows along strictly systematic lines complete with keys to adults of the coleopterous families: Carabidae, Staphylinidae, Nitidulidae, Lathridiidae, Mycetophagidae, Colydiidae, Murmidiidae, Endomychidae, Erotylidae, Anthicidae, Cryptophagidae and Dermestidae.

The author has succeeded in producing a splendid scientific monograph, the material of which is so clearly presented as to make it readily understandable to all classes of readers. Great numbers of excellent illustrations have been prepared to elucidate the keys and to aid in readily distinguishing all the various stages of the complicated life histories of these destructive beetles. The drawings of the adults are specially well executed, and some of them are among the finest to be found in modern entomological literature.

In connection with the descriptions of the various stages of each species is included the synonymy of scientific names and references to original sources, the common names, the genotype and comparative notes.

Historical data, world distribution and the hosts are also given for each species. Methods for rearing the beetles and their habits, parasites and predators are likewise fully treated.

A great deal of confusion has been cleared up especially with regard to the identity and synonymy of the beetles belonging to the family Dermestidae. The author's treatment of these important household pests is noteworthy and extremely valuable.

The very complete list of references and an index to orders, families, genera and species enhances its value.

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CHEMISTRY OF ACETYLENE

The Chemistry of Acetylene. By JULIUS A. NIEUWLAND and RICHARD R. VOGT. xi + 219 pp. Reinhold Publishing Corporation. 1945. $4.00.

As stated in the introduction, this volume presents "a brief but fairly complete account of the preparation, properties, and reactions of acetylene" as disclosed in the literature through 1938, this being the last year of free flow of scientific publications. It proceeds from the preparation and properties of acetylene, through metallo derivatives, non-metallic derivatives and, finally, to the polymerization of acetylene.

The coverage of the literature for this period is very thorough, and the bibliography is extensive, well classified and well indexed. The arrangement of the subject-matter is orderly and logical, and the manner of presentation of the data is clear.

The book is very free of typographical errors. One, however, might be noted. In Table I, page 31, the ratio of gas to liquid concentration should have been reversed, as the figures are actually the ratios of concentration in the liquid to concentration in the gas phase.

The patents relating to acetylene and acetylene derivatives have been extensively consulted and discussed. Due, probably, to the difficulty of interpreting these with accuracy, and the further difficulty of determining which of them are actually in use, this part of the discussion is non-critical in tone, no attempt being made, for the most part, to do more than to record the statements made by the patentees. The more purely scientific part of the literature, however, is treated much more thoroughly and authoritatively, particularly those subjects which lie within the rather broad field of acetylene chemistry worked in by the authors. Since both sources of information are frequently used in connection with the ame subject, the treatment appears, superficially, to be much less critical than is actually the case. As a supplement, the syntheses of monovinylacetylene and its most important derivative, neoprene, are discussed at some length.

In spite of the fact that the literature could be covered only up to 1938, this book is a very welcome and valuable addition to the A.C.S. Monograph series, and should be in the library of any one interested in the field of acetylene and its reactions. It is to be hoped that when the necessary information becomes available, it will be brought up to date so as to include the developments of the war period.

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E. I. DU PONT DE NEMOURS AND CO.,
WILMINGTON, DEL.

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