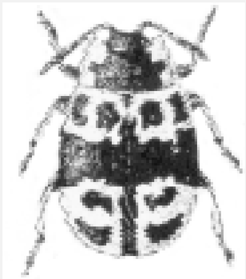

CHRYSOMELA newsletter

Dedicated to information about the Chrysomelidae

Report No. 45 December 2005

Symposium on Biology and Ecology of Tropical Chrysomelidae

Uberlandia, Brazil, July 2005

(See Story page 3)

Some participants, left to right: Alex Trillo, Vivian Flinte, Flavia Noguiera de Sa, Yanett, Fredric Vencl and Donald Windsor.

Research Activities and Interests

Elisabeth Geiser (Salzburg, Austria) recently finished a checklist of the chrysomelids of Austria. This is the first part of a new series 'Checklists of the Fauna of Austria',edited by the Austrian Academy of Science. The chrysomelid list will be the model for similar future publications on other insect groups. Elisabeth is currently working on problems of multiple synonyms proposed in the last 100 years for Central European species. The chaos of names ecology, animal architecture, behavioral isolation, ecological specialization, ecology, and evolution.

Geoffrey Morse (Davis, USA) is currently researching the phylogenetics of the Bruchinae. He is currently finishing work on the genus *Stator* and is intending to begin work soon on the genera *Acanthoscelides* and *Dahlibruchus*. He is willing to identify New World specimens, and is familiarizing himself with Old World species, and would therefore appreciate any specimens.

Konstantin Nadein (St. Petersburg, Russia) is a Ph.D. student interested in the taxonomy, morphology, evolution, cytogenetics, and ecology of flea-beetles. His thesis is a "Review of the flea-beetles of the genus *Psylliodes* Latr. of the fauna of Russia and adjacent countries". Taxonomic reviews of several species-group of the genus *Psylliodes* and revisions of the genera *Aeschrocnemis* Wse. and *Mniophila* are in progress.

Walter Steinhausen (Innsbruck, Austria) is continuing his research on the larvae and pupae of Palaearctic Chrysomelidae and has recently published descriptions of

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The Editor's Page

Caroline S. Chaboo (USA)

Dear Chrysomelid Colleagues:

Unfortunately there were fewer article submissions this year and we have a single issue for 2005. Hopefully this decline in submissions is only temporary, and more stories will appear in next year's volume.

I thank all the contributors for their interest in and support of the newsletter. I believe everyone will enjoy reading these articles and viewing the terrific photos of beetles and places. It has been an exciting year with many superb publications, and a successful meeting in Brazil thanks to Flavia Noguera de Sa's dedication (page 3). The promising research of Vivian Flinte (page 4) is another indicator of the great tradition of chrysomelid research in Brazil. Duane McKenna is an upcoming American chrysomelidologist whose work you can read about on page 7. More established researchers have also contributed interesting aspects of their research. Adding great visual interest are Kenji Nishida's stunning images of Costa Rican chrysomelids - please send any identifications to Kenji.

One project I plan to spearhead is to extend the current list of chrysomelid literature cited in Chrysomela and available at the Coleopterists Society website, http://www.coleopsoc.org/chrys/chrylit1_42.pdf to include ALL literature on Chrysomelidae. If you maintain your own digital chrysomelid literature lists, especially in groups of your interests, it would be very helpful to copy text files to me so we can incorporate, expand and update a universal list. This would be a very valuable resource for all of us in the chrysomelid community and to the broader scientific community.

Guidelines for submission of articles for inclusion in Chrysomela are now available (page 20). Please email me if you have additional questions or suggestions.

Until June 2006, I wish you a very happy New Year!!

Chrysomelidae in Costa Rica

Please send identification to Kenji Nishida.

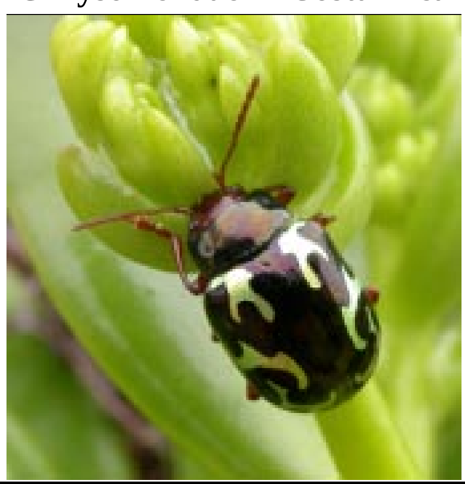
MORE RESEARCH UPDATES

immatures in the genera *Donacia, Chrysolina, Cyrtonus, Timarcha, Phratora, Apthona, Arrhencoela, Longitarsus, Derocrepis, Mniophila* and *Sphaeroderma*.

Vivian Flinte (Rio de Janeiro, Brazil) has completed her MSc. thesis and will continue doctoral research at the Universidade Federal do Rio de Janeiro on the genus *Fulcidax* and chrysomelid diversity in restinga habitats of Brazil. She describes her research on page 4.

Fernando Angelini (Brindisi, Italy) is interested in the Chrysomelidae of Europe and would like to exchange specimens.

Chrysomelidae in Costa Rica



Please send identification to Kenji Nishida, knishida@cariari.ucr.cr.edu

The Newsletter Chrysomela-Founded 1979-is published semiannully, usually in June and December by the American Museum of Natural History, Division of Invertebrate Zoology, Central Park West @ 79th St., New York, NY, 10024. E-mail: chrysomela@coleopsoc.org; telephone: 212.313.7784. This newsletter is sent to students of Chrysomelidae to encourage the exchange of ideas and to disseminate information on these insects. **Editor:** Caroline S. Chaboo, New York. Advisors: Brian D. Farrell, Cambridge; David Furth, Washington, R. Wills Flowers, Tallahassee; Elizabeth Grobbelaar, Pretoria; Pierre Jolivet, Paris; Alex Konstantinov, Washington; Chris Reid, Sydney; Ed Riley, College Station; Al Samuelson, Honolulu and Terry N. Seeno, Sacramento.

