

to birds counted overhead, 851 600 Honey Buzzards flew over Elat in the spring of 1985; there the spring flights are much larger than in fall. Elsewhere large numbers are counted in the fall: an average of 730 000 at Corpus Christi, Texas; 5 200 000 near Cardel in the state of Veracruz, Mexico; 1 950 000 at Keköldi Indigenous Reserve, Costa Rica, and 380 000 over the Strait of Gibraltar at the western end of the Mediterranean. In Veracruz, sometimes dubbed the “river of raptors,” 2 677 355 Turkey Vultures were counted in 2003, 2 389 323 Broad-winged Hawks in 2002 and 1 197 850 Swainson’s Hawks in 2003, including 782 653 in one day, 17 October that year.

Recent advances in technology have provided a big boost to raptor migration studies. Application of satellite radios to 117 Ospreys and 51 Golden Eagles added immeasurably to our understanding of the speed and variability of migration. Nine satellite-tracked Honey Buzzards averaged 270 km/day across the Sahara Desert, with brief stopovers suggesting that most fasted during at least this leg of their trip south. Since raptors often reduce energy requirements by soaring in thermals, Bildstein has included a map and three diagrams of the major deflection/updraft corridors. Raptors are able to orient and navigate simultaneously (setting a direction and then achieving it), using internal magnetic cues, visible landmarks, the sun by day, the stars for the few species that migrate by night. Despite a great deal of research, their navigational prowess still exceeds human comprehension. In at least nine species, including harriers, accipiters and two falcons, the juveniles precede the adults in southward migration, yet come spring the adults often head north first. In the Osprey and a few other species, juveniles spend an extra year in the tropical wintering habitat before returning north at two years of age.

A positive feature is that a number of hawk watching stations, including Hawk Mountain, were found

ed as conservation measures. Incensed by the carnage along the Kittatinny Ridge at Hawk Mountain, Rosalie Edge purchased the property and hired Maurice Broun to patrol it and count the raptors. Rachel Carson, in *Silent Spring* in 1962, used the 25-year Hawk Mountain counts, especially of declining Bald Eagles, to support her arguments concerning the impact of organochlorine pesticides, especially DDT, on the reproductive success of birds of prey.

Bildstein’s final chapter is perhaps the strongest. It explains the widespread effects of bounties, not completely eliminated in Pennsylvania until 1969. From 1917 to 1952, Alaska territory paid bounties on 128 000 Bald Eagles. Today, the main threats to raptors are habitat loss and environmental contaminants, an example being a painkiller, diclofenac, fed to cattle in India, that has led to population declines of over 90 per cent for three species of vulture that eat dead cows.

My only criticisms are small ones. Because owls are also raptors, the absence of any mention of their nomadic movements, cyclical irruptions and migrations is somewhat contrary to the title of this book that is restricted to diurnal raptors. Readers of the main text might believe that DDT has long been banned everywhere, but in fact it is still being used in tropical countries to combat malaria and yellow fever. Only in the Glossary does Bildstein inform his readers that DDT is “still used by public health organizations to control malarial mosquitoes.”

The writing is clear. Each chapter (I have only touched on a few highlights) ends with a synthesis and summary of the main points. This book is a treasure. It belongs in every high school and college library and in the library of every raptor enthusiast.

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## Land Snails of British Columbia

By Robert G. Forsyth. 2004. Royal British Columbia Museum, Victoria, British Columbia, Canada. 188 pages. \$35. Paper.

The study of snails has certain advantages for a naturalist. For one thing, unlike birds or butterflies, they move slowly enough to be identified! However, anyone who has ever tried to identify snails will know that there is a dearth of readily accessible information out there to help with the task. This is a lack that Robert Forsyth has set out to remedy with his guidebook, providing help with the identification of 92 species of land snails and slugs found in British Columbia. This book is similar in layout and format to other recent guidebooks from the Royal British Columbia Museum, a handy 5.5” × 8.5” soft cover book, easy to slip into a backpack or daysack.

