
Woody woodpecker enjoys soft drinks: the blond-crested woodpecker seeks nectar and pollinates canopy plants in south-eastern Brazil¹

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Abstract

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Insects are the staple diet of woodpeckers, but some species also habitually feed on fruits. A few woodpecker species are recorded as flower visitors for nectar intake. We report here on the blond-crested woodpecker (*Celeus flavescens*) taking nectar from flowers of two canopy species, *Spirotheca passifloroides* (Bombacaceae) and *Schwartzia brasiliensis* (Marcgraviaceae), in the Atlantic forest of south-eastern Brazil. *Spirotheca passifloroides* blooms for three months in the austral winter, whereas *S. brasiliensis* blooms for two months in the summer. Flowers of both species produce large amounts of dilute nectar. *Celeus flavescens* visits several flowers per plant touching the anthers and stigmas with its head and throat, and thus acts as a pollen vector. We suggest that woodpeckers may be more frequent flower visitors than previously thought, and that feeding on ripe fruits may be a simple behavioural step for the origin of nectar feeding by Neotropical woodpeckers.

Key words: *Celeus flavescens*, Picidae, *Spirotheca passifloroides*, Bombacaceae, *Schwartzia brasiliensis*, Marcgraviaceae, ornithophily

Resumo

Rocca, M.A.; Sazima, M. and Sazima, I. **Um pica-pau que aprecia bebidas doces: o João-velho procura néctar e poliniza plantas de dossel no Sudeste do Brasil.** *Biota Neotrop.* May/Aug 2006, vol. 6, no. 2, <http://www.biotaneotropica.org.br/v6n2/pt/abstract?short-communication+bn02606022006>. ISSN 1676-0611

Insetos formam a dieta básica dos pica-paus, porém algumas espécies também se alimentam habitualmente de frutos e poucas espécies procuram flores para tomar néctar. Registramos aqui o João-velho ou pica-pau-de-cabeça-amarela (*Celeus flavescens*) ao tomar néctar de flores em duas espécies de plantas do dossel, *Spirotheca passifloroides* (Bombacaceae) e *Schwartzia brasiliensis* (Marcgraviaceae), em Mata Atlântica do sudeste do Brasil. *Spirotheca passifloroides* floresce por três meses no inverno, ao passo que *S. brasiliensis* floresce ao longo de dois meses no verão. As flores de ambas as espécies produzem néctar abundante e diluído. *Celeus flavescens* visita várias flores por planta, tocando as anteras e os estigmas com a cabeça e o pescoço, assim agindo como polinizador. Sugerimos que visitas de pica-paus a flores sejam mais frequentes do que o suposto e que se alimentar em frutos maduros seria um passo comportamental simples para a origem da tomada de néctar por pica-paus neotropicais.

Palavras-chave: *Celeus flavescens*, Picidae, *Spirotheca passifloroides*, Bombacaceae, *Schwartzia brasiliensis*, Marcgraviaceae, ornitofília

¹Dedicated to Benjamin Luz, Ivan Soler and Marcial Cotes (climbers), and to Talita Fontoura (responsible for the Field Course on Canopy Ecology) for training climbing abilities to MAR

Introduction

Woodpeckers (Picidae) feed mostly on insects, although some species also feed habitually on ripe fruits (Winkler & Christie 2002). However, there are a few records of these part time frugivores visiting flowers and feeding on nectar (e.g. Kattan 1988, Molina-Freaner & Eguiarte 2003). Among the woodpeckers recorded visiting flowers for nectar are species of the genus *Melanerpes*, which are also among the most prone to forage on fruits and berries (Winkler & Christie 2002).

While studying canopy flowers visited by birds in the Atlantic forest in southeast Brazil, we recorded the blond-crested woodpeckers (*Celeus flavescens*) foraging for nectar of two plant species. We present here floral features of these plants, the woodpecker behaviour while on flowers, and comment on possible origin of nectarivory in Picidae.

Material and Methods

The blond-crested woodpecker (Figure 1) is widely distributed throughout eastern South America, from lower Amazon in Brazil to Misiones in Argentina (Sick 1997, Winkler & Christie 2002). With 27 cm in total length, it feeds primarily on ants and termites, and also forages on ripe fruits (Sick 1997, Winkler & Christie 2002).