Symposium on Biology and Ecology of Tropical Chrysomelidae
Uberlandia, Brazil, July 2005

Flávia Nogueira de Sá (Brazil)

The First Symposium on Biology and Ecology of Tropical Chrysomelidae, organized by the author, took place during the Annual Meeting of the Association for Tropical Biology and Conservation (ATBC), in Uberlandia (the heart of Brazil), July 2005. Seven chrysomelidologists

Figure 1. The author (left) with João Vasconcellos-Neto.

from the Americas presented talks on the latest results of their research on tropical leaf beetles: **Paula A. Trillo**, University of Montana (USA), presented "The Evolution of Primary and Secondary Sexual Characters in the Chrysomelid Beetle *Acromis sparsa*.", **Fredric V. Vencl,** Stony Brook University (USA) and The Smithsonian Tropical Research Institute (Panama), presented "Dietary specialization influences the efficacy of larval tortoise beetle shield defenses .", **João Vasconcelos Neto**, State University of Campinas (Brazil), presented "Interactions between *Erechitites valerianaefolia* DC. (Asteraceae) and *Agatomerus signatus* Klung, 1824 (Megalopodinae, Chrysomelidae).", **Lenice Medeiros,** UNIJUI (Brazil), presented "Influence of plant trichomes type and density on feeding behavior and performance of Cassidinae (Coleoptera, Chrysomelidae) larvae in South Brazil.", **Judith X. Becerra,** from University of Arizona (USA), presented "Coevolution between Blepharida beetles and their Bursera hosts", I presented "Evolutionary significance of fecal shields in tortoise beetles." and **Donald Windsor,** Smithsonian Tropical Research Institute (Panama), presented the talk "Sexual characters, life history and phylogeny of selected tortoise beetles in the Tribe Stolaini". All talks were wonderful and I was very glad to realize that so many interesting and important work has been conducted on chrysomelids.

During the ATBC meeting itself, **Fernando Friero Costa,** UNILAVRAS (Brazil), presented a poster on parental care in *Doryphora* (Chrysomelidae: Chrysomelinae).

On July 30, Alex Trillo, Donald Windsor, Fredric Vencl and I took a plane from Uberlandia to Rio de Janeiro and then we drove to Macae, a city about 200 km from Rio, on the coast. We spent the weekend there, doing survey fieldwork at Restinga de Jurubatiba National Park. Restinga is a shrub vegetation located on sandy soils along the

Figure 2. Alex Trillo, Vivian Flinte, Fredric Vencl, Donald Windsor, andYanett stop to observe an insect and ex-

Figure 3. A view of the restinga and one of its coastal lagoons.

coast of Brazil. During our visit to the Park, Vivian Flinte, a chrysomelidologist and PhD student at Federal University of Rio de Janeiro, guided us showing wonderful animals and telling us interesting stories about different aspects of insect-plant interactions. Both field days were fantastic and sunny! We were all amazed at the opportunity to find lots chrysomelids in the wintertime; especially the hispines

(continued on page 14)

Chrysomelid fauna in Brazilian restinga habitats and the chlamisine *Fulcidax*

Vivian Flinte (Brazil)

Several students of our group have been studying since the year 2000, the Chrysomelidae fauna associated with different host plant species in a restinga (coastal sand dune) environment in southeastern Brazil, in the state of Rio de Janeiro. As an undergraduate and as a part of my

Figure 1. Restinga habitat, Brazil.

Master's project, I concentrated on the chrysomelid beetles on a very common plant in the National Park of Restinga de Jurubatiba, where only a few research projects concerning insect species had occured. The plant *Byrsonima sericea* belongs to the Malpighiaceaen family and occurs either in a shrub or an arboreal form in the restinga. Five Chrysomelidae species were found on the plant, all members of the subfamily Chlamisinae. This is a relatively small group, with approximately 300 species described, most of which occur in Brazil, and includes small chrysomelide beetles, often exhibiting brilliant metallic colors and many protuberances on the body. Females of this group cover their eggs with feces and glandular substances and the larvae live inside an excremental shell, adding more fecal layers to it as they grow. Finally, the larvae pupate within this case and teneral adults remain inside until fully sclerotized. Some studies indicate that the larval fecal case used by many chrysomelide larvae is an efficient protection against natural enemies, such as predators and parasitoids. Among the five species found on *B. sericea*, only *Fulcidax monstrosa* (F.) was identified. This is one of the biggest of the chlamisine species, reaching a little more than one centimeter in length, while the other four species measure not more than a few millimeters. *Fulcidax monstrosa* had aspects of its biology and behavior and its population fluctuation described during almost four years, resulting in three different papers. Both adults and larvae chew young stems, and when these are ringed around the whole circumference, it causes the

Figure 1. Restinga habitat, Brazil. *Figure 2. Adults of* Fulcidax. *Figure 3. Mating in* Fulcidax. *Figure 4. Oviposition. Figure 5. Egg. Figure 6. Larva. Figure 7. Pupa.*

death of the stem. It was interesting to find that the population phenology of the species is related to the food resource availability, and adults seem to undergo diapause inside the pupal case to synchronize their emergence with the beginning of new stem growth. This is probably one of the reasons why the development time is so long, approximately eight months from the oviposition until the adult emergence. It is a highly seasonal species, for all stages of development and the period of occurrence is similar each

Figure 7. Stem girdling by Fulcidax monstrosa.

year. For my PhD, I will study the Chrysomelid fauna in the National Park of Serra dos Órgãos, an important Atlantic forest mountain reserve in Rio de Janeiro State. The objectives are to describe the Chrysomelidae species composition in this area, comparing it altitudinal differences, and to study aspects of the ecology and biology of the most representative species. The Atlantic forest is one of the richest and most threathened biomes in Brazil and there are only a few limited studies on Chrysomelidae, one of the largest and most diverse Coleoptera families. Malaise traps and visual surveys will be used in the study, which should last until 2008, and specimens will be kept in the collection of the Laboratory of Insect Ecology, at the Federal University of Rio de Janeiro.

