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Purple Swamphens *Porphyrio porphyrio* and Dusky Moorhens *Gallinula tenebrosa* climbing trees and feeding on lerps

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Abstract. During an outbreak of the lerp-forming insect *Glycaspis brimblecombei* (Hemiptera: Aphalaridae) on River Red Gums *Eucalyptus camaldulensis* near Adelaide, South Australia, Purple Swamphens *Porphyrio porphyrio* and Dusky Moorhens *Gallinula tenebrosa* climbed trees to feed on lerps. The Swamphens climbed up to 8 m above ground- or water-level, the Moorhens up to 4 m. The Swamphens usually obtained lerps *in situ* by pecking or by drawing leaves through the bill. Sometimes an individual detached a branch and flew with it to the ground to feed there. The Moorhens took lerps only by pecking *in situ*.

Introduction

Lerps have long been recognised as an important food for birds of Australian forests and other wooded habitats (e.g. Paton 1980; Loyn *et al*. 1983; Woinarski *et al*. 1989). Many non-passerine and passerine species are known to take this food (Barker & Vestjens 1989, 1990) but apparently the only records of a rallid doing so are observations made by David Paton of Purple Swamphens *Porphyrio porphyrio*, which climbed trees to forage for lerps (Low 2014). This paper describes some behaviours of Purple Swamphens *P. p. melanotus* and Dusky Moorhens *Gallinula tenebrosa tenebrosa* when foraging for lerps of *Glycaspis brimblecombei* on River Red Gums *Eucalyptus camaldulensis* in South Australia.

Lerps are the shelters that are formed by the nymphs of certain phytophagous insects (Hemiptera: Aphalaridae: Spondyliaspidinae). The biology of South Australian species is described by Morgan (1984). After hatching from eggs laid on a eucalypt leaf, the nymphs insert their stylets into the host plant's phloem and feed. Each lerp is formed from the excreta of a single nymph, which adds to the structure as the insect develops through five instars, all the while remaining concealed beneath the lerp. A lerp is therefore essentially moulded honeydew (CSIRO 1991). In this paper the classification of lerp-forming insects is that of Burckhardt & Ouvrard (2012).

Evolution of lerp construction has occurred predominantly in the radiation of Spondyliaspidinae on plants of the family Myrtaceae, notably that of the aphalarid genus *Glycaspis* on eucalypt trees (Hollis 2004). In South Australia, *Glycaspis brimblecombei* has been recorded on several eucalypt species, its major host being the River Red Gum (Morgan 1984). The lerps take the form of low, white circular cones.

Observations

All observations were made at Whites Road Wetlands, 16 km north of Adelaide, SA. These wetlands include a series of ponds constructed primarily for flood mitigation alongside the Little Para River, as well as bodies of water along the river itself. River Red Gums line the banks; a few stand in the ponds and are for much of the year surrounded by water. Most of these trees are up to 8 m in height; a few are somewhat taller. An outbreak of *Glycaspis brimblecombei* lerps was first observed on 29 November 2011, but the size of some of the lerps indicated that the trees must have been infested for some time. Lerps were unevenly distributed; some trees appeared completely unaffected, whereas some branches of other trees carried mean densities of 40 or more lerps per leaf. It was not unusual to find more than 100 lerps on a single leaf, and one held 203. Lerp densities were generally more or less equal on the two sides of a leaf. Lerp numbers placed the infestation in the 'main' category of Morgan (1984).

One or more Purple Swamphens, Dusky Moorhens, or both species were studied feeding in trees on 23 days spanning the period 29 November 2011 to 15 December 2012. Swamphens were watched feeding on 19 of these days, Moorhens on seven. Swamphens fed in trees growing either beside or in water, but Moorhens only in trees surrounded by water. Images of the behaviours are shown in Figures 1–2.

Purple Swamphen feeding techniques (Figure 1)

Occasionally it was possible from ground-level to see that one peck of a Purple Swamphen or Dusky Moorhen had altered the pattern of lerps, removing one, thus establishing that the birds were indeed taking lerps. In this paper I call this the *peck* method of feeding. Swamphens often *pecked* at leaves. They also sometimes passed leaves between the mandibles more or less along the long axis of the leaf, a technique I here call the *wipe* method of feeding. The *wipe* was always in the stalk-to-tip direction. Lerps could sometimes be seen adhering to the sides of mandibles of birds feeding in this way. On two occasions, a Swamphen used its beak to pull a branch bearing ~20 leaves towards it, then grasped the branch in one foot while feeding. After a while the bird drew another branch towards it, while retaining its hold on the first branch. In this way the bird gathered several branches into a platform. I watched one bird that had already started collecting branches this way; for 16 minutes it remained on the one growing platform, gathering branches and feeding throughout this time. The bird then flew down to the water's edge. Like some other individuals, this one once removed a leaf, perhaps accidentally. The bird briefly worked the leaf in its beak, then dropped it.

