

# How Do Published Field Guides Influence Interactions between Amateurs and Professionals in Entomology?

David L. Pearson and John A. Shetterly

The influence of field identification guides, such as those for birds, butterflies, and odonates, shows a consistent historical pattern of relationships between professionals and amateurs that can be used to anticipate problems and advances in studies of many other taxa, such as tiger beetles (Coleoptera: Cicindelidae).

## History of Field Guides

For insects and many other taxa, there is a rising interest in global biodiversity. At the core of this concern is a growing appreciation of the importance of species distributions and their abundance. One result is that standardized use of species names (taxonomy) becomes essential for reliable identification and communication between field workers and policy makers. Early in the study of most groups, the data appear in monographs and taxonomic revisions based largely on collected museum specimens. But the arcane terms and ponderous writing style of most of these tomes severely limit the readership to a small cadre of professionals and expert amateurs.

In 1889, Florence A. Merriam [Bailey] wrote what is usually credited as the first popular taxonomic treatise or field guide, *Birds Through an Opera Glass*. Her approach not only attracted a broader spectrum of readers, but belied the accepted philosophy that collecting and studying specimens was the only method by which to learn to identify species (Stevenson et al. 2003). Using binoculars as an alternative to killing specimens dovetailed with a growing conservation movement that involved an ever-increasing number of amateurs. As casual bird watchers became skilled observers, many developed an appetite for more knowledge and even greater skills. These needs sparked a growing market for popular access to this knowledge, much of it encapsulated in field guides.

With a field guide in hand, an enthusiastic amateur could gather reliable distribution and biological information, quickly expanding the data set to the point that the current field guide became obsolete. Soon the market demanded sub-

sequent and much improved editions, which then led to more sophisticated data that were useful to amateurs and professionals. For instance, Simpson and Day (2004) published the seventh edition of *The Birds of Australia* less than 20 years after the first edition.

Although the modern field guide continues to evolve, it usually focuses on a group of related species (taxa) from a limited geographical area (often within political boundaries). The book tends to be small enough to be carried into the field and has a text section with general information on body topography, crucial identifying characters, and species accounts. These accounts include behavior, activity periods, and useful natural history, as well as known distribution within the covered region. Range maps are commonly provided, either in the text or with the second critical part of the guide, the species illustrations. The illustrations are now usually high-quality color photographs or paintings, arranged on a plate so that direct comparisons can be made with the species observed in the field, as well as with similar species that might be encountered in that area and habitat (Vuilleumier 1997).

## Amateur and Professional Entomologists

The general history of most biological studies includes a solid base of amateur investigators somewhere in its origins. Depending on factors such as the economic importance of the taxon under study, professionals eventually become more significant in some areas and for some taxa, and they may even largely supplant the amateurs. In other fields, however, the amateurs remain a significant part of and may even dominate the progress and agenda of the discipline. The focus of publications in these changing fields also evolves, but whether it reflects or drives the makeup of interactions between professionals and amateurs is often unknown.

According to the Directory of Entomological Societies, (1999) 514 organized associations worldwide have insects and spiders as their primary focus; of these associations, 194 are interested in general entomology. The others have more focused missions: pest control (99), honeybee business (79),

forensics (1), or a single taxonomic group (Lepidoptera, 45; spiders, 38; Odonata, 15; Coleoptera, 11; and fewer for Diptera, Orthoptera, Hymenoptera, Isoptera, Heteroptera, Neuroptera, and Ephemeroptera). According to their Web sites and mission statements, 107 of the general entomology associations are primarily for professionals, 85 are for professionals and amateurs, and 2 are expressly for amateurs. The membership of most of the 130 associations with a single taxon as the focus is a combination of professionals and amateurs, but amateurs make up the bulk of the membership.

With many amateurs to swell the ranks of those interested in some insect groups over others, the often-skewed number of field guides for these same insect groups is understandable. Our goal is to look into ways in which field guides may affect the dynamics between amateur and professional insect workers.