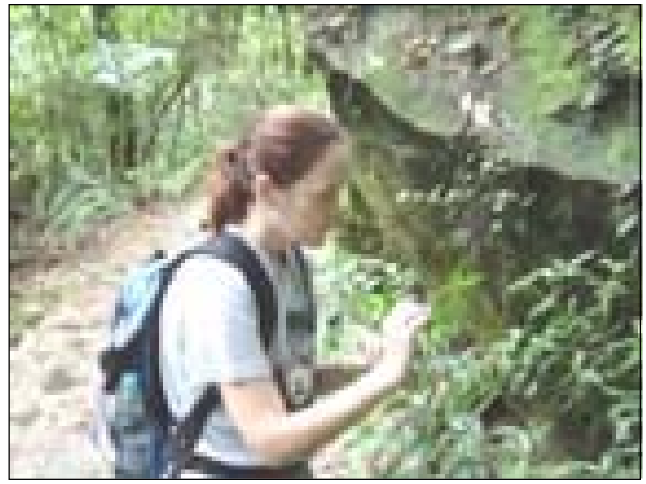


Figure 8. The author collecting in Brazil

We are interested in literature on Chrysomelidae biology, ecology, behavior, population fluctuation dynamics and altitudinal distribution is welcome. We are also interested in Chrysomelidae surveys in forests, which could serve as comparison for our own work. We can borrow or exchange *Fulcidax monstrosa* specimens for others *Fulcidax* or other Chlamisinae species.

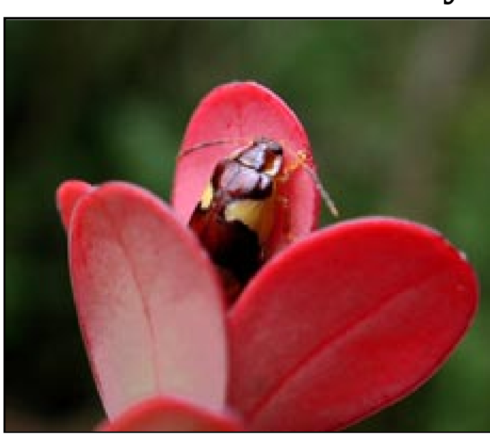
Recent Publications:

Flinte, V., Macedo, M. V., Vieira, R. C. & Karren, J. B. 2003. Feeding behavior of *Fulcidax monstrosa* (Chlamisinae) on its host plant *Byrsonima sericea* (Malpighiaceae). In: Furth, D. G. (ed), *Special Topics in Leaf Beetle Biology. Proceedings of the Fifth International Symposium on the Chrysomelidae*, Sofia-Moscow, Pensoft Publishers, pp. 155-159.

Flinte, V. & Macedo, M. V. 2004. Population ecology of *Fulcidax monstrosa* (Chlamisinae). In: Jolivet, P. H., Santiago-Blay, J. A. & Schmitt, M. (eds), *New developments in the Biology of Chrysomelidae*, The Hague, SPB Academic Publishing, pp. 623-631.

Flinte, V. & Macedo, M.V. 2004. Biology and seasonality of *Fulcidax monstrosa* (F.) (Chrysomelidae: Chlamisinae). *The Coleopterists Bulletin* 58(4): 457-465.

Chrysomelidae in Costa Rica



Please send identification to Kenji Nishida, knishida@ cariari.ucr.cr.edu

Alticinae Studies at US National Museum of Natural History

Grace F. Barroga (Philippines)

I am currently doing a project on "*Philippine leaf-feeding beetles of the subfamily Galerucinae (Coleoptera: Chrysomelidae: Alticini) of Important Food Plant Crops and Ornamentals*" at the University of the Philippines-Los Banos (UPLB). This is a 2-year project that started out on August, 2003. I corresponded with Dr. Alexander S. Konstantinov, curator of Chrysomelidae at the Systematic Entomology Laboratory, USDA, ARS about some type specimens and Philippine materials (i.e. Baker materials), and he suggested that it would be best if I can come over to the National Museum of Natural History (NMNH), Smithsonian Institution at Washington D.C., and study the specimens there myself. I applied for the Smithsonian's short-term visitor program (full sponsorship) and I was granted the award on December 16-31, 2004.

Figure 1. Grace F. Barroga in Washington, D.C.

Within the two-week period, I have examined 46 genera, 101 species and subspecies, 25 holotypes, 21 paratypes and 917 specimens of Philippine Alticini from the collections at the NMNH. These collections were mostly obtained by Baker, who was in the Philippines in the early 1900's. Collections came from different localities all over the country and were largely identified by Dr. Konstantinov. Twenty-three new references on the insect group were also obtained from his reference library. From the study of these literature and the above collections, the checklist of Philpppine Alticinae was updated. From an original finding of 36 genera and 93 species, the total number of genera rose up to 55 genera and 243 species and subspecies. Aside from obtaining literature and examining the various collections in the institution, I also learned from Dr. Konstantinov his technique for dissecting very small specimens. During this visit, I also brought 120 specimens of Alticini from our museum in the Philippines (Museum of Natural History, UPLB). The identities of these specimens were verified via comparison with type specimens and other holdings at NMNH, and with the use of literature (e.g. original descriptions). References regarding other insect groups (Hispinae and other Chrysomelidae, Cerambycidae and Bruchidae) and other articles were also obtained from Dr. Charles Staines and Dr. Steve Lingafelter.

Figure 2. (From left): Boris Korotyaev, Steve Lingafelter, Catherine Duckett, Grace Barroga and Alexander Konstantinov.

I am deeply grateful to Dr. Konstantinov, the Smithsonian Institution and the staff of the Entomology laboratory for the opportunity to study Philippine specimens at NMNH, for the warm welcome and all help during the visit. I am also very thankful to Dr. Catherine Duckett who offered her apartment for me to stay in during my visit, and to Dr. Charles and Sue Staines for all hospitality. It has been very rewarding and enriching, having also experienced there the winter season for the first time.

Chrysomelidae in Costa Rica

Please send identification to Kenji Nishida, knishida@cariari.ucr.cr.edu

Entomological Adventures in the Southern Atlantic Autonomous Region of Nicaragua

Duane McKenna (USA)

In late March and early April of 2003 I traveled to the Atlantic Coast of Nicaragua in the vicinity of Bluefields and Pearl Lagoon to study and collect Zingiberales leaf roll feeding hispine beetles (RLHB for short) in the genera *Cephaloleia* and *Chelobasis* (Cassidinae) with assistance from the staff of Proyecto Biodiversidad (a project of the Universidad de las Regiones Caribeños Nicaraguenses - URACCAN). Financial support was provided by the Harvard University Museum of Comparative Zoology Putnam Expeditionary Grant Program.

Figure 1. Aerial view of gallery forest and savanna during the heart of the dry season (March, 2003) northwest of Bluefields, Nicaragua. Notice the recently burned and cleared areas near the farm on the left (south) side of the picture.

