

# Journal of the Bromeliad Society

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Vol. 51, No. 4

July–August, 2001

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**Cover photographs. Front:** *Aechmea fasciata* 'Albomarginata.' Photograph by Marcel Lecouffe. **Back:** *Guzmania musaica* inflorescence showing damage caused by weevils in the genus *Cholus*. Text begins on page 172. Photograph by Simon Pierce.

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The Journal, ISSN 0090-8738, is published bimonthly at Orlando, Florida by the Bromeliad Society International. Articles and photographs are earnestly solicited. Closing date is 60 days before month of issue. Advertising rates are listed in the advertising section. Permission is granted to reprint articles in the Journal, in whole or in part, when credit is given to the author and to the Bromeliad Society International. **Please address all correspondence about articles and advertising to the editor.**

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Printed by Fidelity Press, Orlando, Florida.

## Bromeliad Flowers, an Attractive Meal for Weevils at Cerro Jefe, Panama.

Simon Pierce<sup>1</sup> and Richard A. Gottsberger<sup>1</sup>

Bromeliads in the wild usually show little sign of damage inflicted by herbivorous insects. Indeed, walking through the cloud forest at Cerro Jefe, Central Panama, most bromeliads appear healthy (aside from leaf-cutter ant damage to inflorescences and leaf margins of *Pitcairnia arcuata* and *P. valerii*). Frank (1999) argues that an apparent lack of pests simply reflects low population densities of pest species. He points out that a number of insects, particularly weevils (Coleoptera, Curculionidae), do attack bromeliads. Indeed, certain weevils appear to target bromeliads, although bromeliads from different genera may play host (Frank, 1999). Depending on the species of weevil, larvae and/or adults may feed on the plant. A single egg is laid on a leaf base; the larva then burrows into the stem and feeds along its length (Vaurie, 1976; Frank, 1999). This weakens the stem and can kill the plant. Adult weevils are usually recorded eating leaves, but here we present a number of observations of these beetles feeding on the flowers of various bromeliads at Cerro Jefe.

During August 2000 (wet season) we observed a large species of weevil (19–23 mm long) eating the flower buds of *Guzmania calamifolia* André ex Mez var. *calamifolia* (six occasions), *G. coriostachya* (Grisebach) Mez (two occasions), and *G. musaica* (Linden & André) Mez var. *concolor* H. Luther (three occasions). The adult weevil has mouth parts at the end of a rostrum (the long 'beak'), with which it makes a hole in the side of the flower bud, gradually pushing the rostrum deeper as it eats (Figure 18). This weevil belongs to the genus *Cholus* (Cholinae) and was also collected from Cerro Jefe by entomologist Henry Stockwell during the 1970's, although the species remains undescribed (H. Stockwell, pers. comm.). It is also apparently identical to the *Cholus* species that Howard Frank reports hitching a ride to Florida, possibly on a bromeliad from Panama (see photo at [www.ifas.ufl.edu/~frank/cholus.jpg](http://www.ifas.ufl.edu/~frank/cholus.jpg)). For our purposes this weevil will be referred to as '*Cholus* species 1'.

*Cholus* weevils were difficult to observe - often from a distance of several meters they would detect us and drop off the plant. It was then impossible to find them in the dense, tangled undergrowth. Falling to the ground appears to be the least energetic and most effective escape route - birds are important predators of adult weevils (Kok and Louw 1994), and taking wing might not be an ideal option for these weak flyers. In common with other flying insects weevils have well-developed eyes, and presumably rely on vision to detect potential predators.

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Also during August, another undescribed species of *Cholus* ('*Cholus* sp. 2') was observed on the same three bromeliad species as *Cholus* sp. 1, and was also observed mating on *Guzmania calamifolia* (Figure 19). Presumably weevils congregate around food sources, and bromeliads may provide an important mating ground for bromeliad-eating weevils. A more familiar weevil, *Metamasius sellatus*, was also found feeding on *Guzmania calamifolia* and *G. musaica* var. *concolor* in August (not shown).