Field observations were made in the Atlantic forest reserve at the Núcleo Sete Barras of the Parque Estadual Carlos Botelho (24°00' -24°15' S, 47°45' -48°10' W) in the southern part of São Paulo, southeast Brazil. The study site is at about 50-100 m a.s.l.; its climate is of type Cfa of Köppen. The coastal Atlantic forest in São Paulo has an average annual rainfall of up to 2000 mm and there is no well defined dry season, even during so-called dry months (May to August) when monthly rainfall is below 200 mm (Nimer 1977).

All canopy plant species believed to be visited by birds were observed from January 2003 to February 2005. Access to the canopy plants was gained with climbing equipment (see Perry & Williams 1981, Whitacre 1981). Canopy level, blooming period, and bird visitors were recorded for each plant species. Floral biology was studied following procedures outlined in Dafni (1992). Nectar sugar concentration and accumulated volume were measured from randomly chosen bagged flowers with a pocket refractometer and a microlitre syringe, respectively, by the end of the morning. Four focal plants of *Spirotheca passifloroides* (Bombacaceae) were watched during eight non-consecutive days at the flowering peak and at the end of bloom, totalling about 15 hours. Additionally, four focal plants of *Schwartzia brasiliensis* (Marcgraviaceae) were watched during six non-consecutive days at the flowering peak, totalling about 10 hours.

Results

The blond-crested woodpecker was recorded visiting two out of three forest plant species whose flowers were visited by birds other than hummingbirds (the third one is a species of the loranthaceous genus *Psittacanthus*, from a total of 60 species recorded for the studied bird-flower assemblage). *Spirotheca passifloroides* bloomed in the austral winter for three months (June-August in 2003; May-July in 2004). The height of the plants in the canopy varied from 13 to 30 m. Some plants bore about 180 open flowers per day. The red flowers are large and their nectar is easily accessible (Figure 2 and Table 1). *Schwartzia brasiliensis* bloomed in the summer for two months (January-February in 2004; December-January in 2004/2005). The height of the plants in the canopy varied from 8 to 20 m. Some plants bore up to 10 inflorescences. The small, red flowers are arranged in brush-like inflorescences, and the extrafloral nectaries are a contrasting deep purple (Figure 3). The cup-like nectaries have wide openings (Table 1), and thus are easily accessible for several bill types and sizes (see Sazima et al 1993).

Only female blond-crested woodpeckers were recorded exploiting these flowers, but we were unable to tell whether the woodpecker was the same or another individual during the visits. We recorded the woodpecker on the flowers of *S. passifloroides* (Figure 4) three times in two consecutive days at the end of the blooming period. The visits were made at a plant 22 m high in the canopy. While taking nectar from the flowers the woodpecker contacted the stamens and stigmas, pollen being placed on its forehead and crown. Visits to *S. brasiliensis* flowers were recorded once on a plant 15 m high in the canopy. The woodpecker perched on the inflorescence axis and took nectar from several nectaries in a row. While taking nectar the woodpecker received pollen on its head and throat.

Discussion

Both *S. passifloroides* and *S. brasiliensis* occur in the forest canopy, and thus their flowers have the potential to be visited by birds other than hummingbirds in the studied area (see also Toledo 1977). The flowers of both species are typically ornithophilous (sensu Faegri & van der Pijl 1980, Endress 1994), although their nectar is much more dilute than that of several species of hummingbird-pollinated plants (e.g. Buzato *et al.* 2000, Araujo & Sazima 2003, MAR pers. obs.). Dilute and copious nectar is characteristic of ornithophilous flowers visited by birds other than hummingbirds (see review in Nicolson & Fleming 2003). Ten species of perching birds and eight species of hummingbirds were recorded as visitors of *Schwartzia brasiliensis* by Sazima et al (1993), who noted that passerines and not hummingbirds are the main pollinators of this plant in southeast Brazil. *Spirotheca brasiliensis* is also visited by a di-

verse assemblage of 11 bird species including hummingbirds, perching birds, and woodpeckers (MAR pers. obs.).