Cephaloleia. *Cephaloleia* (Cephaloleiini) feed only on Monocotyledonae, especially the immature rolled leaves of plants in the order Zingiberales (Cannaceae, Costaceae, Heliconiaceae, Marantaceae, Zingiberaceae, and occasionally, non-natives such as Sterlitziaceae and Musaceae). *Cephaloleia* can be found in a diversity of tropical and subtropical New World plant communities. At least 200 species have been described. All life stages and most behavior take place on host plants. Larvae are exophagous and usually feed on the same hosts as adults.

Chelobasis. *Chelobasis* spp. (Arescini) feed only on the immature rolled leaves, petioles, and inflorescences of Neotropical *Heliconia* (Heliconiaceae). There are probably fewer than 25 species in the genus, all of which show remarkable color polymorphism (Figure 2). All life stages and most behavior occur only on host plants. Larvae are exophagous and feed on moist and mostly concealed host plant surfaces.

Bluefields & Pearl Lagoon Ecosystems

Hurricane Joan dramatically altered Bluefields and Pearl Lagoon ecosystems in 1988, devastating several hundred thousand ha of forest. During the following dry season, fires ravaged large areas of recovering vegetation (Urquhart 1997; Vandermeer et al. 1990). The vegetation that we encountered thus bore signs of a complex and varied disturbance history. In some places, large old trees (e.g., *Dipteryx panamensis*), were especially noticeable emerging from the otherwise hurricane-devastated forest. Many large trees that remained standing showed signs of having lost large portions of their canopies, and others had apparently resprouted after being snapped off. Immediately adjacent to Bluefields and Pearl Lagoon much of the land that we saw had been recently burned and/or was in cultivation or pasture.

Figure 2. Male Ch. perplexa *(A.), attempting to dislodge another male (B.) mating with a female (C.) in a* Heliconia pogonantha var. pogonantha *leaf roll.*

Away from towns and agricultural areas we encountered a diversity of terrestrial and emergent aquatic plant communities including lowland tropical wet and humid rain forest with *D. panamensis*, *Pentaclethra macroloba*, and many other typical lowland tropical wet Atlantic slope tree spp., fresh water swamp forest with *Raphia taedigera*, *Carapa nicaraguensis*, *Prioria copaifera*, *Pterocarpus officianalis*, etc., mangrove forests, and Caribbean pine savannas. Some of the most apparent woody plants in the savannas we visited were *Acoelorrhaphe wrightii*, *Byrsonima crassifolia*, *Pinus caribaea* var. *hondurensis*, *Quercus oleoides*, and shrubby Melastomaceae and Myrtaceae (Figures 1, 3).

Collecting near Bluefields & Pearl Lagoon

Our travels throughout the region were conducted by

Continued next page

Continued from previous page

boat and on foot. We used the labyrinth of canals, rivers, and lagoons in the area to access a sample of the forested and open habitats characteristic of the region.

La Union (mostly disturbed secondary rain forest on residual soils and disturbed alluvial forest).
Our first collection site was near a small farm at La Union on the Rio Escondido northwest of Bluefields. The hurricane ravaged regenerating forest at this site supported a rather limited diversity of *Cephaloleia* and *Chelobasis* host plants in the order Zingiberales. The lack of diversity of potential hosts coupled with the regionally intense dry season made for less than ideal collecting conditions, but we managed to find several typical Atlantic slope *Cephaloleia* spp., and *Ch. perplexa*. To my knowledge, *Ce. ornatrix* and *Ch. perplexa* had not previously

Figure 3. Edge of Pinus caribaea *savanna near Haulover at the southern end of Pearl Lagoon. Although heavily human-impacted, this savanna retains much characteristic flora.*

been reported from Nicaragua. *Cephaloleia fenestrata* was notably absent from its only known host, *Pleiostachya pruinosa* which was abundant at this site.

RLHB collected: *Ch. perplexa* (*Heliconia pogonantha*), *Ce. dorsalis* (*Costus* sp.), *Ce. suturalis* (*Costus* sp.), *Ce. trivittata* (*Calathea marantifolia, Pleiostachya pruinosa*), *Ce. stevensi* (*Calathea marantiifolia, C. micans*), *Ce. sallei* (*Heliconia pogonantha, H. wagneriana*), *Ce. ornatrix* (*Heliconia pogonantha*), *Ce. belti* (*Heliconia pogonantha, H. wagneriana, Pleiostachya pruinosa, Canna generalis*).

Pearl Lagoon: Haulover, Rocky Point, others (hurricane impacted and otherwise mostly disturbed forests and Caribbean pine savanna). Our later travels were further north to several sites in and near Peal Lagoon, an approximately 52,000 ha lagoon fed by four major rivers and numerous creeks. It is the largest lagoon on Nicaragua's Caribbean coast. Pearl Lagoon is approximately 55 km north of Bluefields. The basin surrounding the lagoon contains one of the largest remaining nearly intact blocks of lowland tropical forest remaining in Central America. We arrived at Pearl Lagoon by boat and explored several sites on foot.

Figure 4. The author at work.

Despite the diversity of habitats we encountered, we found most of the same Zingiberales spp. and attendant beetles in the genera *Chelobasis* and *Cephaloleia* as we found near La Union.

RLHB collected: *Ch. perplexa* (*Heliconia pogonantha*), *Ce. erichsonii* (*Calathea gymnocarpa*), *Ce. stevensi* (*Calathea micans*), *Ce. sallei* (*Heliconia latispatha, H. pogonantha*), *Ce. ornatrix* (*Heliconia pogonantha*), *Ce. belti* (*Heliconia latispatha, H. pogonantha, H. wagneriana*).

Summary

Our collecting in the Bluefields-Pearl Lagoon region extended the known geographic ranges of several RLHB species, but failed to uncover new species. The Zingiberales-feeding rolled leaf hispine beetle fauna of the area was a subset of that found in similar forests further south (e.g., Tortuguero, Costa Rica). In fact, the number of RLHB species decreases from Barro Colorado and Tortuguero, Costa Rica as one heads north into Nicaragua through Indio Maiz National Park, Bluefields, and into Pearl Lagoon. Rainfall and host plant species richness also decrease from south to north along this transect of nearly continuous forest.

If you are interested in visiting this area, I would be happy to share tips with you about traveling in the region and direct you to contacts in Nicaragua. This amazing wilderness is changing rapidly with the development of of new roads and changes in the regional political situation
new roads and changes in the regional political situation.

