volumes above any other popular book and above many conventional texts as being suitable for anyone, from high-school age onward, who wants to understand those parts of science where man's heaviest intellectual artillery is being deployed.

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**Biological and Chemical Control of Plant and Animal Pests.** A symposium. L. P. Reitz, Ed. AAAS Publication No. 61. American Association for the Advancement of Science, Washington, D.C., 1960. xii + 273 pp. Illus. $5 (cash price to members); $5.75.

**Pesticide Handbook, 1960.** Donald E. H. Frear, Ed. College Science Publishers, State College, Pa., ed. 12, 1960. 265 pp. Illus. Paper, $1.75; cloth, $3.25.

**Chemical and Natural Control of Pests.** E. R. de Ong. Reinhold, New York; Chapman and Hall, London, 1960. viii + 244 pp. Illus. $8.75.

The AAAS publication, a group of 19 papers presented at a symposium arranged by the section on Agriculture at the Indianapolis meeting of the AAAS (1957), is a powerful counterpoise to some of the inaccurate thinking which has found expression here and abroad on the subject of chemicals in our food. One might hope that the fuzzy thinking of the alarmists does have a useful by-product if it indeed stimulates scientists working in the field of pesticides and biological control of pests to become more articulate, as reflected in these papers. Another by-product is a more vigorous exploitation of the biological control of pests that attack our plants and animals.

The first five papers are grouped in part 1 under the heading "The public's stake in pest control." M. R. Clarkson, J. R. Hansbrough, and J. A. Beal (U.S. Department of Agriculture), E. H. Fisher (University of Wisconsin), and B. L. Oser (Food and Drug Research Laboratories) present a well-rounded picture of the need for pesticides, together with some outstanding examples of their use and regulation by the Department of Agriculture and the Food and Drug Administration.

The four papers in part 2 are grouped under the heading "Recent advances in chemical control." G. L. McNew (Boyce Thompson Institute for Plant Research) outlines progress made with the newer fungicides and antibiotics in controlling plant diseases. R. H. Beatty (AmChem Products) gives a brief history of 2,4-D and its extraordinary usefulness, and he also discusses some of the newer herbicides. J. E. Casida (University of Wisconsin) describes the behavior of some of the systemic insecticides for use on plants and animals. F. O. Gossett (Eli Lilly and Company) gives an account of the anthelmintics and other chemicals used to combat internal parasites of domestic animals.

The final 10 papers are grouped in part 3 under the heading "Biological control of pests." These are separate contributions by W. C. Snyder, C. A. Fleschner, and E. H. Stanford (University of California); J. D. Briggs (Illinois Natural History Survey); E. F. Knipling and N. F. Waters (U.S. Department of Agriculture); J. D. Rodriguez (University of Kentucky); A. D. Pickett (Canada Department of Agriculture); J. R. Shay (Purdue University); and R. H. Painter (Kansas State University). A broad range of topics is covered here, from antagonism as a plant disease control principle to the use of pathogens, parasites, and predators for controlling pests; the use of atomic radiation to sterilize male screw-worm flies, which results in their annihilation; the breeding of disease-resistant crops and animals; the effect of nutritional changes in the host and the host's reaction to parasites; disease resistance in animals; and the effect of pest control practices on biological balance in apple orchards. I recommend these papers to those who would strive for a balanced outlook on pest control and eradication. It is quite evident that (i) chemicals are extremely useful and necessary for pest control; (ii) the use of chemicals is being properly regulated; (iii) there is active exploration of biological control in its many aspects; (iv) there are new methods, such as male sterilization by gamma radiation, which will have important consequences in the future; and (v) the way is open for the combined action of both chemical and biological control methods to enable man to decrease the stupendous toll exacted by plant and animal pests and parasites.

The articles in parts 2 and 3 contain many useful references; there is a subject index. This volume is a worth while and very interesting book to have on one's shelf.

If one has occasion to look up the trade names of pesticide formulations or what they contain and who sells them, the *Pesticide Handbook* is the standard reference on the subject. Frear lists 7851 formulations and gives the contents according to their labels. A list by active ingredients is tied in through a number system with the formulations presently on the market in the United States. There is also a useful list defining the registered pesticides and their legal tolerances on certain raw agricultural commodities.

*Chemical and Natural Control of Pests*, if judged by its title, should cover a wide scope, but actually it is largely oriented toward insecticides and their recommended uses. Unfortunately, it requires the reader to know which insecticides recommended for use are no longer manufactured or readily available and which ones are no longer of much use against a given species because of insect resistance. The pesticides listed in the appendix have not been brought up to date with respect to the common names or the trade names. In several instances, the names used in the text cannot be found in the appendix. Despite these shortcomings, the book contains much useful information.

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**A Revision of the Species of Schizonycha Dejean (Col.:Melolonthidae) from Southern Africa.** *Bulletin of the British Museum (Natural History), Entomology*, vol. 9, No. 2, pp. 63–218. R. D. Pope. British Museum (Natural History), London, 1960. Illus. + plates. 50s.

This is a most welcome, much needed revision of work on the species of the scarab beetles of the very large and difficult genus *Schizonycha* inhabiting southern Africa. Over 300 species of *Schizonycha* have been described, and all but eight are African. This part, the first step of a proposed revision covering the entire genus, includes the natural faunistic unit found south of a line across the continent along the border between Angola and Southwest Africa and continuing eastward along the Zambezi River. Very few species

occur on both sides of this line. This is the first comprehensive paper on the *Schizonycha* since Péringuey published a similar but much less extensive paper in 1904.