In November (late wet season), a flower of *Werauhia capitata* (Mez & Wercklé) J.R. Grant was found containing four small black weevils (Baridinae, Centrini, possibly *Limnobaris* species). These had eaten through a petal and into the cavity of the unopened bud, and were grazing on the filaments of the stamens. *Limnobaris* weevils usually eat the pollen of monocots, and are typically found on inflorescences composed of numerous small white flowers. Their shiny black appearance is thought to be a kind of camouflage, resembling the gaps between flowers (H. Stockwell, pers. comm.).

Another *Werauhia capitata* plant hosted both species of *Cholus* (Figure 20). *Cholus* sp. 2 had pierced the petals of a flower bud - the bud was about to open, and so the petals were no longer fully enclosed by the tougher sepals. The *Cholus* were joined by a small weevil with a thin, brown, stick-like body (Brentidae, *Ulocerus* cf. *sordidus* Sharp). This species is usually associated with rotting wood, and eats fungi and other small insects - it does not eat living plant tissue. Possibly it was attracted by the colorless mucilage that coats the inflorescence of this bromeliad (H. Stockwell, pers. comm.).

All bromeliad species observed under attack from weevils at Cerro Jefe produce inflorescence mucilage (Figure 21; see also Pierce and Gottsberger [2001] for a photo of mucilage on *Guzmania musaica* var. *concolor*), although less so in the case of *G. calamifolia*. When dried, mucilage of *Werauhia capitata* yields only 0.3 % dry matter (i.e., mucilage is 99.7 % water). Currently nothing is known about the chemical composition or origin of the solid component, but mucilages are produced consistently enough by certain species that it is undoubtedly exuded by the plant (see Utley, 1983). *Guzmania globosa* L.B. Smith appears to produce more mucilage when conditions are wetter (H. Luther, pers. comm.), and dried mucilage can re-hydrate (unpublished data), suggesting that at least some of the water in mucilages originates directly from external sources such as rainwater.

Benzing (2000) suggests that mucilage of *Guzmania globosa* insulates developing fruits<sup>2</sup>. In the species at Cerro Jefe, mucilage was also present when inflorescences were young, often weeks before flowering proper. We suggest that

<sup>2</sup> It has also been suggested that mucilages could have an anti-microbial role (H. Luther, pers. comm.). However, we inoculated sterile agar with mucilage from *Werauhia capitata* (n=6) and, after five days incubation at 40°C, fungal hyphae were evident growing outwards from the mucilage, and a number of bacterial colonies were apparent adjacent to the mucilage (data not shown). Therefore, mucilages are not sterile.



Figure 18. *Cholus* sp. 1 feeding on *Guzmania calamifolia*, with section through damaged flower (inset).

Simon Pierce



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Figure 19. *Cholus* sp. 2 on *G. calamifolia*, and mating (inset).



Simon Pierce

Figure 20. *Cholus* spp. on *Werauhia capitata*.

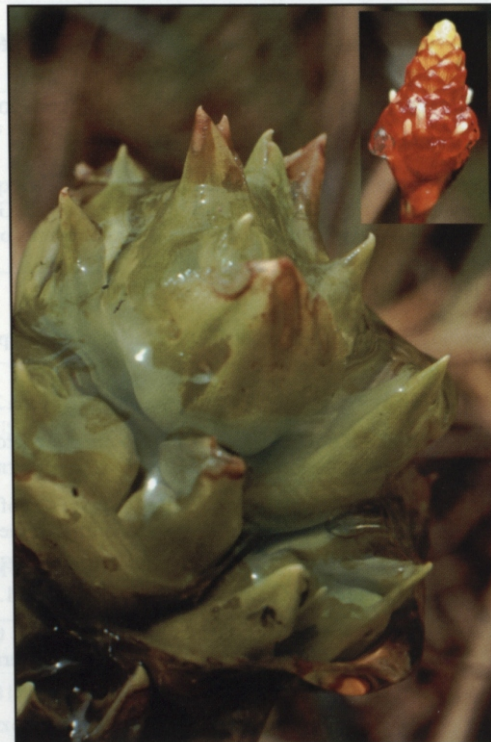


Figure 21. Inflorescence mucilages of *W. capitata* and *G. coriostachya* (inset).

