

SANBORN, A. F. 2014. Catalogue of the Cicadoidea (Hemiptera: Auchenorrhyncha). Academic Press/Elsevier, London, UK. Hardcover, ISBN 978-0-12-416647-9. viii + 1001 pp. US \$112.46.

All aspects of Sanborn's "Catalogue of the Cicadoidea" affirm this is a labor of love—carefully prepared, beautifully presented, easy to read, and durably bound. Based on this massive compilation, the superfamily includes two extant families: Tettigarctidae (with only 2 species in the Australian genus *Tettigarcta*) and Cicadidae (with 3 subfamilies, 40 tribes, 412 genera, and more than 2,900 valid species). Cicadas are conspicuous components of natural environments the world over owing to their distinctive male courtship calls, relatively large size, and, in the United States, spectacular mass emergences of *Magicalcada*. All cicadas feed on plants and, in depositing their eggs, females often injure the stems of various cultivated crops, shrubs, and trees. With subterranean nymphs and flying/singing adults, the fascinating life histories and great diversity among cicadas beg investigation. What better way to organize our knowledge of these insects than in a catalogue with taxa arranged based on phylogeny.

The "Contents" section (pp. v-vi, in the hardcover version) summarizes the higher classification, along with corresponding page numbers for families, subfamilies, tribes, and subtribes. It is perplexing that the electronic version of the work (accessed 7 March 2014) lacks these two pages, so essential to informing users of the catalogue's layout. Otherwise, the electronic and hardback versions seem to be identical in content.

The brief "Introduction" explains that this is the third in a series of catalogues and bibliographies on the Cicadoidea, which together summarize the published literature on cicadas. The format closely follows its predecessors—Metcalf's 1963 catalogue (covering the literature through 1955) and Duffels and van der Laan's 1985 supplement (1956-1980). Countries of distribution, however, are spelled out, rather than given as numerical superscripts. Sanborn focuses on the more recent literature, but includes a complete list of extant cicada taxa, with current combinations and synonymies, through 2012. Moreover, for each work published between 1981 and 2010, he gives data briefly summarizing the content of that publication under each taxon mentioned. The result is an invaluable resource.

The 715-page section "Catalogue of the Cicadoidea" is remarkably current and complete. Although the cut-off date of the bibliography is 2010, names of more recently described taxa are included. Thus, tracking the full citations for new taxa described since 2010, as well as recent taxonomic changes incorporated in the catalogue, may require outside resources. Using online search tools, I found the source of the synonymy of *Hyallessa* China, 1925 = *Sonata* Lee, 2009 is Hayashi

(2011), and many of the resulting new combinations first appear in Wang et al. (2014). These two sources were not even indexed in the online version of the Zoological Record as of 7 March 2014. Furthermore, Sanborn's emphasis on organizing the higher taxa based on recent phylogenetic studies enhances the predictive value of his classification over those that preceded it.

The "Summary Species List" is a simple checklist of all cicada taxa listing their synonyms, which provides a useful overview of the detailed catalogue. Based on this summary, I counted roughly 2,916 valid species, of which about 82 have 2-12 valid subspecies each. Counting the valid species and subspecies is arduous and problematic because some names are nomina nuda (unavailable) and others appear to be in taxonomic "limbo." Examples of the latter are "*Chremistica elenae madagascariensis*" and "*C. elenae seychellensis*," described subspecies of "*Chremistica elenae*," a species not treated as a separate entry in the catalogue and possibly itself a nomen nudum.

The "Bibliography" includes all references Sanborn could locate that mention a cicada genus or species in the work, a total of 2,591 publications. Thus, the catalogue and bibliography should serve all areas of biology, both basic and applied. The large number of taxonomic works by retired specialists underscores the urgent need to train new workers interested in descriptive taxonomy. The Duffels and van der Laan's 1985 supplement (falling in the 1981-2010 range of coverage) is omitted from both the bibliography and catalogue, presumably to avoid duplication. This is in contrast to the series of catalogues on treehoppers—by Funkhouser 1927, Metcalf and Wade 1965, McKamey 1998—where each supplement indexed the last previous catalogue, thus providing useful summaries of past records of distribution, as well as synonymy, for each species.