Citations given on page 15

Biology and pest management strategies for the sunflower beetle in cultivated sunflower in North America

Larry Charlet (USA)

Sunflower (*Helianthus annuus* L.) (Asteraceae) is one of only a few agricultural crops in North America cultivated in close proximity to its native host plants of which there are approximately 50 recognized species (Seiler and Rieseberg, 1997). This situation allows for the movement of insect pests, which have evolved on native sunflowers, into the domesticated plantings. A number of insect species have thus become frequent pests of commercial sunflower requiring management to limit economic losses (Charlet et al. 1997, Charlet 1999).

The sunflower beetle, *Zygogramma exclamationis* (F.), (Coleoptera: Chrysomelidae), is the only major defoliating pest of sunflower (*Helianthus annuus* L.). in North America and occurs from Texas to Manitoba, Canada. This species feeds on both cultivated and native sunflower. Economic damage has been confined to North and South Dakota and Minnesota in the U.S. and Manitoba, Canada. Adults overwinter in the soil and emerge during May to early June and feed on the first available sunflower foliage. Beetles mate shortly after emergence and eggs are deposited on wild or volunteer sunflower until cultivated plants become available. Larvae develop through four instars and feed on plants from mid-June through late July. Mature larvae move off the plants and pupate in the soil, emerging as new-generation adults from late July to early August. These adults usually cause minimal damage to sunflower and leave the plants by mid-September to overwinter in the soil. There is one generation per year. Both the adult and larval stages consume the leaf tissue. Larval populations of 25 or more per plant can completely defoliate a plant and reduce yields by as much as 30%. Population densities of only two adults per plant plus the resulting larval feeding can reduce seed yield by over 20% (Westdal 1975, Charlet et al. 1997, Knodel et al. 2002).

Figure 1. Lebia *eating* Zygogramma *larvae.*

The primary control strategy for the sunflower beetle by sunflower producers has been the use of insecticides directed at either the adults or larvae feeding on the sunflower leaves. While this tactic has proven to be successful, the use of an integrated pest management (IPM) system provides long-term benefits. IPM utilizes a number of different approaches including host-plant resistance, cultural control, biological control, relying on pesticides only as a last resort to reduce populations below economic injury levels. Reliance on pesticides can result in resistance of the pest and destruction of both pollinators and natural enemies of both the sunflower beetle and other sunflower pests as well. Knowledge about the pest's biology and population dynamics is also essential in order to implement an effective IPM strategy.

A series of studies were to conducted to investigate aspects of the biology of the sunflower beetle, its overwintering and emergence pattern, the impact of tillage or cultivation on adult survival, the natural enemies (parasitoids and predators) attacking the larvae in native and cultivated sunflower, and whether altering planting dates could reduce the impact of sunflower beetle feeding on cultivated sunflower.

Egg production and longevity. Based on a two-year laboratory study, sunflower beetle females produced an average of 646 eggs over a period of 53 days with a mean of 12 eggs laid per day (Charlet 2003b). Total egg production by females ranged from about 200 to almost 2000 eggs. A study of populations of the sunflower beetle from the southern Great Plains, conducted by Rogers (1977), reported a longer oviposition period (75 days), a similar daily egg production (15 eggs per day), and a somewhat higher total egg production (1027 eggs). Males lived longer than females surviving an average of 76 days and females

63 days. Longevity for males and females in Rogers' (1977) laboratory studies was 93 and 91 days, respectively. A mean of 74% of the eggs deposited by the females were fertile and hatched in the laboratory, which was similar to Rogers' (1977) findings of 71% survival. In the field we have found that egg survival is somewhat lower, due to either environmental conditions or lack of males for mating.

Overwintering biology. Based on two-year overwintering and emergence pattern study, overwintering beetles were not recovered in any of the soil samples from the field margin collected in May 1996, but adults were in 73% of the soil samples from within the field (Charlet 2003b). Adults that were recovered were collected at both the 0-5 cm and 5-10 cm soil depth, with the majority in the layer closer to the soil surface. Results were similar in the soil samples collected in the fall. No adults were present in any of the soil from the field margin, but were in soil samples from within the field. In the fall collections, adults were only recovered in soil at the 5-10 cm depth, with none at the 0-5 or 10-15 cm depth. Since sunflower beetle adults were collected closer to the surface in the spring samples, it is possible that they overwinter at 5-10 cm below the surface and move up in the soil in the spring prior to emergence. Findings from May 1997 were similar to the investigations on overwintering sites from 1996. Overwintering sunflower beetle adults were more abundant within the field than at the margin and the majority were located in the upper 5 cm of the soil surface. Results strongly indicate that the adults do not move away from the field to overwinter.

Impact of Cultivation on Survival. Results from a two-year study showed that disturbing the overwintering adults in the soil by cultivating the field either in the fall or spring did not reduce adult emergence from the soil in the spring and summer (Charlet 2003b). Although studies with another sunflower pest, the red sunflower seed weevil, *Smicronyx fulvus* LeConte (Coleoptera: Curculionidae) revealed that tillage could be used as a control practice to reduce adult emergence (Gednalske and Walgenbach 1984), neither fall nor spring cultivation in these studies reduced survival of overwintering sunflower beetle adults.

Natural enemies. Sunflower beetle larvae were recovered from 5 of 6 native sunflower species sampled in 1995 and 1996 in North Dakota and Minnesota (Charlet 2003a). These included *Helianthus annuus*, *H. tuberosus*, *H. nuttallii*, *H. petiolaris*, and H. *maximiliani*. None were collected on *H. pauciflorus*. Parasitoids were present in larvae from the different species and were all the parasitoid, *Myiopharus macellus* (Reinhard) (Diptera: Tachinidae). Parasitism was as high as 72% in larvae recovered from some species of *Helianthus*. Because beetle numbers were low at some locations, it is evident that this parasitoid is very efficient in searching for beetle larvae at different population densities.

The dissections of the larvae from the different fields in 1997 revealed no difference in rates of larval parasitism by *M. macellus* among any of the four locations (edge to 60 m inside the field) sampled in five commercial sunflower fields. In 1998, results were similar although a slightly higher rate of parasitism was noted at sites 20 m in the field compared to other locations. Results indicated that the adult parasitoid is capable of effectively searching throughout the field. The overall parasitization rates among the field sampled were very low in 1997 (4 to 7% of larvae attacked) compared with 1998 (7 to 15%). These rates were quite different than those reported earlier by Charlet (1992) which had been over 50% in some years. The reasons for the lower parasitism could not be accounted for by insecticidal treatment because many of the fields sampled during the two years had not been sprayed during the season.