Figure 1. Purple Swamphen (a) with a lerp-rich branch that it had just plucked to take to ground-level, (b) with lerps adhering to its beak, and (c) wiping lerps from a leaf. Photos: John Seymour

Twice, Purple Swamphens bit through leafy branches and took them to the ground. The first occasion was on a windy day: the Swamphen was on fairly fine branches and looked unsteady, flapping its wings from time to time to maintain balance. Eventually the bird bit through a branch and flew down to the ground with the branch in its beak. It then proceeded to feed as it had done up the tree, using a foot to hold the branch. On the other occasion, an adult was observed feeding lerps to young birds. The adult was walking in grass near the edge of a pond, followed by three juveniles that had grown to ~60% of adult body length. The adult was foraging on the ground, and from time to time held its beak still and low for the juveniles to take food. Then the adult climbed a tree, flying and jumping from branch to branch until ~5 m above the ground, leaving the juveniles on the ground more or less concealed by grass. The adult fed itself by both the *peck* and *wipe* methods. After a few minutes, it started biting through fine branches, but dropped the first two, presumably by accident. It then severed a third, held this in its beak, and flew down to the ground with it. The adult then fed by the *wipe* technique, before presenting its beak to the juveniles.

Only twice did a Purple Swamphen appear to obtain, or attempt to obtain, lerps without climbing. On the first occasion, an adult was walking along the edge of a pond when it jumped up from the ground towards a low leafy *Eucalyptus* branch. The bird made only two jumps, without removing a branch, before resuming its walk. Whether it obtained any lerps was impossible to determine at that distance. On the other occasion, an adult standing in shallow water beneath a tree stretched its neck up to feed on something in overhanging branches.

Dusky Moorhen feeding techniques

Dusky Moorhens fed almost exclusively by the *peck* method. However, one individual also used a tugging action: this was sometimes applied to a leaf, and may have been a way of removing lerps difficult to collect by pecking, in which case it may have been somewhat like the *wipe* of Swamphens, but as the action was rapid, distant, and often obscured by nearer foliage in the same tree, it was difficult to see. Sometimes the bird tugged at a branch, but the advantage was unclear, as branches always returned to their original position as soon as the bird let go. Unlike Swamphens, Moorhens did not use a foot to hold a branch in position for feeding.

Cleaning the beak

Although several birds could be seen to have lerps adhering to the beak, actions that might be interpreted as attempts to clean them off were rare. A Dusky Moorhen ~2 m up a tree once brought its right foot up to the beak, suggestive of trying to clean off lerps. Two Purple Swamphens feeding in a tree flew down to shallow water by a bank and drank, dipping their beaks into the water several times. One of them briefly brought one foot up to its beak and scratched, perhaps to remove lerps.

Climbing trees (Figure 2)

Both Purple Swamphens and Dusky Moorhens were seen to climb trees starting from ground-level. Occasionally they flapped their wings a few times to bridge a gap. Swamphens also sometimes flew directly from the ground to a point in a tree several metres above ground- or water-level; in one case, this flight was ~100 m long from the mud at the edge of some reeds *Phragmites* sp. to a tree surrounded by water. The usual way down was flight. Sometimes a bird climbed down; once, one flew directly from one tree to another. Swamphens were twice seen feeding 8 m above ground- or water-level. Moorhens were recorded no higher than 4 m above the water.

Feeding on lerps was seen at various times of day, but the largest numbers of Purple Swamphens in trees (up to six in the same tree, and up to 10 in the trees in one pond) were in March 2012, for ~1 hour beginning ~15 minutes before sunrise. This was the time of day at which individual

Figure 2. (a) Purple Swamphen, and (b) Dusky Moorhens foraging in trees. Photos: John Seymour

Swamphens spent the longest intervals in trees: up to 58 minutes. Only two Dusky Moorhens were timed; they stayed 11 and 24 minutes, respectively, up trees. It was not always possible to track a single individual, especially when several birds were in a tree simultaneously, but the following episode is probably representative. On 5 April 2012 at 0615 h Central Australian Standard Time, 16 minutes before sunrise, a Swamphen emerged from reeds on the bank of one of the ponds. It reached a tree near one corner of the pond at 0617 h, and climbed onto an emergent limb. It was soon feeding 2 m above water-level. By 0624 h it was at 4 m, by 0633 h at 5 m, and by 0634 h it had reached 7 m. By 0653 h the bird was feeding at 8 m, ~30 cm below the top of the tree, with only unacceptably spindly branches above it. At 0659 h it flew more or less horizontally away from the tree and out of sight, having spent 42 minutes in the tree.

On a single occasion, a Eurasian Coot *Fulica atra* pecked at low-hanging leaves as it swam on the water surface. The bird was too far away to enable identification of the food, but lerps are possible, as there were just then both a Swamphen and a Moorhen feeding by the *peck* method in that tree, 2 m and 0.5 m above the water, respectively.

