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Book Review

BEE TL ES OF EASTERN NORTH AMERICA. Arthur V. Evans. 2014. Princeton & University Press, 560 pp., 8x10 paperback. ISBN:9780691133041. Price: 35.00.

Those of you who know me may think I've always been a "beetle guy" but growing up in southwestern Michigan and loving to trout fish, my first real insect infatuation was with aquatic insects. It was, in fact, not until the summer of my junior/senior year at Michigan State University that I was really introduced to beetles – by a Ph.D. student for whom I worked as a student hourly (on cucumber pollination and honey bees!) He also loved beetles but was at a career nexus heading in a different direction and he bequeathed to me a partial set of old Coleopterists Bulletins. So the love affair began and it was a hot romance that summer! I was largely self-taught and tattered my copy of Dillon and Dillon's (1972) *A Manual of Common Beetles of Eastern North America*, incomplete though it was.

I certainly echo Mark O'Brien's assessment that for anyone to attempt coverage of as large a region as eastern North America, for as rich and diverse a group of insects as the Coleoptera is a major undertaking. I also agree that *Beetles of Eastern North America*, by Art Evans, will not disappoint the serious beetle novice as well as naturalists and those for whom Coleoptera is an interest from numerous tangential disciplines such as ecology, behavior, and general field entomology. Mark has also well outlined the essential strengths and high points of this new contribution -- most notably the plethora of very fine images in wonderfully odd contrast to the very modest price tag!

The anatomy section is reasonably sound. I should note, however, a few points that Art might address in a second edition (I hope there will be one)! The ventral view of a carabid (p. 11, Figure 1) incorrectly indicates the "tarsus" as does Figure 10 (p. 17). The insect **tarsus** does not include the pretarsus as these figures suggest. The associated text (p. 17, column 2, lines 18-19) likewise need correcting. While this may seem trivial, it most certainly is not as anyone who has tried to key out beetles will know. Ever since Geoffrey (1727-1810) introduced the concept of tarsal structure ("tarsal formula") as a critically important character set in the familial classification and identification of beetles, serious students of Coleoptera have been ruining their eyesight in attempts to correctly interpret coleopteran tarsal structure. Misinterpreting the tarsal structure (e.g., Figure 10, p. 17) incorrectly comingles the pretarsus (claws + arolium + auxillae + unguitactor plate) with the ultimate tarsomere (in Figure 10, that is the 5th tarsomere). Coleopteran **mouthparts** (p. 13, column 2, lines 24-25 are described as basically consisting of "two pairs of chewing appendages (mandibles, maxillae)." Morphologically, there are three pairs of appendages since the insect labium is the result of paired appendages quite homologous to the maxillae that have fused together. Also, I can't readily think of an instance wherein the maxillae "chew" (= masticate) in the sense that mandibles commonly carry out this function. The description of the **elytra** and some modifications is very useful (p. 16, column 2 – p. 17, column 1), however, I really wish they would have been defined right away as the mesothoracic wings. The typically rigid nature of the elytra is very commonly and misleadingly described as the "shell" of a beetle and since beetles are neither mollusks nor crustaceans nor turtles, I should think it prudent to emphasize their true nature. The ground plan for the coleopteran **abdomen** (p. 17, column 2, 3rd line from the bottom) consists of 10 (not nine) segments, and there are two (not four) sclerites: tergum and sternum. The insect abdomen – unlike the thorax - virtually always lacks a "true" morphological pleuron as the pleuron is generally hypothesized to have been derived from ancestral "leg-derived" sclerites (i.e., the subcoxa or subcoxal elements of the ancestral leg). These paired, "podite derived" structures are thought to have been largely "abandoned" in the evolution of the abdomen. The abdominal spiracles are commonly associated with what is often called the "pleural membrane" but that is, as I understand it, not an indicator of the morphological pleuron.

While it is true that the antennae of most beetle **larvae** (p. 23, column 2, line 16) have “two to four simple segments” the second segment frequently bears a conspicuous sensorium that sometimes has taxonomic significance. It should also be noted that larvae of Scirtidae (pp.180-183) are quite remarkable in Coleoptera for exhibiting long, multi-segmented filiform antennae. The “last abdominal segment” (p. 23, column 2, 6th line from bottom) might be better described as the terminal segment in that it is not the anatomically last segment in many families. In fact, that is the case in the associated figure (p. 23, Figure 16) wherein the urogomphi of Pyrochroidae (pp. 373-375) are associated with the ninth abdominal tergum and the remnants of tenth abdominal segment are ventral and recessed.

The section on **aquatic beetles** (p. 31) provided a good, quick summary, but it might have benefited by noting that several families of aquatic beetle larvae possess gills (e.g., Psephenidae; p. 22, Figure 15h; pp. 203-204). The eclectic set of techniques, observations, hints, and practical suggestions relating to finding, collecting, photographing, and preparing beetle for study as well as for making a permanent collection (pp. 33-52) are rarely presented in book form. To new students of Coleoptera these pages should be a real treat and should be visited regularly as these elements become part of the coleopterist mind-set! My only recommendation in this context might be a section discussing research collections: housing, curatorial and management topics, and preparing specimens for shipments as loans or exchanges with other coleopterists.

Attempting to write even a simple **familial key** (pp. 53-57) to beetles is a task inherently fraught with the perils of daunting species and phyletic diversity. The author strikes a good balance between simplicity of use and thoroughness. The key is, for the most part, relatively easy to interpret and understand and should offer reasonable reliability. Two specific comments: (couplet 5') I'd be careful to define the lamellate antennal club as being distinctly asymmetrical or “1-sided” lest the reader think any antennal club is lamellate; (couplet 15') the head is still distinct, it's just not exposed and clearly visible, dorsally.

While I did not particularly care for the overly large-sized type to introduce each family by common and taxonomic name, and I did not agree with all the pronunciation guides, the general composition and balance of the family treatments is very well-struck. And while the diagnoses may, to a professional coleopterist, seem a bit odd, I believe they will be of immense help to the novice coleopterist and hobbyist. The images are of good size and appear generally to be very well chosen to represent a wide array of diversity in a reasonable amount of space.

My rather detailed critiques of this book are not offered because I think it is a flawed treatment. To the contrary, my sincere hope is that the first printing will fly off the shelves quickly and some suggestions might find their way into a subsequent edition. I'll be offering an “Advanced Taxonomy of Coleoptera” course this fall semester, and I certainly plan to recommend this book to my students. I concur with Mark O'Brien's assessment that, “*Beetles of Eastern North America* may well become the “go-to” guide for many of us.” I, too, congratulate the author on this very significant contribution which should inspire a new generation of coleopterists-in-training as well as naturalists.

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