There are a number of different insect predators recovered from sunflower fields that were shown in the laboratory to feed on the different life stages of the sunflower beetle. These included the lady beetles *Hippodamia tredecimpunctata tibialis* (Say), and *H. convergens* Guerin-Meneville, green lacewing, *Chrysoperla carnea* Stephens, the spined soldier bug, *Podius maculiventris* (Say), the stink bugs, *Perillus bioculatus* (Fabricius) and *P. circumcinctus* (Stal) (Fig. 2), the carabid beetle, *Lebia atriventris* Say (see Fig. 1).

Planting date Planting date was evaluated as a potential management tool, using three seeding dates, in a variety of production regions throughout North Dakota from 1997 to 1999, for its impact on sunflower beetle population density of both adults and larvae, defoliation caused by both feeding stages, seed yield, oil content, and larval parasitism in cultivated sunflower. Among the four different locations studied in 1998, peak adult density occurred in mid-June in most sites, but was shifted to the end of June or early July in 1999 (Charlet and Knodel 2003). In 1998 the greatest larval populations occurred between early to mid-July, but in 1999, they were more variable with the greatest density occurring from late-June to late-July. In both 1998 and 1999, among all locations, the data showed that the latest planting date had the least number of both adults and larvae. The combined data for all four locations in 1998 and 1999 also showed that defoliation was significantly different among all dates with the least damage at the third planting date. Seed yield comparisons in 1998 from the different planting dates, although not as consistent as the defoliation data, did show that at most locations seed weights were less at the first planting date compared to the third planting date. However, in 1999 the data was less consistent with two of the four locations having no difference in yield among dates. The lack of response in yield to the defoliation shown in 1999 was probably because of the lower densities of the sunflower beetles and consequently the differences were due to factors other than feeding. Combining the data for all locations in 1998 showed that parasitism of beetle larvae by *M. macellus* was the same among the dates. Data from 1999 showed that overall parasitism was greater than the previous year at most locations and that parasitism was not different among

(continued on next page)

*(**Sunflower beetle,** continued from previous page)*

dates at two locations. The combined data for all sites showed that there was slightly less parasitism at the first date, but no difference between the second and third dates. The results of this investigation showed the potential of planting date as an effective nonchemical management strategy to reduce numbers of sunflower beetle adults and larvae and the resulting defoliation. Delayed planting also prevented yield reduction caused by the leaf destruction of the sunflower beetle. In addition, this IPM tactic is compatible with biological control, another IPM strategy, since delaying the planting date did not reduce the effectiveness of the parasitic fly that attacks the sunflower beetle larvae. Planting date has also been shown to be a successful cultural control tactic with other sunflower insect pests including the red sunflower seed weevil (Oseto et al. 1987), the sunflower stem weevil (Oseto et al. 1982), and the banded sunflower moth (Oseto et al. 1989).

Figure 2. The pentatomid predator, Perillus.

Conclusions

These studies have extended our understanding of the biology of the sunflower beetle, its behavior and overwintering habits. Although the cultural control tactic of cultivation did not appear to be effective in reducing populations of the beetle, delayed planting was revealed to be very successful as a management tool. Natural enemies are significant mortality factors in the population dynamics of this sunflower pest and should be conserved when possible. The long-term goal for the control of the sunflower beetle should be the use of IPM strategies combined with monitoring of fields for pest densities. While effective, the chemical control of the sunflower beetle should remain as a last resort, utilized only when the economic threshold has been reached.

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Brazilian Chrysomelid Symposium

(Nogueira de Sa article continued from page 3)

Figure 4. Donald Windsor and Vivian Flinte walk among the bushes in the restinga.

Figure 5. Fredric Vencl, Yanett and Donald Windsor observe the scenery.

Mecistomela marginata and a probable *Eurypedus*. We also observed many other interesting insects feeding on plants, mostly. Besides, we were impressed with the Chlamisinae Fulcidax monstruosa, Vivian's study species. In Macae, most of us stayed at NUPEM (a wonderful Ecology research station of Federal University of Rio de Janeiro, Macae and a Brazilian oil Company). That weekend was a great time to share our knowledge on tropical beetles, ideas and getting to learn more about the research of other chrysomelidologists.

I intend to organize other Symposia during ATBC meetings. However I will probably not attend next year's meeting in China. In 2007 and 2008 ATBC Meetings will occur in Suriname and Mexico, respectively, and I hope we can have new Symposia then. Tropical chrysomelidologists are all invited.

Figure 6. Fredric Vencl (standing), Yanett, Donald Windsor and Vivian Flinte look for beetles on a Cordia *plant.*

French Entomological Society gathering in Languedoc-Roussillon, near Montpellier, France 2001

From left to right: Gérard Tiberghien,Serge Doguet, Michel Bergeal, Pierre Cantot, Roger Vincent, Franck Duhaldeborde, Bernard Bordy and Hervé Bouyon. Missing: Jean-Claude Bourdonné, Alain Grafteaux, Bernard Pinson and Pierre Jolivet (photo: Serge Doguet).

McKenna article from page 8

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International Date Book

2006	Evolution meetings, June 23-37, Stony Brook, USA
2006	Hennig Society Meeting, July, New York, USA
2006	Association for Tropical Biology and Conservation, China
2006	Animal Behavior Society, Aug 12-16, Utah, USA
2006	European Congress of Entomology, Sept 17-22, Yzmir, Turkey, http://www.topcom.com
2006	Entomological Society of America, Dec 10-14, Indianapolis, USA
2008	International Congress in Entomology, Durban, South Africa

Flight muscles in *Galeruca tanaceti*

Ron Beenen (The Netherlands)

Dispersal power plays a major role in the survival of species. Den Boer (1977) treated this at length in Carabidae in The Netherlands. For the conservation and rehabilitation of Chrysomelidae in a cultivated environment it is also important to have knowledge of the dispersal powers of endangered species (Beenen, 1999). Species with high dispersal capacities will possibly recolonize suitable habitats soon after local extinction. For species with low dispersal powers the chances of efficient recolonization following local extinctions are small. Conservation strategies should therefore be directed to species with low dispersal capacities in the first place.

