



Larval morphology, development, and notes on the natural history of *Cephaloleia* “rolled-leaf” beetles (Coleoptera: Chrysomelidae: Cassidinae)

CARLOS GARCÍA-ROBLEDO^{1,3}, CAROL C. HORVITZ¹ & CHARLES L. STAINES²

¹Department of Biology, University of Miami, P.O. Box 249118, Coral Gables, Florida 33124–0421

²Department of Entomology, National Museum of Natural History, Smithsonian Institution, Washington DC 20560

³Author for correspondence. Current address: Departments of Botany and Entomology, National Museum of Natural History, Smithsonian Institution, P.O. Box 37012, Washington DC 20013-7012, E-mail: garciac@si.edu

Abstract

The Neotropical genus *Cephaloleia* Chevrolat, 1837 is comprised of 209 described species. Adults usually feed and mate within the scrolls formed by the young rolled leaves of plants of Neotropical Zingiberales. This paper reports for populations of *Cephaloleia belti* Baly, *C. dilaticollis* Baly, *C. dorsalis* Baly and *C. placida* Baly at La Selva Biological Station (Costa Rica, Central America) detailed descriptions of: 1. larval and adult diets and diet breadth; 2. egg, larval and pupal morphology; 3. larval development times; 4. dimorphic sexual characteristics; 5. adult longevity; and 6. differences in lifespan between genders. *Cephaloleia belti* displays the broader diet breadth, feeding on 14 species of three families of Zingiberales. *Cephaloleia dilaticollis* feeds on nine species of three families of Zingiberales. *Cephaloleia dorsalis* and *C. placida* feed on four species of Costaceae and two species of Zingiberaceae, respectively. Time to pupation ranges among species from 32.8 to 59.1 days. In the four *Cephaloleia* species, adult females are larger than males. Genders display marked sexual dimorphism in the shape of their last abdominal sternite and the pygidium. Longevity of adults ranged from ca. 300 to 390 days. Life expectancy estimates for adult beetles reared in the laboratory ranged from 111.5 to 187.2 days. Male and female adults of *C. belti* and *C. dilaticollis* have equivalent life expectancies. However, life expectancy is longer for male *C. dorsalis* and *C. placida*.

Key words: Cannaceae, *Cephaloleia*, Costaceae, Heliconiaceae, Larval development, life cycle, Marantaceae, sexual dimorphism, Zingiberaceae, Zingiberales

Introduction

The Neotropical genus *Cephaloleia* Chevrolat, 1837 is comprised of 209 described species (Staines 2008). *Cephaloleia* beetles (Cephaloleiini) are frequently referred to in the ecological literature as the “rolled-leaf” beetles. This is a guild of insect herbivores that usually feed and mate within the scrolls formed by young rolled leaves of Neotropical plants of the Zingiberales Griseb. (Strong 1981; 1982a, b; Staines 1996; 2008). Recent phylogenetic analyses revealed that the group previously known as “rolled-leaf” beetles is polyphyletic and includes the monophyletic genus *Cephaloleia* together with unrelated groups that have similar life histories, such as members of the “Arescini” (McKenna & Farrell 2005). This paper focuses on the natural history of *Cephaloleia*. Most species of *Cephaloleia* feed on the Neotropical families Cannaceae Juss., Costaceae Nakai, Heliconiaceae Nakai, Marantaceae R. Br. and Zingiberaceae Martinov (Order Zingiberales) (Staines 1996). *Cephaloleia* additionally have been reported feeding on Bromeliaceae Juss., Cyclanthaceae Poit. ex A. Rich., Cyperaceae Juss., Orchidaceae Juss., Poaceae Barnhart (McKenna & Farrell 2005), and Arecaceae Bercht. & J. Presl (Staines 1996; 2008).

The interaction between the Cephaloleiini and their hosts in the Zingiberales may be one of the oldest and most conservative plant-herbivore interactions (Wilf *et al.* 2000; McKenna and Farrell 2006). The origin of *Cephaloleia* is controversial. Estimates based on feeding tracks assumed to be produced by “rolled-leaf” beetles in Zingiberaceae from the latest Cretaceous and early Eocene suggest that ancestors of tribes