

Apis amphibia, Cicada, Cimex, Cimices sylvestres, Tipulae... **The insects now known as Hemiptera,** **in Ulisse Aldrovandi's *De Animalibus Insectis* (1602)**

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Abstract

The great naturalist from Bologna, Ulisse Aldrovandi (1522-1605), is an important representative of scientific humanism in the late Renaissance: his activity was largely characterized by the re-elaboration of the knowledge of the Classical World and the Middle Ages. In his entomological work *De Animalibus Insectis Libri Septem* (1602), his interest for certain topics of morphological, functional, systematic and ecological character as well as for practical (e.g. medical) topics is notable also with regard to the insects we today call Hemiptera or Rhynchota. Of the many insects treated and illustrated by Aldrovandi in his book, a certain number are clearly those now known as Hemiptera. As regards these, much space is dedicated to cicadas, bed-bug and other bugs. Aldrovandi's woodcuts of these insects are among the earliest illustrations to be found in printed works. In the 16th century Aldrovandi's volumes with original watercolours preserved together his manuscripts in the University Library of Bologna, we can see the fresher, true to life illustrations of insects which served as a model for the woodcuts; not all the insects portrayed in the watercolours are, however, treated and reproduced in the book.

Key words: entomology, hemipterology, history, Italy, early authors, bugs, water-bugs, cicadas, hoppers.

Introduction

Bugs and cicadas have always interfered somehow with human life and activities, and have always interested man. In ancient civilizations we already find references to these insects, not only in the "scientific" literature, but also in poetry, fables and drama, where insects are used as symbols for character types, faults and vices, and behavioural traits characteristic of human nature. Renowned students and scientists of classical Greece, such as Aristotle, Theophrastus and Dioscorides, or of the Latin civilization, such as Varro and Pliny the Elder, wrote on cicadas and bugs, or on aphid galls and scale insects useful for man, driven by a purely speculative interest or with practical purposes in mind. In the Bible we find mention of coccids which today we can identify as kermes, and in the Talmud there are clear references to the bed-bug. Encyclopaedic or medical and pharmaceutical texts of ancient Far Eastern civilizations such as that of China, dating back to some centuries before Christ (e.g. the "Erh-ya"), or written about a millennium later (e.g. the "Pên-ts'ao-Kangmu"), contain references to cicadas, insects which since antiquity have enjoyed a high reputation as a food and also, especially in the Chinese pharmacopoeia, as a source of medicaments (Goidanich, 1954). Later on, we find traces of all the above-mentioned insects in the scientific literature of the Christian Middle Ages of Europe (in authors such as Isidore of Seville, Thomas of Cantimpré, Albert the Great, Pier Candido Decembrio, and others) and of the Arabic civilization (see for instance the texts of Al-Quazwini and ad-Damiri, dating back to the 13th and 14th centuries), until the Renaissance, when authors such as the Italian physician Pier Andrea Mattioli from Siena - a follower of Dioscorides -, as well as others, also dealt with these insects (Bodenheimer, 1928-1929).

With the Renaissance ends a long epoch as regards the progress of scientific thought in the Western World, an epoch which started in the Classical times; from this point of view the Renaissance to some extent represents the last stage of a continuum with the ancient world. The 17th century will be characterised by the ferments of a new approach to scientific topics and questions, a critical spirit reacting against the past, a refusal of the principle of authority, and the advent of the experimental method in accordance with the dictates of Francis Bacon and Galileo Galilei.

Aldrovandi's work

Ulisse Aldrovandi (1522-1605), born in Bologna, is an important representative of scientific humanism in the late Renaissance, being one of the greatest naturalists and zoologists of the 16th century. His works therefore represent, in a certain sense, the conclusive seal of an epoch. In the history of entomology Aldrovandi is remembered for his work *De Animalibus Insectis Libri Septem* (Aldrovandus, 1602), which however also leads him to be considered as the founder of the modern study of insects. He was the first author to dedicate a whole printed book specifically to insects, rich in references, notions and concepts taken from previous authors but also with many original observations and a large number of woodcuts illustrating the insects. Aldrovandi was professor for many years, also teaching natural history, at Bologna University; only late in life, when he was seventy-seven years old, he started the publication in Latin of his enormous work (Berlese, 1909; Montalenti, 1978; Nicoli Aldini, 2005). The many volumes of Aldrovandi's manuscripts and original watercolour illustrations of animal, plant and mineral subjects pertinent