Species of the genus *Galeruca* are assumed to be unable to fly (Jolivet & Hawkeswood, 1995). For the species that have brachypterous wings or in apterous *Galeruca*-species (Jolivet, 1959) this seems evident. For *Galeruca*-species having fully developed wings it is not self-evident. *Galeruca tanaceti* (L.) is a European species with fully developed wings but there are no published observations of specimens of *G. tanaceti* flying.

A long time ago a colleague, M. A. Hielkema, informed me of a strange observation in the Pyrénées. On May 29 1996 he observed in Baillestavy (13,5 km South of Vinca, France) large numbers of *G.. tanaceti* climbing in halms of grasses. It looked like the pre-flight behavior of many other beetles (Scarabaeidae, Carabidae). A sample of the specimens was collected. Because I received them more than a year after the observation it was impossible to study the flight muscles, but this observation suggests that some populations of *G. tanaceti* include specimens capable of flight. Indirect evidence for flight capability was searched for by studying flight muscles in this species.

The mechanism of insect flight will not be explained here but readers can refer to textbooks like Nation (2004). The muscles relevant for flight in beetles are the dorsoventral muscles and the longitudinal dorsal muscles. They are not attached to the wings; the wings are moved by the deformation of the thorax as a result of the contracting indirect flight muscles.

Material and methods

The specimens investigated here were collected in the following localities (acronyms are used in text): GB = GERMANY, Brandenburg, Stolpe-Stolzenhage, 20 vi 2004, leg. U. Heinig; GR = GERMANY, Rheinland-Pfalz, Gensingen a/d Nahe, 27 x 1995, leg. R. Beenen; GT = GERMANY, Thüringen, Stadtilm, 30 vi 2004, leg. F. Fritzlar; GT = GERMANY, Thüringen, Thüringerwald, 5 viii 2004, leg. F. Fritzlar; IA = ITALY, Abruzzo, Opi, 21 vi 2002, leg. G. den Hollander; NG = NETHERLANDS, Gelderland, Millingerwaard, 23 vi 2005, leg. R. Beenen; NL = NETHERLANDS, Limburg, Castenray, 25 vi 2005, leg. F. van Nunen; and NU = NETHERLANDS, Utrecht, Leusderheide, 1 x 2004, leg. R. Beenen.

The specimens were killed with ethyl acetate and fixed in 70% alcohol or killed and fixed in 70% alcohol . To study muscle development, elytra and wings were removed and the thorax was transversely cut (Fig. 1b). Subsequently the thorax was longitudinally cut. Later, when it became clear that the longitudinal cuts gave a good impression of muscle development, only longitudinally cuts were made (Figure 1 A).

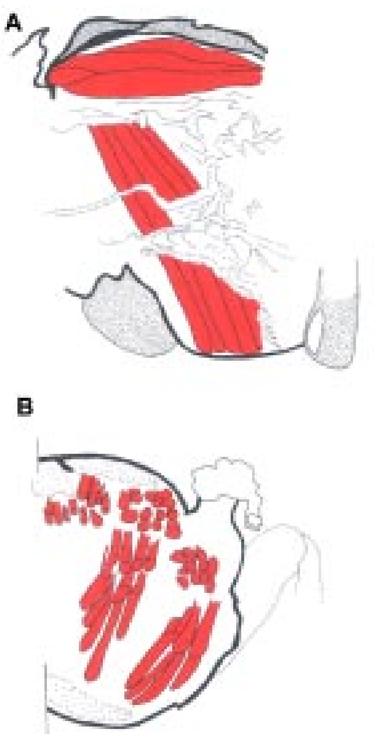

Figure 1. Thorax. A. Longitudinal section. B. Cross-section.

Because development of the dorsal longitudinal muscles proved to be indicative of the dorsoventral muscles development, the presence or absence of dorsal muscles was registered.

In specimens lacking flight muscles the spaces are usually filled with fat tissue. Sometimes very thin muscle fibers are visible. These were registered as absent. In other beetle studies (e.g., Van Schaick Zillesen & Brunsting (1984)) such small fibers are described as "not conspicuous" and assumed to be non-functional.

Results

Table 1 presents the absence or presence of dorsal wing muscles in *G. tanaceti*. In some of the investigated populations, specimens with well developed flight muscles were present. Both absence and presence of flight muscles occur in males as well as in females. Developed flight muscles have been found only in specimens collected in June. These specimens have not entered summer diapause. In post-diapause specimens no developed flight muscles have been found. Not in all pre-diapause specimens well developed flight muscles occur.

Discussion

From this study it is unclear that all specimens that possess flight muscles before the summer diapause, fail to have them after the diapause. Only pre-diapause specimens were available from the Brandenburg and Abruzzo populations. However, it seems plausible that flight muscles are atrophied during the summerdiapause. In another galerucine leaf beetle where atrophication occurs, *Lochmaea suturalis* (Thomson), it has been shown that females histolyse their flight muscles and start oviposting whereas in males no flight muscle histolysis is apparent (Van Schaick Zillesen & Brunsting, 1983). In male post-diapause specimens of *G. tanaceti* that were dissected in our study no developed flight muscle have been found. If flight muscle histolysis in *G. tanaceti* is analogue to histolysis in *L. suturalis*, then these male specimens of *G. tanaceti* most probably did not have flight muscles before the summer diapause.

We assume that we have here a case of wing muscle dimorphism in the way that there are some populations of *Galeruca tanaceti* in which no specimens at all have flight muscles and other populations that may include specimens with fully developed flight muscles. More specimens and more populations must be studied to test this hypothesis.

Flight muscle dimorphism could be induced by food quality in the larval stage. Shortage of food during larval development increases the percentage of individuals with conspicuous flight muscles. This has been reported by Van Schaick Zillesen & Brunsting (1984) for *Philonthus decorus* (Gravenhorst) (Staphylinidae) and *Pterostichus oblongopunctatus* (F.) (Carabidae). There is no information on the basis of the possible flight muscle dimorphism in *G. tanaceti* - is it genetically-based or induced by environmental factors like food quality?