### Areas of Conflict between Amateurs and Professionals

The history of some areas of study can sometimes help foresee problems and provide solutions for other fields. Because studies of birds, and to some degree, of butterflies and odonates, have such a long history, they may serve as paths along which studies of other groups can choose to follow. The rise of birding, the observation of insects, and the availability of identification field guides have produced a plethora of problems, but also possible solutions in the form of viable compromises. These past experiences could clarify and anticipate many potential interactions, including those between amateurs and professionals in entomology.

**To Collect Specimens or not to Collect.** The world of bird studies endured a bitter battle of philosophies in the late 1800s about collecting specimens (Barrow 1998). Professionals and many enthusiastic amateurs argued that a specimen in the hand was the only incontrovertible way to establish identification and range extensions. The burgeoning number of amateur bird enthusiasts, however, most of whom were attracted to birds through field guides, argued that with training, observational skills could adequately substitute for most sightings of new and unusual species. Among ornithologists today, laws and legal restrictions as well as a change in philosophy about collecting specimens have made a general non-collecting philosophy the norm, in developed as well as developing nations (Vuilleumier 1998). This debate is now repeating itself for insects, especially among the Lepidoptera and Odonata. Again, much of this controversy can be traced to recently popularized field guides, such as the *Butterflies Through Binoculars* series, written and edited by Glassberg (1999) and other expert amateurs.

**Common Names versus Scientific Names.** In the late 1800s, as field guides for birds became more popular, a personal and volatile disagreement arose between many professionals and most amateurs over the use of scientific and common names. On one side, arguments were made that scientific

names were stable and made communication easier. In addition, proponents of scientific names argued that there is no inherent barrier preventing the public from embracing scientific names. Nevertheless, publishers, the press, and much of the public perceived scientific names as elitist (Barrow 1998). A subsequent mushrooming of often-duplicated common names made communication difficult. Finally, a committee made up of professionals and expert amateurs chose a single common name for each bird species in North America. This committee has since become the final arbiter of these names. Among insect students, odonates and butterflies have repeated this history. There is now one generally accepted “official” list of common English names of butterfly species in North America (Cassie et al. 2001).

### Writing Style, Terminology, and Methodology.

More subtly, distinctive writing styles emerge that indicate levels of expertise and establish levels of authority that can separate professionals from amateurs. Some examples of writing devices that are preferred by professionals include the reduced use of personal pronouns, reliance on passive voice, a decrease in the number of simple sentences, the presence of technical terminology, an emphasis on reliability of evidence, and the use of citations (Lakoff and Johnson 1980, Chafe 1986, Carter 1990).

Amateurs writing field guides for popular consumption frequently mix science and sentiment, describing species in technical detail and telegraphic phrases, or in romantic prose and full sentences. The various writing styles often make some field guides more readable to amateurs but less scientifically respectable for some professional biologists.

**Illustrations.** Regardless of the accuracy of the text and the reliability of its descriptions, the usefulness and market share of a field guide rise or fall primarily on the basis of its illustrations. Early field guides relied on black-and-white line drawings. Later books printed different kinds of pictures by various processes in color or black and white, used conventions of natural history illustration or fine art, and linked the pictures to the text.

What constitutes the best type of illustration is another area of great controversy. The general consensus among bird guides, however, is that too much detail is counterproductive. Thus, simpler illustrations that have just enough detail to depict characters you are likely to see in the field are ideal. Some early bird field guides (Bull et al. 1977) and now several insect field guides touted the superiority of photographs taken in the wild for their illustrations. The argument has been that these photos best reproduce what you see in the field, as well as providing a natural habitat backdrop. However, reviewers and the marketplace have cast considerable doubt on the general usefulness of specimens

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illustrated by photographs in the wild. They tend to insert too much clutter and detract from the major function of the field guide—identification. Most bird guides are now illustrated by paintings that show all the pertinent identification characters simultaneously with just enough detail. An unmanipulated photo will show only one aspect of the specimen, taken at a single instant and in a specific pose. All the characters are unlikely to be expressed simultaneously in a photograph, and unless every species is similarly posed, the value of comparing illustrations side by side can be minimized or lost (Vuilleumier 1997).