Pope combines the genus *Atys* Reiche with *Schizonycha* to list 107 species described from southern Africa. In the present paper he points out 22 cases of synonymy and five cases of preoccupied names. Nineteen new species and the five new names bring the total number of valid species to 117.

A complete history of the genus is given. *Scarabaeus globata* Fabricius (1781) is selected as the type of the genus *Schizonycha* Dejean (1833), and discussion of and reasons for the selection are presented. The taxonomic position of the genus and its relationship to other genera are covered adequately. The paucity of information on the biology and habits of the group is pointed out, with a review of what little is known.

Perhaps the most valuable part of the revision is the carefully prepared, easily followed key to the species involved. It is very full, but it is clear and understandable even though it includes 125 couplets covering 15 pages. For each species the following information is given: pertinent references, description of both sexes, type locality, location of type, distribution, and number of specimens seen. Five plates, illustrating adults and diagnostic characters other than genitalia, plus nine illustrations of genitalia, complete the book.

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**Ecology of the Peregrine and Gyrfalcon Populations in Alaska.** *University of California Publications in Zoölogy,* vol. 63, No. 3, pp. 151–290. Tom J. Cade. University of California Press, Berkeley, 1960. Illus. + plates. $2.50.

This study of two closely related raptors in an environment "biotically simple, geologically young, and still in a state of active surficial change" began as a study intended to supplement and extend analyses already made of peregrine populations in North America, the British Isles, the Baltic Sea region, the Soviet Union, and Greenland. The author found that in Alaska the gyrfalcon is an important part of the peregrine's ecology, so the study became comparative; his report includes sections on the distribution, abundance, and breeding biology of the two species in Alaska; it also includes discussions of the nesting cliff as an "ecological magnet," the importance of a strong pair bond, tradition as a factor linking generations to the same cliff, the significance of sexual dimorphism in falcons, and peregrine versus gyrfalcon competition. Cade shows clearly that further study of the gyrfalcon is sorely needed, an observation that applies, I hasten to add, not only to Alaska but to all parts of the species' range.

The gyrfalcon is the world's largest true falcon, and it is the only true falcon that breeds exclusively in the far north. It is highly polymorphic. Its polymorphism varies geographically both in kind and in degree, mixed broods of white and gray birds being the rule in some areas, most birds being white in northern Greenland, all breeding birds being gray in Iceland, some birds being very dark in the Canadian Arctic Archipelago and in Labrador. Geographical races have been described, but none of them are strongly characterized. The species is sexually dimorphic, strikingly so in size, the females being much larger than the males, but less strikingly so in color, the males being paler than the females, as a rule. Cade considers the gyrfalcon "the counterpart of a basic stock which has always been associated with landscapes of open expanse such as prairies, steppes, and deserts, and which is adapted for catching both birds and mammals (and also reptiles) pursued on or near the ground." The species breeds circumboreally—northward to 82°N. in Greenland, southward to 60°N. in Greenland, and even somewhat farther southward in the Komandorski Islands, Labrador, the Altai Mountains, and around the base of the Alaska Peninsula.

The peregrine, the third-largest of the true falcons, is also sexually dimorphic in size, females being much larger than males. The species is a bird of compact plumage "adapted primarily for the pursuit of flying quarry." Unlike the gyrfalcon, the peregrine is virtually world-ranging, and it is highly polytypic, 22 geographical races being recognized by some taxonomists. Possibly as a result of an ameliorating arctic climate within recent times, it now breeds northward to 75° to 78° N. Birds which breed in the far north are strongly migratory. An important (but in my opinion not wholly valid) point made by the author is that the arctic peregrine's reproductive cycle is determined to a considerable extent by the migrations of prey species, while that of the gyrfalcon is not.

The breeding ranges of these two large falcons overlap to some extent. The peregrine is not known to breed northward to 82°, but in some areas at the southern limits of the gyrfalcon's breeding range, the peregrine may breed in greater numbers than it does in any other part of the world. The overlap is more apparent than real, and only in certain restricted areas are the two species truly sympatric. Thus, while the gyrfalcon inhabits Iceland, the peregrine does not; the common falcon of northern Greenland is the gyrfalcon, of southern Greenland the peregrine; in the Aleutians there are many breeding peregrines but no gyrfalcons, while on the mainland coast from the base of the Alaska Peninsula to Point Hope, gyrfalcons "maintain maximum densities" but peregrines are rare.

In Alaska the gyrfalcon breeds in foothill tundra and arctic alpine areas (frequently in localities above 2500 feet elevation and far from water) and on coasts and islands in the Bering Sea region. The peregrine, on the other hand, invariably breeds near water, either on the outer coast or along a river, and at elevations below 2500 feet. "The principal areas of actual overlap . . . are the foothills of the arctic slope and the coast and hinterland of the Arctic Ocean from Kotzebue Sound to Cape Lisburne."

Some sort of cliff is required by both species for nesting. In general, cliffs used by gyrfalcons are more "accessible" than cliffs used by arctic peregrines. Gyrfalcons have fewer nesting sites to choose from since they must find one that is free of snow at the laying season. Gyrfalcons start nesting about a month ahead of the peregrines and, therefore, take possession of some cliffs that might, were it not for the gyrfalcons, be used by peregrines. Nesting cliffs are rarely very close together, and no cliff is occupied by both peregrines and gyrfalcons or by more than one pair of either species.

Choice and defense of the nesting cliff are an important part of the reproductive cycle. The cliff must be close to an adequate supply of food. Since gyrfalcons prey heavily on ground squirrels in Alaska, especially in the