



Figure 2. Current distribution of Royal Cinclodes *Cinclodes aricomae*, with the new record indicated by a star; circles = previous published records, based on Auca et al.¹, Ávalos & Gómez², eBird⁴ and Witt & Lane⁹.

<http://www.ebird.org>
(accessed 6 March 2021).

5. Engblom, G., Auca, C., Ferro-Meza, G., Palomino, W. & Samochuallpa, E. (2002) The conservation of *Polylepis*-adapted birds at Abra Málaga, Cuzco, Peru. *Cotinga* 17: 56–59.
6. Fjeldså, J. (1993) The avifauna of the *Polylepis* woodlands of the Andean highlands: the efficiency of basing conservation priorities on patterns of endemism. *Bird Conserv. Intern.* 3: 37–55.
7. Lloyd, H. & Marsden, S. J. (2008) Bird community variation across *Polylepis* woodland fragments and

matrix habitats: implications for biodiversity conservation within a high Andean landscape. *Biodiver. Conserv.* 17: 2645–2660.

8. Schulenberg, T. S., Stotz, D. F., Lane, D. F., O'Neill, J. P. & Parker, T. A. (2007) *Birds of Peru*. Princeton, NJ: Princeton University Press.
9. Witt, C. C. & Lane, D. F. (2009) Range extensions for two rare high-Andean birds in central Peru. *Cotinga* 31: 90–94.

Nicolás W. Mamani-Cabana
Universidad Nacional de San Agustín de Arequipa (UNSA), Arequipa, Peru. E-mail: nmamanicabana@gmail.com.

Juan C. Ocaña-Canales

Facultad de Ciencias Forestales de la Universidad Nacional Agraria La Molina, Lima, Peru. E-mail: jcocana@lamolina.edu.pe.

Carlos Garnica-Philipps

Consultores Asociados en Naturaleza y Desarrollo (CANDES), Calle Rodín 129 Int. 101, Surquillo, Lima, Peru. E-mail: cgarnica@candes.net.

Received 20 November 2020; final revision accepted 23 March 2021; published online 5 July 2021

Secondary nectar robbing by a Purple-collared Woodstar *Myrtis fanny*

Nectar robbing, in which an animal obtains nectar from a flower without providing pollination services, has been observed in many taxa, including bees, wasps, ants, beetles, moths, butterflies, birds, and mammals⁶. Among Neotropical birds, flowerpiercers of the genus *Diglossa* are well-known primary nectar robbers⁵ that have specialised bills and tongues for piercing the base of a flower's corolla and extracting nectar¹⁵. Primary nectar robbers also include several species of hummingbirds, which pierce the base of a flower with their bill tip^{1,8}, or perhaps use serrations ('tomial teeth') near the bill tip to cut into the base of a flower^{9,12}. Other hummingbirds are secondary nectar robbers that access nectar via holes made by other species, especially bees and flowerpiercers^{6,7,14}. Secondary nectar robbing is confined to flowers whose corollas are longer than the bills of the robbing birds. All species of hummingbirds known to practice nectar robbing are believed to do so facultatively, because they typically forage on flowers whose corollas match their bill morphology, and access nectar via the floral entrance⁶.

Distinguishing primary from secondary nectar robbing in hummingbirds can be difficult, and information as to which species rob nectar is incomplete³. Nevertheless, nectar robbing has

been documented in >20 species of hummingbirds; 17 of these were reported to be secondary nectar robbers^{3,6,19}. Here, I provide the first report of nectar robbing by a Purple-collared Woodstar *Myrtis fanny*.

Purple-collared Woodstar is a small hummingbird (c.2.4 g¹⁶) found in northern Ecuador to southern Peru. It occurs in coastal and montane scrub, arid valleys, and urban gardens from sea level to 3,200 m^{13,17}. Although publications on its foraging behaviour are scarce¹⁶, the species is known to feed on a variety of flowers with corollas shorter than its bill⁴, in addition to arthropods¹⁰. I have found no reports of nectar robbing by this species.

I observed nectar robbing on the grounds of Hotel El Abuelo in Carhauz, dpto. Ancash, west-central Peru (09°16'46"S 77°38'47"W; 2,660 m), between 16h30 and 18h00 on 23 July 2019. I was not present for the entire observation period and thus was unable to record all events that might have occurred. I took brief notes on each nectar-robbing event by the hummingbird that I witnessed and also noted details of visits by a primary nectar robber to the same shrub in which the hummingbird foraged.