**Segregation of Areas of Study and Expertise.** Vuilleumier (2003) and others have argued that the phenomenal rise in availability of bird field guides has revolutionized and vitalized field studies in region after region, and that amateurs and professionals have gained from their publication. In the past 30 years, these modern field guides have become useful and attractive to a growing reading public. Their market success is largely due to authors who have more than just museum experience with organisms. Extensive experience in the field helps these authors understand what is important for recognizing the characters used for separating similar species, as well as what information the inexperienced readers most need to become skilled. The majority of these modern field guides are written by expert amateur ornithologists rather than by academic professionals.

Once these popular field guides are published, they encourage more professionals and amateurs to go to the field in the area covered by the book and study organisms in greater depth. Their studies then provide more detailed information and data on the species that need to be incorporated into

the next and more sophisticated field guide. Thus, field guides often reflect the stage of development of the study of organisms and directly influence its activity. They also accelerate skills that in turn help basic and applied knowledge grow.

One result of this interaction between expert amateurs and professionals is that natural history observations, geographical distributions, and seasonal records of occurrence and dispersion of many taxa have, by default, been largely turned over to amateurs. Professionals rarely publish these types of basic data. However, because of language use and perceived low standards of scientific rigor, acceptance of the resultant data by professionals is not universal.

### Tiger Beetles as an Example of Learning from History

We have been involved with ornithology and birding for years. We also have become deeply interested in tiger beetle observations and studies during this time (see Pearson and Vogler 2001). As a professional biologist (DLP) and an amateur enthusiast (JAS), we often have arrived at our levels of interest in these taxa with different goals and experiences. Our different points of view may help us to see problems in the development of our studies and interests more clearly and perhaps provide useful solutions that might be less obvious to either of us alone. We hypothesize that we can use the history of other fields to anticipate and minimize some of these problems in developing a growing base of data and community of enthusiasts. Just as for birds, field guides for tiger beetles are likely a major part of this growth.

In the past 10 years, at least 15 books have been published that roughly meet the criteria of field guides to tiger beetles from around the world (Fig. 1). Some of them are compromises that have monographlike descriptions, but with beautiful color illustrations and mapped distributions. Others are full-fledged field guides that primarily target the public market. Expert amateurs wrote almost half of these books.

**Collecting.** Because tiger beetle studies have only recently opened up to a broad amateur market, collecting specimens is still the philosophy underlying most of the field guides to these beetles. Already, however, concerns among the old guard anticipate a growing change in this philosophy. Discussions of collecting in the most recent field guides typically take an apologetic tone and advise that binoculars and cameras are legitimate alternatives to nets. Observations and photographs are often touted as equally appropriate methods of registering species and documenting range extensions, behavior, and natural history. A chapter or section on conservation and threatened species has become *de rigueur* and implicitly downplays the importance of collecting specimens, especially of those species with threatened populations.

As the popularity of widely marketed field guides grows with their availability, history tells us that the collecting versus noncollecting phi-

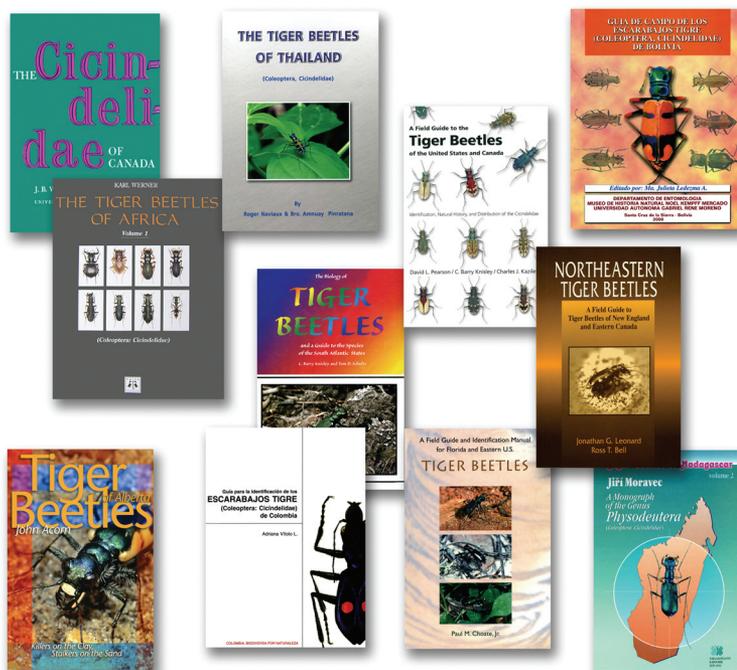


Fig. 1. Published field guides and monograph/field guides on tiger beetles from North America, South America, Africa, and Asia.

