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Front cover: Coconut Ants eating a spider, Collin Officer Flora Reserve, Broadford. Photo Alistair Smith, TREC Land Services.
Back cover: Coconut Ants on a branch, Burges Lane, Broadford. Photo Kirsten Boehm. See pages 27–29.

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Preliminary observations on the distribution of a Coconut Ant, *Papyrius nitidus* species complex, and the interdependent, rare Ant-blue butterflies within the Broadford area

The Mount Piper Nature Conservation Reserve near Broadford, Central Victoria, is the only locality in Australia that includes Butterfly Community No. 1, which is listed as threatened (*Flora and Fauna Guarantee Act 1988* [*FFG Act*]) (Threatened Species Conservancy [TSC] 2022). This community characteristically contains multiple significant, rare and extremely rare invertebrate species. It is of particular interest as Butterfly Community No. 1 includes two threatened (*FFG Act*), congeneric, lycaenid species, the Large Ant-blue *Acrodipsas brisbanensis* and Small Ant-blue *Acrodipsas myrmecophila* (Jelinek 2003). Mount Piper is the only area within Victoria where these two butterflies are known to co-occur.

The Threatened Species Conservancy (TSC) is investigating the occurrence of these two butterflies at the Mount Piper Nature Conservation Reserve, nearby reserves and roadsides, to contribute data that will aid development of appropriate legislative protection for the butterflies. TSC is also searching for the attendant ants to better understand the relationship between the butterflies and ant species, their breeding biology, population density and distribution. Preliminary findings are presented in this Naturalist Note.

The Small Ant-blue shares an interdependent relationship with Coconut Ants of the genus *Papyrius* (Bond 2019). A similar interdependent relationship with these Coconut Ants is believed to occur with the Large Ant-blue. The genus *Papyrius* was described in 1992 by Steven O Shattuck (see Bond 2019). He placed 2 species into it, *Papyrius flavus* and *P. nitidus*, with the latter having 3 subspecies: *P. nitidus clitellarius*, *P. nitidus oceanicus* and *P. nitidus queenslandensis*. However, there are no extant images or valid specimens available for *P. flavus* and the distinctions for *P. nitidus* and its subspecies are subtle, and characters may be unreliable (Bond 2019); thus Bond (2019) was cautious and referred to them collectively as *P. nitidus* species complex. This article does the same. The genus is under genetic and taxonomic revision by ant

taxonomist Jon Lewis from the Australian National Insect Collection (CSIRO) (J Lewis, pers. comm. 2022), and TSC is assisting by providing samples of ant specimens from nests found during their study.

The Victorian Biodiversity Atlas's (VBA) most recent adult butterfly records of the two species at Mount Piper were made in 1995. In more recent years , photographs of eggs were placed on iNaturalist (2019) and sightings of the Large Ant-blue at Kinglake National Park in 2006 were recorded on the VBA. Prior to TSC's project, the VBA had no records of Coconut Ants in Victoria. The Atlas of Living Australia (ALA) has a few records; some are near Buchan and Albury but most occur around the suburbs of Melbourne. Records of historical sites from past projects are limited and have not been reconfirmed for many years, and new observations of the butterfly and ant species are also scarce.

In January 2022, TSC recommenced surveys of the Mt Piper region to investigate the current distribution of the Large and Small Ant-blue butterflies. These surveys involved extensive searching for nests of *Papyrius nitidus* species complex, as the nests are easily recognisable. The nests usually occur on or in dead trees, fallen branches and stumps, but may occur in decaying wood or in the ground (Bond 2019). They are readily identified by the 'byre' built from small pieces of leaves, sticks, flowers, and any natural material in the area. This debris is woven together to fill in cracks in logs, and to cover the nest and foraging trails (Bond 2019). The byre may be formed around the branches of trees and over the bark of tree or sapling stems. It is believed to protect the ant nests from parasitic wasps (Bond 2019; J Lewis, pers. comm. 2022). Current knowledge suggests the nests can span up to 10–20 m from a central point, being an expansive underground network with small, above-ground structures built into trees, fallen timber and stumps. New, smaller nests are created by dispersing queens, which fly to a new location and create another nest within the area (J Lewis, pers. comm. 2022).