I observed a male Rusty Flowerpiercer *Diglossa sittoides* foraging on flowers of a *Cantua buxifolia* (Polemoniaceae), c.2.5 m tall, with tubular corollas, c.8 cm long, and bright reddish pink in colour. I saw the flowerpiercer visit the plant six times. On each visit, it pierced the base of several corollas in the usual manner in which flowerpiercers forage. On three occasions, a female-type (i.e. female or juvenile male) Purple-collared Woodstar visited the *Cantua* and probed at the base of 3–5 corollas as if feeding. In each case, the trochilid began foraging <5 minutes after the flowerpiercer had visited the same patch of flowers, although I did not record whether it probed the same flowers as the flowerpiercer. I never observed the hummingbird and the flowerpiercer interact, nor did

I see them forage in the *Cantua* simultaneously.

With its relatively short bill (16–18 mm²⁰), a Purple-collared Woodstar would be unable to obtain nectar through the floral opening of a *C. buxifolia* flower, even if we take into account that hummingbirds can extend their tongues from one-third to nearly twice the length of their bills to obtain nectar^{2,11,18}. Thus, the only way the woodstar can feed on *Cantua* flowers is to rob nectar, either by piercing the base of the corolla, or by probing a hole in the corolla made by a primary nectar robber. Because each of the hummingbird's visits occurred so soon after the Rusty Flowerpiercer had foraged in the same flowers, I am convinced that the hummingbird was engaged in secondary nectar robbing. My observations represent the first report of nectar robbing by Purple-collared Woodstar. Left unanswered is the extent to which this species obtains nectar by opportunistic robbing vs. the 'legitimate' technique of inserting its bill into the floral opening, which is the normal manner in which hummingbirds pollinate flowers.

Acknowledgements

I thank Ramiro Yábar for identifying the *Cantua buxifolia* and for cheerfully accompanying me on several birding expeditions in Peru. I also thank two anonymous reviewers for their valuable comments on the manuscript.

References

- Boehm, M. M. A. (2018) Biting the hand that feeds you: Wedge-billed Hummingbird is a nectar robber of a sicklebill-adapted Andean bellflower. *Acta Amazonica* 48: 146–150.
- González, O. & Loiselle, B. A. (2016) Species interactions in an Andean bird-flowering plant network: phenology is more important than abundance or morphology. *PeerJ* 4: e2789.

- Igić, B., Nguyen, I. & Fenberg, P. B. (2020) Nectar robbing in the trainbearers (*Lesbia*, Trochilidae). *PeerJ* 8: e9561.
- iNaturalist (2020) <http://www.inaturalist.org/> (accessed 1 September 2020).
- Inouye, D. W. (1980) The terminology of floral larceny. *Ecology* 61: 1251–1253.
- Irwin, R. E., Bronstein, J. L., Manson, J. S. & Richardson, L. (2010) Nectar robbing: ecological and evolutionary perspectives. *Ann. Rev. Ecol., Evol., Syst.* 41: 271–292.
- Kjonaas, C. & Rengifo, C. (2006) Differential effects of avian nectar-robbing on fruit set of two Venezuelan Andean cloud forest plants. *Biotropica* 38: 276–279.
- Lara, C. & Ornelas, J. F. (2001) Preferential nectar robbing of flowers with long corollas: experimental studies of two hummingbird species visiting three plant species. *Oecologia* 128: 263–273.
- Ornelas, J. F. (1994) Serrate tomtia: an adaptation for nectar robbing in hummingbirds? *Auk* 111: 703–710.
- Rensen, J. V., Stiles, F. G. & Scott, P. E. (1986) Frequency of arthropods in stomachs of tropical hummingbirds. *Auk* 103: 436–441.
- Rico-Guevara, A. (2017) Relating form to function in the hummingbird feeding apparatus. *PeerJ* 8: e3449.
- Rico-Guevara, A., Rubega, M. A., Hurme, K. J. & Dudley, R. (2019) Shifting paradigms in the mechanics of nectar extraction and hummingbird bill morphology. *Integrat. Organ. Biol.* 1: oby006.
- Ridgely, R. S. & Greenfield, P. J. (2001) *The birds of Ecuador*, 2. Ithaca, NY: Cornell University Press.
- Roubik, D. W., Holbrook, N. M. & Parra, G. V. (1985) Roles of nectar robbers in reproduction of the tropical treelet *Quassia amara*