losophies may quickly evolve into a pro- and anticollecting schism. Not only do the new initiates need to be shown that there is a time and place for collecting, but the old guard need to change their preconceptions that a specimen is needed to document every event and site. To promote these compromises, careful and planned communication will be essential in subsequent field guides. The attitude of future authors will largely determine how cooperative this change will be.

Ironically, field guides can create unintended consequences in the conflict over collecting. Almost 20 years ago, JAS, relying on a report from a high school biology class's "bug collection," confirmed a population of a species of tiger beetle not seen in Massachusetts for about 70 years. At the time, he was preparing a report on his recommendations for state listing of threatened and endangered tiger beetles. The newly rediscovered form was then state listed, and the rediscoverer, like everyone else, was prohibited from collecting or interfering with the population. This prohibition excluded close, and often critical, observations.

Current field guides to tiger beetles may well increase interest. Some of these new amateur devotees likely will be tempted to observe and perhaps even collect specimens from localities that previously were under little pressure from enthusiasts. The compulsion to collect or even disturb populations for observation and photography is hard to control, especially for rare or endemic species. As knowledge and interest grow, perhaps dealers will enter the field and start offering taxa in which there was limited interest until the appearance of the field guide. The potential for growing misuse of data could influence legislation and controls that will affect amateurs and professionals, as well as the rate of legitimate data accumulation for tiger beetles.

**Common Names or Scientific Names.** The community of tiger beetle enthusiasts has already laid the groundwork for an uncomplicated transition to common names. Largely under pressure from publishers of the field guides, newspaper reporters, and government agencies dealing with threatened species, the use of common names was discussed increasingly in the 1990s. Many entomologists, professional and amateur alike, raised a good deal of opposition to the introduction of common names; they argued that some of the proposed common names were obscure, more complicated than the Latin names, and unlikely ever to be used by many. (Which flows more readily from the tongue? "*Amblycheila hoversoni*" or "South Texas Giant Tiger Beetle;" "*Cicindela togata*" or "White-cloaked Tiger Beetle"?).

Even more problematic was the burgeoning problem of duplicated common names. In response to this issue, 10 professionals and amateurs formed an ad hoc committee in 2003 to guide a selection process that would establish standardized common names for tiger beetle species in Canada and the United States. Using the history of how bird, Lepidoptera, and Odonata groups got their com-

mon names, the committee tried to avoid historical pitfalls in the process by including as many as possible of the North American community of tiger beetle enthusiasts. The entire readership of the journal *Cicindela* was drafted, and after a year of solicitations, winnowing, and voting, a cautious consensus of common names was chosen (Pearson 2004). No claim was made that these were the official names, but they were used in a field guide to the tiger beetles of the United States and Canada that appeared the following year (Pearson et al. 2005). Whether or not this procedure adequately anticipates and avoids the problems of applying common names remains to be seen, but for the committee, the past was an important ingredient in developing the steps used for tiger beetles.

**Writing Style.** The most appropriate writing style for articles and books on tiger beetles is usually an individual choice, not a committee decision. The journal *Cicindela* originally evolved from a newsletter in 1969, and it has been an important form of communication among amateurs and professionals for more than 35 years. Originally informal, primarily unrefereed, and largely written by amateurs, the writing style has become more formal and professional in terms of data presentation, citations, acknowledgments sections, and writing style. This journal publishes information on range extensions, descriptions of new species, and unusual natural history and behavior: subjects that are unlikely to be published by professionals. For more experimental and broader philosophical subjects, expert amateurs and professionals publish in a broad range of refereed international journals, a pattern similar to that seen in studies of other taxa.