to his observations, dating back to the second half of the 16th century and serving for the subsequent realization of printed works, are preserved in the University Library of Bologna (see BUB in the references) and are a precious source of reference for a deeper analysis of his way of thinking and working (Simili, 2004; Alessandrini and Ceragato, 2007; Nicoli Aldini, 2007); his activity was largely characterized by his re-elaboration of the knowledge of the Classical World and the Middle Ages. Son of his age, he was principally a follower of Aristotelianism. Of the many insects treated and illustrated in the approximately 800 in-folio pages of the *De Animalibus Insectis*, a certain number are clearly those that today we call Hemiptera or Rhynchota and, as regards these, much space is dedicated to cicadas and bed-bugs. Aldrovandi, while searching for a systematic arrangement of the insects, builds up a classification scheme (or at least a dichotomous key for identification, of practical use) based on rather heterogeneous criteria, not only the morphology but also including habitats and so on. He is still far off from recognising the Rhynchota as an unitary-physiognomy group; he was working, however, before the invention and diffusion of the microscope.

The cicada (figure 1) is included among terrestrial insects provided with legs and four membranous wings, and not comb-builders. In chapter XIII (*De Cicada*) of the Liber secundus, 36 pages deal with this insect alone, following a predefined schema, also used with minimal variations for other principal kinds of insects (bee, wasp, hornet, fly, mosquito, butterflies, locusts, and so on), covering the following topics concerning this subject: systematic position, homonyms, synonyms, external morphology, differences between “kinds” of cicadas, birth and reproduction, habitat, song, feeding, lifespan, methods for catching them, their importance for indicating weather and season, historical anecdotes, relations with religions, moral teaching from cicadas, hieroglyphic inscriptions, symbols, ancient coins, emblems, enigmas, apophthegms, epigrams, proverbs, epithets, fables, apologues, food uses, medical uses, etc. As can be imagined, in all this there is much humanistic and literary information (the above paragraphs are full of quotations from mostly Greek and Latin authors), revealing an encyclopaedic intent in a learned person who reports what was written in the past. In any case the interest shown for certain practical topics and for other topics of morphological, functional, systematic and geographic or ecological character is notable. For example, Aldrovandi records and discusses the opinions of the ancients about function of the rostrum and cicada feeding, way of sound production, metamorphosis and adult emergence; birth and reproduction are linked with the problem of spontaneous generation. The quotations from the ancients are not reported without comment: Aldrovandi is often expressly critical, although in the past he has been accused of not being so.

The bed-bug is treated in chapter II (*De Cimice*) of the Lib. quintus, which deals with exapod and wingless insects (including the tick!). 7 pages are dedicated to homonyms, synonyms, kinds of bugs, habitat, birth and reproduction, names deriving from this bug, prevention



Figure 1. U. Aldrovandi, *De Animalibus Insectis* (Bologna 1602), woodcut at p. 311: cicadas (adults and nymph).

of infestation, medical uses, etc. In this case, the amount of ancient literature treating the subject is smaller, so the author’s interest in some practical aspects stands out more clearly. In the following chapter (III, *De Cimicibus sylvestribus Plinii*), Aldrovandi draws our attention to many winged bugs, moving away from his own classification, because he finds that such insects, even if provided with wings and similar to beetles, are closer to the bed-bug because of the disagreeable smell they have in common, showing their affinity. This chapter is short but original, describing and illustrating briefly about twenty Heteroptera (including Pentatomids, Coreids, Lygaeids...) (figure 2). It is only right to add that in some tables of the printed book, some undue confusion among these insects and certain small Coleoptera is to be noted, due partly to errors made by the engraver when grouping the subjects for the book to be printed later from the original watercolours: Aldrovandi complains of these inconveniences in various passages of his book. Moreover, some other modern-day Hemiptera are considered in very separate parts of the *De Animalibus Insectis*: an insect we can today identify as a Notonectid of the genus *Notonecta* Linné, is considered in chapter IV of the Lib. primus, dealing with the comb-building insects, under the name “*Apis amphibia*”: a very vague resemblance and no behavioural affinity with the bees! Other water-bugs are treated instead in chapter I of the Lib. septimus, among aquatic insects with six legs, under the name “*Tipulae*”, a term which can already be found in ancient Latin authors, and which in some way alludes to the long, thin legs by means of which some of these insects are able to walk on the surface of water: we can today identify those described and illustrated by Aldrovandi as a possible Hydrometrid of the genus *Hydrometra* Latreille, and as a Nepid, *Ranatra linearis* (Linné) (figure 3).