Simon Pierce

mucilages protect the inflorescence and flowers from herbivores throughout development. Mucilage could either act as a physical barrier or as a decoy food, distracting herbivores from more vital parts of the plant. Indeed, we have observed weevils stationary and with their rostrums in the mucilage, once for as long as half an hour (*Cholus* sp. 1 on *Guzmania coriostachya*), and no damage was observed on these plants. Inflorescences with little or no mucilage are frequently found with weevil damage (Back cover). Being composed mainly of water, production of mucilage would not use many of the plant's mineral or carbohydrate resources, and would thus be an 'inexpensive' defense. The bromeliad species we observed flowered and produced mucilage only during the wet season, when water is in plentiful supply and adult weevils are active (H. Stockwell, pers. comm.).

In conclusion, the bromeliad population at Cerro Jefe plays host to a number of floriphagous (flower-eating) weevil species, some of which have yet to be formally described. Many of these bromeliads produce mucilage that coats the developing inflorescence and may possibly impede weevils.

#### RELATED WEBSITES

*For further information on weevils:*

[www.ifas.ufl.edu/~frank/wvbrom.htm](http://www.ifas.ufl.edu/~frank/wvbrom.htm)

[www.fcbs.org/articles/olan\\_creel.htm](http://www.fcbs.org/articles/olan_creel.htm)

[www.ifas.ufl.edu/~eny3005/lab1/Coleoptera/Curculionid.htm](http://www.ifas.ufl.edu/~eny3005/lab1/Coleoptera/Curculionid.htm)

[www.coleopsoc.org/nwsltrrs.shtml](http://www.coleopsoc.org/nwsltrrs.shtml)

[www.insects.org/entophiles/coleoptera/cole\\_003.html](http://www.insects.org/entophiles/coleoptera/cole_003.html)

#### ACKNOWLEDGEMENTS

Many thanks to Henry P. Stockwell for sharing his expertise concerning the Curculionidae of Panama, Harry E. Luther (Marie Selby Botanical Gardens) for his thoughts on mucilage, Howard Frank (University of Florida) for comments on the manuscript, and to Lina Gonzalez for scanning.

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*Panama City, Republic of Panama*



Photograph by Simon Pierce

*Guzmania musaica* with holes in the sepals typical of damage caused by weevils in the genus *Cholus* at Cerro Jefe, Panama. See the text beginning on page 172. Photograph by Simon Pierce.

## Calendar

- 24-26 Aug The Bromeliad Society of Greater Chicago will hold its 16th annual standard bromeliad show at the Chicago Botanical Garden, Glencoe, IL. Contact: Ardie or Jack Reilly at 217-486-5874 or by e-mail at jar56@one-eleven.net
- 24-26 Aug The Greater Dallas-Fort Worth Bromeliad Society will host the 28th annual Southwest Bromeliad Guild and 7th annual International Cryptanthus Show at the Fort Worth Botanic Garden Center in Fort Worth, Texas. Contact: Flo Adams (817) 467-7500.
- 12-15 Oct 11th Australian Bromeliad Conference 'Brom-A-Warra' at Wollongong, New South Wales, Australia. Contact: Graham Bevan, 25 Tallwong Cres., Dapto 2530 or e-mail Eileen Killingley at john.killingley@det.csiro.au
- 27 Oct The Bromeliad Society of Central Florida will host the 2001 Extravaganza of the Florida Council of Bromeliad Societies at the Maitland Civic Center, 641 S. Maitland Ave., Maitland, FL (just north of Orlando). Activities include a large sale, interesting speakers, rare plant auction and banquet. Admission and parking are free, but there is a charge for the banquet. Hours are 9 a.m. to 5 p.m. Contact: Eloise Beach, 407-886-8892, e-mail floridapro@aol.com.
- 9-11 Nov The Caloosahatchee Bromeliad Society will host its 2001 Standard BSI Bromeliad Show and Sale at Terry Park, 3410 Palm Beach Blvd., Fort Myers, FL. Judging will be held on Friday and the show and sales areas will be open to the public on Saturday and Sunday. For more information contact Dr. Lawrence Giroux, FAX 941-997-6377 or by e-mail at n2finchs@peganet.com or Brian Weber, 941-591-4268 or by e-mail at brianweber1b@aol.com.