The authors of tiger beetle field guides have experimented with a range of writing styles to try to attract a broader readership and initiates into tiger beetle studies. Some, such as Acorn's *Field Guide to the Tiger Beetles of Alberta* (2001), combine a readable style of species accounts and distributions interspersed with calculated informality and poetry. Most of the others have a range of style, from the near-stilted discourse usually associated with monographs to a compromise of limited jargon and uncomplicated sentences that will reassure professionals, but not intimidate readers new to the tiger beetles. This latter style is the one that the majority of successful field guides have adopted, but it is a difficult tightrope to walk.

**Illustrations.** As seen previously for bird field guides and now for Lepidoptera and Odonata field guides, an often personal confrontation is rising among some of the tiger beetle field guide authors about the best types of illustrations to incorporate.

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**Fig. 2.** Photograph of the white-striped tiger beetle, *Cicindela lemniscata*, taken in the field. Photo courtesy John Acorn.

The most common and accepted form of illustrating bird field guides is by painting individual species on plates that can be easily compared. These paintings are often prohibitively costly, and many publishers cannot justify their cost if the market is limited.

Photographs can be much less costly to produce, and they represent postures and a habitat context that are realistic. But, as mentioned previously, they are not popular among many users because of the difficulty of incorporating sufficient identifying characters in a single photograph. Many insect field guides initially have unproven markets, and photographs of insects in their natural habitat are considered the most appropriate for use in identifying species, as well as for hedging book profit margins. Indeed, field guides of some groups, such as caterpillars (Allen et al. 2005), succeed dramatically in their effort with photographs in the wild. Photographs of other groups, such as odonates and tiger beetles, although aesthetically pleasing and accurate in depicting behavioral postures and habitat substrates, arguably do not lend themselves so well in accomplishing one of the main goals of a field guide: revealing multiple, reliable characters for identification (Figs. 2 and 3).

As a compromise, McGavin (2000) for insects and Kaufman (2001) for birds pioneered the use of computer-enhanced photo illustrations in their popular field guides. Pearson et al. (2005) applied a similar process to their color illustrations in *A Field Guide to the Tiger Beetles of the United States and Canada*. With computer manipulations and pixel adjustment, this process combines the positive artistic and commercial aspects of photography, the advantages of a scientifically accurate painting, and many identifiable characters in a single illustration (Fig. 4).

**Division of Labor.** Expert amateurs have influenced studies of tiger beetles throughout history (Pearson and Cassola 2007). But now, as this taxon becomes more available and attractive to graduate

students, academicians, and other professionals seeking a study organism, a division of labor is becoming evident. As in many other taxa, field studies of distribution, declining populations, and descriptions of new species of tiger beetles have been taken over almost completely by amateurs. Professionals dominate more technical fields of spatial modeling, molecular studies, physiological adaptations, and conservation policy. The cooperation and mutual respect between professionals and amateurs is remarkable, but it may be largely due to the small cadre on both sides who find that they need each other to advance.

Field guides are likely to throw off this delicate balance. As they introduce larger numbers of participants to the thrills and joys of tiger beetles, ground-swell changes are almost guaranteed. As we have seen historically for studies of other taxa, a culture of cooperation is likely to decline when a rapidly growing number of enthusiasts join in. Many of these recent initiates no longer know each other personally, and more extreme views regarding collecting and other potentially disruptive turmoil are likely to arise. How the presently small world of tiger beetle workers can prepare for major changes is not yet clear. Perhaps knowing they are coming is the first important step.

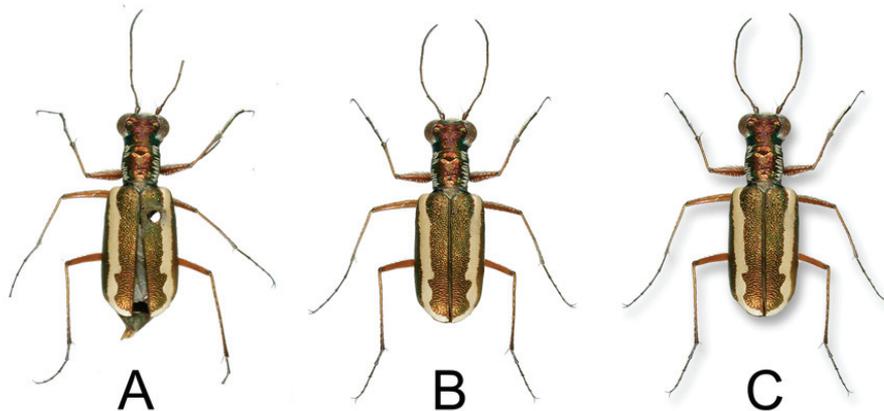


**Fig. 3.** Another photograph of the white-striped tiger beetle taken at a different angle in the field. Photo courtesy Kim Wismann.