Each taxon is provided with a “species account” that consists of a description of the animal, its distribution,

and its natural history (basically its habitat preferences). Each account also includes information on the etymology of the animal’s name, some remarks, usually dealing with taxonomic issues or species with which it may be confused, and references. The species are arranged in taxonomic order. These accounts form the bulk of the book (128 pages). Most taxa are illustrated by line drawings or black-and-white photographs. For the planispiral snails, the images generally include the upper (apical) surface, lower (umbilical) surface, and apertural view. For the conispiral snails, the images generally consist of an apertural view and a distal view. There are also 33 colour images, of which 23 are of slugs. These colour images are generally much crisper and more useful than the black and white photos. Forsyth includes some brief discussion of eleven other taxa that he considers of doubtful occurrence in British Colum-

bia or that he judges to have equivocal taxonomic status. These are often species that were perhaps only recorded from one locality or for which the record was made many decades ago and has not been confirmed or supported by subsequent observations.

These species accounts highlight some interesting points about the land molluscs of British Columbia, as they are known at present. Of the species discussed, about one third (24) are slugs. Of these, more than half of them (13) are introduced. Many of these slug species are described as being common in gardens, which perhaps suggests that eagle-eyed gardeners may be responsible for drawing attention to them. Forsyth notes that many of these exotic species are significant agricultural pests, in contrast to members of the native fauna, which are not. He points out (page 19) that most may have been accidental introductions, brought in on plants or associated soil. Most of the snail species, in contrast, are native (53) with less than a quarter (15) identified as introduced. This striking pattern raises the question as to whether it is a consequence of the method of introduction (that is, on horticultural or agricultural plants) or simply a lower level of investigation of the mollusc fauna outside urban and intensively farmed areas. Despite its focus on British Columbia, many native species described by Forsyth have wider distributions. Some are found in other areas in the Pacific Northwest, from Oregon to Alaska. Others are more widespread and some occur east of the continental divide in other areas of western North America. Despite its focus on British Columbia, therefore, this book has wider applicability in western Canada.

The remainder of the book offers useful supplemental information. An extensive introduction (19 pages) describes the biology of the animals, including, for the snails, some discussion of shell characteristics, which are important for species identification. There is also a checklist of the species described in the volume, and two dichotomous keys, one for snails and one for slugs, to help narrow down the selection to genus. Ten other keys are interspersed among the species accounts and focus on genera, such as *Vallonia*, *Vertigo*, and *Arion*, in which there are more than a couple of species. All the snails described are dextral coiling species, as are most land snails. Following the species accounts, there is a lengthy (14 pages) reference list, a glossary of terms, and a species index.

I obtained this book primarily to help with the identification of mollusc shell remains recovered from fine-fraction analysis of sediment samples from archaeological sites and other postglacial depositional contexts.

In these situations, the soft parts of the animals are not preserved and only the shells remain. Hence, identifications rely primarily on the morphology and structure of the shells. So I was particularly interested in the shell descriptions. In this regard, the book has been very helpful although I have noticed some limitations. My main complaint is that the line drawings are not reproduced well. This is a significant problem. On many drawings, the lines are faint and details of shell surface features and ornamentation are extremely difficult to discern. Moreover, Forsyth only provides one shell measure for each taxon. For the planispiral molluscs, he provides the width of shells, but not the spire height. For the conispiral molluscs, he provides the height of the shells, but not the width. The complementary measures can be approximated from the drawings, but it would have been useful to have them included in the text. The width/spire height ratio is an easily acquired descriptive character that helps discriminate different taxa.

Two additional sets of information would have made this book even more helpful. First, I thought each species could have been illustrated by a "dot map" showing the localities in British Columbia where it has been collected or observed. I imagine that the dots would have been very sparse for many species! Nevertheless, such maps could highlight areas that may well repay survey and collecting effort. Second, it would have been useful to have a list of the accession numbers for the specimens that were studied to compile this volume. This is important so that in future scholars could re-examine the specimens to confirm and refine the taxonomy or acquire additional measurements and images. Because the Royal British Columbia Museum is the publisher, I assume that it may be the institution housing these collections. However, this information (that is, the institutional repository and accession numbers) could have easily been included, for example, in the species checklist, making such detective work unnecessary.

Compiling this volume obviously involved a formidable amount of painstaking work and study. I heartily commend Forsyth's commitment to a neglected but rewarding faunal group. This book is a fine introduction to these animals and deserves to be on all western Canadian naturalists' bookshelves. Anyone who pays attention to the information in this volume will never look at a snail on a rockery or a slug on a cabbage leaf in quite the same way again!

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