A similar observation as the one in the Pyrénées was made by G. den Hollander. In Opi (Abruzzo, Italy), 21 June, 2002, 12.00-13.00 h, he observed many specimens of *G. tanaceti* climbing in halms of grasses. The weather was dry with a few clouds and the temperature between 20-25 °C. The same locality was visited again between 16.00-17.00 h. At that moment no specimens of *G. tanaceti* were seen on the grasses; individuals walked around on the ground. The weather had changed to rain. Specimens were collected from this population and studied herein. The specimens with this particular "pre-flight behaviour" had developed wing muscles (IA, Tabel 1). Although no flying specimens were observed in this population, it is not unlikely that

Locality Code	**Sex**	**Month**	**Dorsal wing muscle**
IA	?	June	Present (1)
IA	?	June	Present (1)
GB	?	June	Absent (1)
GB	?	June	Absent (2)
GB	?	June	Present (1)
GT	?	June	Present (1)
GT	?	June	Present (3)
NG	?	June	Absent (1)
NL	?	June	Absent (1)
NL	?	June	Absent (1)
GT	female?	August	Absent (2)
GR	male?	October	Absent (3)
GR	female?	October	Absent (3)
NU	male?	October	Absent (1)

Table 1. Absence or presence of dorsal wing muscles in Galeruca tanaceti.

sone specimens were able to fly and that the peculiar behaviour is "pre-flight behaviour".

Window traps (flight interception traps) are often used to get information on flight ability. The knowledge of flight ability in Carabidae is almost completely the result of intensive use of window traps. F. van Nunen recently reported a single male specimen of *G. tanaceti* from a window trap in Tilburg (Noord-Brabant, The Netherlands), indicating that they can fly. This specimen was found in June 2003 by R. Felix and P. van Wielink. It is, according to the researchers, very unlikely that this specimen entered the tray of the trap in any other way but by flying.

Although no specimens of *G. tanaceti* have been seen flying it seems likely that there are populations in which flying could occur. From our preliminary results, it may be concluded that not all specimens in a populations of *G. tanaceti* possess developed flight muscles. This is not uncommon among beetles. Landin (1980) found in Sweden that only small parts of the population of *Helophorus strigifrons* Thomson (Hydrophilidae) disperse by flight, which might be due, among other things, to the fact that only about 20 % of the specimens of *H. strigifrons* have a functioning flight apparatus (flight muscles).

This study is only preliminary. There are many more problems to be solved. Any observations of specimens of *Galeruca* in flight are welcome. Until now there is only one record of a *Galeruca*-species flying: Cox (2004) reported the capture in flight of *Galeruca laticollis* (Sahlberg) at Sherborne (Dorset, UK) in 1919.

Acknowledgement

Ron Felix, Meindert Hielkema, Gijsbert den Hollander, Frank van Nunen and Paul van Wielink (all from The Netherlands), Frank Fritzlar and Uwe Heinig (both from Germany) made specimens available for this study or reported their interesting observations.

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Costa Rican Chrysomelidae

Please send identification to Kenji Nishida.

The Entomology Museum,

Leon, Nicaragua

Jean-Michel Maes (Nicaragua)

The museum's collection is growing little by little through routine collecting. It is still not verybig, with ~15 drawers (40 x 50 cm), but it gives a good representation of Nicaraguan Chrysomelidae. The Catalogue is on-line at: http://www.insectariumvirtual.com/termitero/nicaragua/FAUNA ENTOMOLOGICA DE NICARAGUA/COLEOPTERA/chrysomelidae.htm

Those interested in studying a group of Chrysomelidae from Nicaragua, please contact Jean-Michel Maes (jmmaes@ibw.com.ni). If you prefer to come to Nicaragua to collect your own samples, information on field trips, and collecting and export permits is available on our website at: http://www.ibw.com.ni/u/jmmaes/FieldTrips.htm

Trips are generally small groups of 4-8 people, and offer the possibility of serious sampling in different ecological systems, mainly the tropical dry forest in Domitila lodge, rainforest in Bartola lodge and cloud forest in Selva Negra hotel. If colleagues want to collect on their own (not in groups) we can organize these and they will definitely have no problems. This new website on Nicaraguan biodiversity should also help in planning trips: http://www.bio-nica.org/Biodiversidad/00Biodiversidad.htm.

Photo of the Entomology Museum, Leon, Nicaragua.

Editor's Note: Domitila Nature Reserve, in southern Nicaragua offers a friendly lodge, good food, and suberb habitat for natural history enthusiasts and researchers. Contact: domitilareser@yahoo.com

USA and UK Museum Visits

K. D. Prathapan (India)

The Natural History Museum, London, with its historic collection of animals from all over the world, is the prime destination of any Biologist. The Coleoptera section comprises about 1,95,500 species. This treasure trove of leaf beetles houses the single largest collection of the primary types of Oriental leaf beetles. I visited the Museum during the last winter to study the flea beetles. Ms. Sharon L. Shute was very kind enough to make arrangements for my work though the collections are being prepared to shift to the new premises. I met Dr M. L. Cox at the Museum after several years of correspondence! The present building of the Museum is a celebration of Natural History with its array of innumerable terracotta beasts both from the present and from the geological past. It was rather sad to know that this Cathedral of the legacy of the past will be demolished soon and replaced with a modern building.

Photo from left: Alex (Sasha), the author, and Catherine.

From London I proceeded to the U. S. National Museum of Natural History to study the leaf beetle collection in the Systematic Entomology Laboratory on invitation from Dr. Alexander S. Konstantinov. Alex has organized a complete synoptic collection of the Oriental flea beetle genera. We spent a lot of time on this material and found several generic synonyms. This was a unique opportunity for me to look at all the Oriental flea beetle genera. I must admit that lengthy discussions with Alex remoulded my concepts of some flea beetle genera. At the Smithsonian Institution, I also met Dr. Catherine N. Duckett after a lot of correspondence and exchange of material. All three of us worked on the larvae and adults of an undescribed *Ivalia* from the Nilgiri Hills in south India. In all, the visits were fantastic. Many thanks to Alex, Tanya, Catherine and Ms. Shute.

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Where are these former members?

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G. Boulou

Timarcha tenebricosa, *Tessy-sur-Vire, Manche, near St Lô, France, May 2002. On* Galium aparine*, one of its food plants.* *- Pierre Jolivet*

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Accounts of chrysomelid beetles and research to CHRYSOMELA are welcome. Please submit each image as separate TIFF or JPG files, without layers or text. A photo of the author of longer articles is recommended. Please acknowledge photographers in figure captions and indicate locality. For best resolution, submit images at 200+ on a CD. Submit main article and figure captions as two separate word documents in 12 point Times Roman font, with paragraphs separated by double spacing and not indented. Reprints of publications should be submitted for inclusion in 'Recent Publications List'.

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Submission Deadlines:
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