TSC has found three sites with Coconut Ant nests across the Broadford area, each in quite different environments. Only one nest definitively showed the presence of the Ant-blue butterflies, in the form of hatched eggs. Each site with Coconut Ant nests is described below.

The first site with nests was on the side of a dirt road. Nests were found in three old stumps, a large fallen log, in the branches of several small eucalypt saplings and twisting up the trunk of two older eucalyptus trees. A large part of the complex nest system lay unseen beneath the ground; the above-ground structures played a key role in confirming their presence. One stump was situated on private land while the rest of the nest was beside a small dirt road within an open grassland area. Unfortunately, the large fallen log containing one of the nests was removed several months after being recorded, most likely for firewood. A piece of an old stump was used to replace the now missing log and the Coconut Ants subsequently moved their nest into this piece of stump. This replacement piece of stump can be referred to as an ant trap nest, proven to work in a previous project by DR Britton (1997). The nests in the saplings, older eucalypts and stumps are, currently, active and functioning well. The site is under the jurisdiction of the local Mitchell Shire Council and, currently, steps are being taken to establish this roadside as an area of 'very high conservation'.

The second site with nests was within crown land overseen by the Department of Environment, Water, Land and Planning (DELWP). There were nests in a large, old, standing eucalypt, several fallen branches and debris from flooding and a small dead standing tree. The site was in open woodland within a floodplain area beside a stream. Ant-blue butterfly eggs were found under a layer of bark on the nest in the small standing tree (Fig.1).

The third site was within the Colin Officer Flora Reserve, beside a dam. Coconut Ant nests were found in a large stump surrounded by a Sifton Bush *Cassinia sifton*, an old log, and in the bark of one of the nearby stringybarks *Eucalyptus* sp.. Several small ant residences were found within the branches of a nearby Sifton Bush (Fig. 2). These structures within the bush occurred over almost all the Sifton Bushes within the 10–20 m area around the central above ground structure of a large stump (Fig. 3).

These initial surveys showed that the Coconut Ants are present in a wider area around Mount Piper than previously known and have been

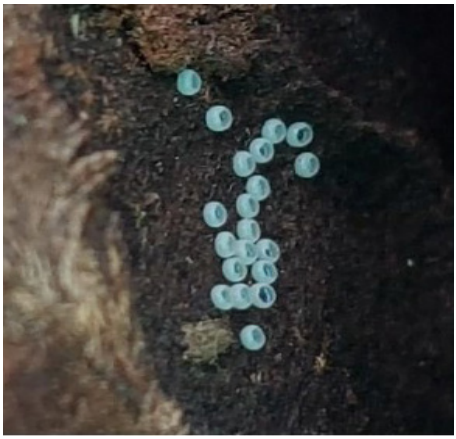

Fig. 1. Hatched eggs of *Acrodipsas* sp. on a Coconut Ant nest (31 March 2022). Each egg is 0.8 mm in diameter. Photo Kirsten Boehm and Jeni Kalowsky.

used for breeding by Ant-blue butterflies. No observations of nests directly in the Mount Piper Conservation Reserve have been made in recent years; however, further surveys by the TSC, trialling novel search methods, will be conducted to determine the presence or absence of Coconut Ants and Ant-blue butterflies in this reserve and surrounds. This work also will be used to develop a protocol to assist others when searching for butterfly-associated ants around Australia.

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Fig. 2. Coconut Ant nests in a Sifton Bush *Cassinia sifton*. Photo Kirsten Boehm.

Fig. 3. Stump with Coconut Ant nest, Collin Officer Flora Reserve, Broadford. Photo Karen Meijis.

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Kirsten Boehm, Georgie Custance and Abi Smith
Threatened Species Conservancy
Bunurong Country
PO Box 446
Cowes, Victoria 3922.
Corresponding author: <kirstenboehm13@gmail.com>.