Two indexes complete the work. The "Index of Cicada Genus-group Names" lists 818 entries. Among these, I counted 413 valid genera (no subgenera appear to be recognized as valid at present). The "Index of Cicada Species-group, Subspecies and Intraspecific Names" lists more than 8,500 entries—many names are invalid (including synonyms and homonyms) or unavailable in terms of zoological nomenclature. A note (top of page 938) states, in part, "Currently valid taxa are listed in italics . . ." but a few italicized species-group names are nomina nuda, thus unavailable in terms of zoological nomenclature. With so many names, the indexes are critical to navigating the hardback version of the catalogue. Moreover, a comprehensive index (or indexes) covering all taxa and all three catalogues in the series would be helpful.

In a technical work of this magnitude and complexity, a few errors, inconsistencies, and omissions are nearly unavoidable. As a treehopper specialist, I struggled to find even minor flaws worthy of mention. On p. 616, the listing for "*Lembeja harderi* Jong and Boer 2004: 266" should read "type species of *Mariekea*" [not *Lembeja*]. In the summary species list (p. 756), under "*Becquartina*," "*B. octonotata octonotata* (Jacobi, 1920)" should read "*B. electa* (Jacobi, 1920);" also, under "*Cicada*," "*C. barbara* (Stål 1866)" should read "*C. barbara barbara* (Stål, 1866)." In the genus-group index, the pages listed for a few genera are incomplete (i.e., *Aedeastria*, add pp. "661-663"; *Rhadinopyga*, add "272-273"; *Thaumastopsaltria*, add "628-630"; and *Thopha*, add "79-81"). In the index to the species-group and infrasubspecific names, "*barbara* (Stål, 1866) *Cicada*" should be "*barbara* (Stål, 1866) *Cicada barbara*;" "*barbara lusitanica* Boulard, 1982 *Cicada*" should be "*lusitanica* Boulard, 1982 *Cicada barbara*;" "*Terpnosia nacua*" should be indexed as "*nacua* *Terpnosia*;" and "*Tettigonia spinosa* *Tettigonia*" should be indexed as "*spinosa* *Tettigonia*."

In the bibliography, capitalization varies among article titles: instead of ". . . western cicada killer wasps," one finds ". . . Western Cicada killer wasps" under Hastings 1986 and 1989a, and ". . . western Cicada Killer wasps" under Hastings 1990; "*Auchenorrhynchous*" in Lago & Testa 2000, and "*auchenorrhynchous*" in Wilson & Hillburn 1991; and "*Membracidae*" instead of "*Membracidae*" in Miranda 2006. Additionally,

the title of Akers' 2007 paper should read ". . . mountain [not 'mountains'] high. On Sunday 21st October IFFA held [not 'held'] . . ."

Fortunately for cicada enthusiasts, Sanborn continues Metcalf's high level of scholarship and exhaustive coverage. Collectively, the series of catalogues of the Cicadoidea document virtually everything written on cicadas, an amazing achievement. Sanborn's catalogue, the only current, complete listing of all cicada taxa and a crucial index to the literature since 1980, merits a place in entomological collections and libraries worldwide. It provides a wealth of information for all students, researchers, and others with a serious interest in cicadas and their significance in the natural world. Like its predecessors, this work will likely fuel a surge of research on cicada systematics, ecology, biology, and behavior.

REFERENCES CITED

- HAYASHI, M. 2011. Preliminary notes on some taxonomic changes in Japanese Cicadidae. *Cicada* 20: 2-5. In Japanese with English summary.
- WANG, X., HAYASHI, M., AND WEI, C. 2014. On cicadas of *Hyalessa maculaticollis* complex (Hemiptera, Cicadidae) of China. *ZooKeys* 369: 25-41. doi: 10.3897/zookeys.369.6506

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