Discussion

Information on the diets of Australian non-passerine birds has been compiled by Barker & Vestjens (1989), with updates by Lepschi (1993, 1997). Lerps were not listed among the food items of Purple Swamphen before Low's mention (2014) of observations by David Paton. Lerps do not appear to have been previously recorded among the foods of the Dusky Moorhen.

The chemical composition of lerps varies from species to species of scale insect. For example, Basden (1970) found the lerps of *Eucalyptolyma maideni* to consist of ~10% water and 90% starch, the latter referring to polysaccharides, branched and unbranched, of varying length but all containing at least 50 glucose residues. Gilby *et al.* (1976) obtained similar results for *Cardiaspina albitextura* and *Lasiopsylla rotundipennis*, finding also some lipid (<2%) and protein (<1%). However, Woinarski *et al.* (1989), examining lerps of three species, *Creiis* sp. (?*corniculata*), *Glycaspis fuscovena*, and *Lasiopsylla striatus*, found significant soluble sugars in *Glycaspis* (16.4% by weight), though not in *Creiis* (2.2%) or *Lasiopsylla* (nil). The lerps of *Glycaspis brimblecombei* have not been analysed, but their sweet taste suggests an appreciable concentration of sugars. As part of the same study, Woinarski *et al.* (1989) conducted experiments with recently caught wild leaf-gleaning passerines. They observed that almost all bird species took the *Glycaspis* lerps for preference, and the authors suggested that this reflected the high levels of sugars and of total carbohydrate in those lerps. It therefore seems likely that Purple Swamphens and Dusky Moorhens are attracted to *Glycaspis* lerps by the ready availability of sugars.

It is not known whether the South Australian Purple Swamphens and Dusky Moorhens were taking lerps alone, or consuming the nymph also when it was present. That birds can be selective has been demonstrated for Bell Miners *Manorina melanophrys* and some other species

(Loyn *et al.* 1983). Woinarski *et al.* (1989) found in their experiments that when a bird took a lerp, it usually also ate the nymph beneath, although the authors concluded that this was probably more as accidental by-catch than as deliberate prey.

The *wipe* used by Purple Swamphens to remove lerps from leaves resembles the action described by Loyn *et al.* (1983) for Crimson *Platycercus elegans* and Eastern Rosellas *P. eximius*, but whereas rosellas plucked leaves and drew them through the bill by foot, Swamphens removed individual leaves so rarely that this seems likely to have been the accidental consequence of applying too much force while *wiping* a leaf or drawing a branch closer to the bird. It seems likely that a Swamphen uses its tongue when *wiping* a leaf. When, unusually, one individual detached a single leaf, the Swamphen worked the leaf to and fro between its mandibles in a manner that suggested the tongue was removing the lerps. On two occasions, Swamphens bit off branches holding ~20–50 leaves. On the first occasion, this may well have been an inventive solution to the problem of obtaining lerps in a fairly strong wind. The second observation involved taking a branch to juveniles. A Swamphen with dependent young may bite through the base of a stem of *Typha* sp. and carry it to the bank to feed in small pieces to juveniles (pers. obs.); the severing of a lerp-laden *Eucalyptus* branch could be considered an opportunistic variant of this behaviour. Similarly, the gathering of branches by Swamphens in relatively flimsy parts of a tree may be another manifestation of the impulse leading them to construct platforms for various purposes among reeds (Bryant 1940; Holman 1947). Full-grown Purple Swamphens *Porphyrio porphyrio melanotus* (the relevant subspecies) weigh ~850–1100 g (Marchant & Higgins 1993). As *Glycaspis brimblecombei* tend to lay their eggs on young leaves (Morgan 1984), and therefore often at the ends of fine branches**,** platform-building may improve a Swamphen's access to lerps both by supporting the bird and by bringing younger foliage within reach.

Although Purple Swamphens have occasionally been recorded in the literature as climbing trees, they have rarely been described as taking food in the process. A particularly striking observation came from D'Urville Island, New Zealand: two Pukekos (the local name for *P. p. melanotus*) moved "through the top of tall kanuka trees making short leaps from branch to branch, sometimes aided by wing flaps and occasionally pecking at something in the foliage" (Edgar 1972, p. 351). Kanuka *Kunzea ericoides* can grow to 10 m in height. Writing about the Purple Gallinule *P. martinicus* in Panama, Wetmore (1965, p. 361) described birds as "often" climbing trees, "particularly those that grow in water", to heights of up to 20 m in search of food.

In a rare account of Dusky Moorhens climbing, Garnett (1978, p. 367) described them "walking along branches of shallow incline and flapping up steeper boughs", adding that "young birds use their wing spurs to obtain purchase when climbing". Reports of climbing by the more widespread Common Moorhen *G. chloropus* are similarly uncommon, but Urban *et al.* (1986, p. 123) mentioned that these birds climb "nimbly" in trees and bushes. There do not appear to be any previous records of either the Dusky or the Common Moorhen feeding while in trees.

It seems likely that the Eurasian Coot that pecked at low-hanging leaves was also taking lerps, and perhaps this species, too, will one day be added to the growing list of those that feed on this popular resource.

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