One suggestion for the origin of flower-visiting by birds is that fruit-eating species began to destructively eating flowers, whereas another idea deals with woodpeckers' habit to feed on sap flowing from holes in plants (cf. Faegri & van der Pijl 1980). As for Neotropical woodpeckers, the former idea seems more likely than the latter, since species in the genera *Melanerpes* (Kattan 1988, Ruiz et al. 2000) and *Celeus* habitually feed on ripe fruits and berries (Sick 1997, Winkler & Christie 2002). Moreover, sap-feeding remains to be recorded for these two genera in the Neotropics. Indeed, *Melanerpes uropygialis* is known for its nectar feeding on flowers of several plants, including those of cacti and agaves in scrubland and deserts (Winkler & Christie 2002, Molina-Freaner & Eguiarte 2003), and *M. formicivorus* is recorded taking nectar from two species of Bombacaceae, *Ochroma lagopus* and *Spirotheca* sp. in lower montane wet forest (Kattan 1988).

We suggest that moving from feeding on fruit juice to taking nectar from flowers is a relatively simple behavioural step for the woodpeckers. The long, protrusible tongue of these birds, provided with barbs or brush-like tips (Winkler & Christie 2002) may be as adequate to extract juice from ripe fruits as to sip nectar from flowers. As *Celeus* is another woodpecker genus known as having a "sweet tooth" (Sick 1997, Winkler & Christie 2002), visits to flowers would be expected for species within this genus. Indeed, a brief account on *C. grammicus* acting as a pollinator of *Symphonia globulifera* (Clusiaceae), an Amazonian tree species up to 20 m tall, is available in a popular journal (Pivetta 2003). We expect that additional records of flower-visiting woodpeckers in the Neotropics will likely to be uncovered by further studies on forest canopy plants, especially for species of such fruit-feeding genera as *Celeus* and *Melanerpes* (Sick 1997).

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Note added in proof: *Celeus* and *Melanerpes* are two genera for which visits to flowers are documented in the Neotropics (Kattan 1988, Ruiz et al. 2000, Winkler & Christie 2002, Molina-Freaner & Eguiarte 2003, present paper). Since these two genera are nested in distinct clades within the Picidae, *Celeus* within the Malarpicini and *Melanerpes* within the Dendropicini (Benz et al. in press), we suggest that flower-visiting behaviour arose independently and more than once during the woodpeckers' evolution. The apparently exclusive insect-eating habits of the basalmost sister clades (Benz et al. in press) seem to strengthen our suggestion.

BENZ, B.W., ROBBINS, M.B. & PETERSON, A.T. In press.
Evolutionary history of woodpeckers and allies (Aves: Picidae): Placing key taxa on the phylogenetic tree. Molecular Phylogenetics and Evolution.

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Figure 1 - A blond-crested woodpecker female (Celeus flavescens) foraging for insects on a tree trunk. Note dirt on bill. Photo ©Edson Endrigo.



Figure 2 - Two fully open Spirotheca passifloroides flowers. Note position of the stigma and stamens.



Figure 3 - An inflorescence of Schwartzia brasiliensis. Note purple extrafloral nectaries.



Figure 4 - A blond-crested woodpecker female (Celeus flavescens) about to take nectar from a flower of Spirotheca passifloroides. Flowers reddened during the original photo enhancement (compare with Figure 2).

Table 1: Floral features of *Spirotheca passifloroides* and *Schwartzia brasiliensis* at the Parque Estadual Carlos Botelho, Sete Barras, São Paulo, south-eastern Brazil. N= 30 flowers for all measurements except for nectar of *S. passifloroides* (N = 15 flowers).

Species	Colour	Shape	Length (mm)	Diameter (mm)	Volume (μ l)	Concentration (%)
<i>S. passifloroides</i>	red	brush	48.4 \pm 6.7	10.9 \pm 1.7	141.9 \pm 78.4	6.0 \pm 1.2
<i>S. brasiliensis</i>	red & purple	dish ¹	29.0 \pm 2.8 ²	6.1 \pm 0.7 ¹	34.3 \pm 13.9	4.6 \pm 2.0

¹ Dish flowers in brush-like inflorescences.

² Extrafloral nectaries measurements.