Figure 2. U. Aldrovandi, *De Animalibus Insectis* (Bologna 1602), detail of the woodcut at p. 542: winged bugs (“*Cimices sylvestres*”); some of them are recognizable as Pentatomids, Coreids, Lygaeids.

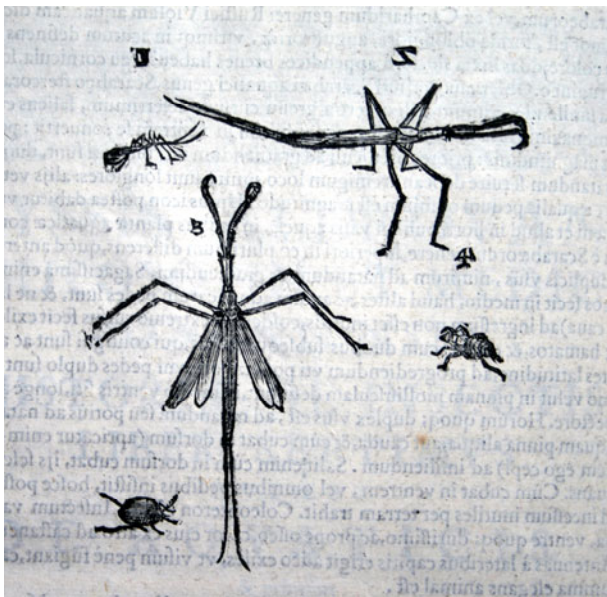


Figure 3. U. Aldrovandi, *De Animalibus Insectis* (Bologna 1602), woodcut at p. 708: the large Nepid, *Ranatra linearis* (Linné), and a possible Hydrometrid (top, on the left).

In the 16th century Aldrovandi volumes with original watercolours preserved in the University Library of Bologna (B.U.B., Ulisse Aldrovandi, *Tavole di Animali*), we can see the fresher, true-to-life illustrations of insects which served as a model for the woodcuts, and which today, in some cases, provide us with indispensable help in the identification of certain subjects in the printed work. Not all the insects portrayed in the watercolours are, however, treated and reproduced in the book: some of

them, perhaps due to the difficulty of placing them in the classification arrangement, are not there; as regards our Hemiptera, for instance, some hoppers are missing. In the watercolours, Aldrovandi more than once denominates these insects as “*locustacea insecta*”, clearly referring to their jumping ability. One of these watercolours represents for instance a Dictyopharid of the genus *Dictyophara* Germar and another undoubtedly corresponds to an unmistakable Cicadellid, *Ledra aurita* (Linné) (cf. B.U.B., U. Aldrovandi, *Tavole di Animali*, T. VII, c. 75, details). But only one or two uncertain hoppers, treated as young locusts, are illustrated in the book (Lib. quartus, chapter I, *De Locustis*).

If we consider the way Aldrovandi treated the insects we today call Hemiptera from a general point of view, we recognise some of his principal merits: his interest in biodiversity and his systematic aim to classify (among other things, his short descriptions in Latin of the represented subjects are a clear forerunner of the style which Linné was to adopt more than a century later), his exploitation of the iconography, his consideration of practical topics, and his very wide knowledge of past literary and scientific sources, which also makes his work a mine of information for the history of entomology. Really a great work which, as Bodenheimer (1928-1929) wrote about eighty years ago, deserves and waits to be studied and recognised for its true value.

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