### The Future

Published field guides in the form of books have many influences, but soon, the electronic revolution is likely to make many printed field guides obsolete. Electronic replacements will significantly speed the dissemination of knowledge and broaden the potential number of participants. Although the advantages are clear, some problems are likely to be magnified. For instance, with this acceleration of information, much of the buffering action of time to accommodate to changes will be eliminated.

In 1994, the electronic version of *Birds of North America* CD-ROM was published and released by Thayer Birding Software. (Cornell Lab. 2001) This was the first electronic field guide, and its CD-ROM



**Fig. 4.** Process of developing photo illustrations for the identification plates in *A Field Guide to the Tiger Beetles of the United States and Canada* (Pearson et al. 2005). (A) dried specimen of the white-striped tiger beetle, *Cicindela lemniscata*, removed from its pin and digitally photographed; (B) missing parts replaced and anomalies corrected using Adobe Photoshop software; (C) drop shadow added, courtesy Charles J. Kazilek.

combined photos, songs, videos, and side-by-side comparisons on the computer screen. Its authors claim that this is the future for learning to identify birds by sight and sound. There is also an Avian Jukebox and an entire section on birding hot spots, reviews of binoculars and scopes, bird clubs to join, links to birding Web sites, bird identification quizzes, and more. Free updates are available as new information on taxonomy, behavior, or range becomes available.

Similarly, Capinera et al. (2005) supplemented their recent field guide book to the Orthoptera of the United States with a Web site. Here, insect sounds and additional identification characters are available to identify species beyond the capability possible using the printed field guide alone.

However, even this technology is rapidly taking a back seat to iPods and other more recent electronic advances. This new equipment makes it possible to take sounds, descriptions, and pictures into the field on a tiny portable device with earphones. Its memory capacity challenges large desktop computers that, five years earlier, were top of the line.

Can we adapt? It appears as if we have little choice, but we hope that the positive outcomes of these modern field guide formats outweigh the problems. As available technology and formats for disseminating knowledge change, we can use history to anticipate the problems and plan the most useful transitions for both amateurs and professionals.

In a broader but parallel insight, the British social critics Charles Leadbeater and Paul Miller (2004) identified a rapidly growing involvement of amateurs in science from astronomy to medicine that is not fully recognized or used. These investigators are a new breed of largely self-trained experts or professional amateurs (Pro-Ams) who, using modern technology, such as the Internet, are producing significant innovations and discoveries in a wide range of fields. Leadbeater and Miller propose that the government and professionals need to facilitate the contributions of Pro-Ams and be prepared to share the stage with them so that there can be mutually beneficial advances in their shared field.

Technology is likely to make the borders separating professionals and amateurs less defined. Field

guides in whatever form are bound to be involved in this advance for many fields of entomology.

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- David L. Pearson** is a research professor in the School of Life Sciences, Arizona State University, Tempe, AZ 85287-4501. His primary areas of interest are ecology, conservation biology, and environmental education techniques. **John A. Shetterly** is an attorney at 127 Magazine St., Cambridge, MA 02139. He is an avid tiger beetle collector and bird watcher who has traveled extensively around the world pursuing birds and beetles. 

### ESA Contact Information:

Entomological Society of America  
10001 Derekwood Lane, Suite 100  
Lanham, MD 20706

Headquarters Phone: 301-731-4535

Data Processing Phone: (703) 234-4052, or (703) 234-4121

### Important E-mail addresses for ESA:

Certification (ACE or BCE) - [bce@entsoc.org](mailto:bce@entsoc.org)

Elections - [elections@entsoc.org](mailto:elections@entsoc.org)

General - [esa@entsoc.org](mailto:esa@entsoc.org)

Help Desk (AMT) - [amthelp@entsoc.org](mailto:amthelp@entsoc.org)

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