- (Simaroubaceae). *Oecologia* 66: 161–167.
15. Schondube, J. E. & Martínez del Río, C. (2002) The flowerpiercers' hook: an experimental test of an evolutionary trade-off. *Proc. Roy. Soc. Lond. Ser. B* 270: 195–198.
 16. Schuchmann, K. L. & Boesman, P. F. D. (2020) Purple-collared Woodstar (*Myrtis fanny*), version 1.0. In: del Hoyo, J., Elliott, A., Sargatal, J., Christie, D. A. & de Juana, E. (eds.) *Birds of the world*. Ithaca, NY: Cornell Lab of Ornithology. <https://doi.org/10.2173/bow.pucwool.01> (accessed 1 September 2020).
 17. Schulenberg, T. S., Stotz, D. F., Lane, D. F., O'Neill, J. P. & Parker, T. A. (2010) *Birds of Peru*. Revised edn. Princeton, NJ: Princeton University Press.
 18. Vizin-Bugoni, J., Maruyama, P. K. & Sazima, M. (2014) Processes entangling interactions in communities: forbidden links are more important than abundance in a hummingbird-plant network. *Proc. Roy. Soc. Lond. Ser. B* 281: 20132397.
 19. Vogt, C. A. (2006) Secondary nectar robbing, a previously unobserved foraging behavior of the Cinereous Conebill (*Conirostrum cinereum*). *Orn. Neotrop.* 17: 613–617.
 20. Zimmer, J. T. (1930) Birds of the Marshall Field Peruvian Expedition, 1922–1923. *Field Mus. Nat. Hist. Zool. Ser.* 17: 233–480.

Jeffrey S. Marks

Montana Bird Advocacy, 909
Locust Street, Missoula, Montana,
USA. E-mail: jmarks17@gmail.com.

Received 30 September 2020; final
revision accepted 17 November
2020; published online 5 July 2021

Nest, nest site and early growth of Crestless Curassow *Mitu tomentosum* in northern Amazonia

Cracids are among the most conspicuous forest-dwelling birds in the Neotropics. Due to their relatively large body sizes, members of the Cracidae are vulnerable to anthropogenic disturbance, being heavily affected across their ranges by deforestation and subsistence hunting^{11,13}. At present, 22 of 56 species of cracids are listed as Vulnerable or in higher IUCN threat categories⁶, making them priority taxa for conservation⁷. Curassows, in particular, are of special interest as 13 species are globally threatened.

Despite their relevance to subsistence rural human populations and for the integrity of natural ecosystems¹², many cracids are poorly studied⁹, and Crestless Curassow *Mitu tomentosum* is no exception as evidenced by the lack of estimates of its current population⁶. Although the species occurs in Brazil, Colombia, Venezuela and Guyana, information on its natural history is scarce, especially its breeding ecology¹⁰. Here, we describe the species' nest, nest site and early nestling development.

On 30 August 2004 we found two nests of Crestless Curassows in the upper Rio Negro region, along the Içana River, near the Brazil / Colombia border (01°29'N 68°16'W; 125 m). The area is one of the few large patches of Amazonian white-sand forest known in Brazil as *campinarana*^{2,14}. The nests were found near a recently opened trail used by us to conduct wildlife surveys, in a type of white-sand forest known locally by the Baniwa indigenous group as *Ttiñalima*, or caraná palm *Mauritia carana* forest. It is a relatively low, open white-sand forest with a dense shrub and herbaceous layer¹. Nest sites were c.3–4 km from the edges of the Içana River and relatively close to each other, c.480 m apart. A total of 37 km of trails was opened in the region across distinct white-sand forest types, and were visited several times during the

study period (1 July–5 December 2004). Despite this, no other nest was found. The specific forest type where the nests were found forms a small part of the whole mosaic of white-sand forests in the region¹, being <10% of the entire area surveyed by us, perhaps indicating a preference for this habitat to nest. Additional studies are necessary to confirm this.

Both nests were sited c.4 m above ground (Fig. 1A) and were constructed of small sticks, thin roots, lianas, and fully covered by dry and green leaves, many from the trees where they were built (Fig. 1A, C). The nests were bowl-shaped, supported by several small thin branches, and both were c.40 cm in diameter. Two white eggs were present in one of the nests, the same clutch size previously reported for the species in Venezuela⁹, whilst the other was empty. Identification of the species to which both nests belonged was confirmed by local hunters.

Although neither egg was examined closely, they were both collected by local Baniwa with the purpose of hatching them. One was accidentally broken en route to the village, but the other successfully hatched, possibly being incubated by a hen, a practice already reported among other indigenous groups in Amazonia^{3,4}. The egg hatched on 4 September 2004. The villagers kept the hatchling alive and it was examined by the authors twice subsequently, firstly on 5 September 2004, one day after hatching, when it had light brown down feathers with black stripes on its head and body, red legs, and measured c.15 cm (Fig. 2A–B). Eighty-seven days later, on 1 December 2004, the young was larger and mainly covered by black feathers, the head had a small crest with feathers still missing around the eyes, the belly was fully covered by chestnut feathers, and the bill was still dark with a reddish base (Fig. 2C). No other visits were made to this village to further investigate the bird's development.

Our observations suggest a potential preference by Crestless Curassow for relatively open forests as nest sites and that