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A note on seed dispersal by Little Corellas *Cacatua sanguinea*

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Abstract. A flock of Little Corellas *Cacatua sanguinea* deposited six large American Sweetgum (Liquidambar) *Liquidambar styraciflua* fruit and three Mediterranean Cypress *Cupressus sempervirens* cones under the canopy of a Yellow Box *Eucalyptus melliodora* in a suburban backyard in Albury, New South Wales. Subsequent searches encountered American Sweetgum fruit under four further Yellow Boxes with evidence of pruning by Little Corellas. This is the first record of actual seed dispersal by the species, as well as of the use of American Sweetgum as food. These observations underline the importance of psittacids as incidental dispersers of plant seed.

Introduction

Little Corellas *Cacatua sanguinea* feed primarily on seed and grain on the ground (St John 1994; Higgins 1999; Strang *et al*. 2014). This species is also known to feed on various eucalypt species (Lepschi 1997; Burbidge 2008) including their seed (St John 1994). Although originally confined to the arid and semi-arid zone, over the past three decades Little Corellas have adapted to the novel ecosystems of urban areas (Burgin & Saunders 2007; Davis *et al*. 2011). Street trees and ornamental feature trees now regularly augment opportunities presented by traditional food sources in areas of remnant vegetation.

Little Corellas, like most other parrot species, are on record as destructive feeders on both flowers and fruits (Blythman 2012) and, as consumers of seeds, defaecating non-viable seed components. Consequently, they have not been commonly reported as seed dispersers. Observations of captive Little Corellas have documented individuals scooping up multiple seeds from a feeding bowl and flying to a perch for subsequent consumption, thus theoretically demonstrating dispersal (Matthews 1973). In non-captive settings such dispersal is unlikely, however, as the seeds will not occur in heaped circumstances even if already separated from their diaspores. Here I document observations that show Little Corellas as a disperser of complete or largely complete fruit and seed cones of plants that normally do not rely on animal-mediated dispersal and document the appearance of the dispersed cones and fruit.

Observations

The study area was located in 1930–1950s-era suburban development in central Albury, New South Wales (NSW). Observation sites were five Yellow Box *Eucalyptus melliodora* trees (coordinates of trees: 1 –36.072069, 146.905077; 2 –36.072256, 146.910378; 3 –36.072260, 146.910302; 4 –36.072156, 146.909939; 5 –36.079457, 146.905035).

On 3 and 4 April 2022, a flock of Little Corellas visited a ~22-m-tall Yellow Box (Tree 1) in a suburban backyard in Albury, severely 'pruning' the tree. The flock size ranged from 40 to 60. In the following days, a flock of 50–100 Little Corellas could be seen at various points in the leafy sections of central Albury.

During clean-up of the lawn, three American Sweetgum (Liquidambar) *Liquidambar styraciflua* fruit and three Mediterranean Cypress *Cupressus sempervirens* cones were noted, all encountered under the eastern half of the canopy of the Yellow Box where the Corellas had been noted. Since neither of these tree species occurs in the yard nor immediately nearby, the evidence suggests that these fruits were brought by the flock of Little Corellas. Unlike other seed dispersed into the garden by Pied Currawongs *Strepera graculina* (dispersing Canary Island Date Palm *Phoenix canariensis* and Broad-leaf Privet *Ligustrum lucidum*: Spennemann 2020a) and Sulphur-crested Cockatoos *Cacatua galerita* (dispersing European Olive *Olea europaea*: Spennemann 2021), I have never encountered American Sweetgum fruit and Mediterranean Cypress cones here during my 7-year residence. None of the other bird species observed in the Yellow Box feed on American Sweetgum or Mediterranean Cypress.

Searches in the neighbourhood encountered four other Yellow Box trees, three located 450 m east-south-east and one located 825 m south of the first observation, all of which had likewise been pruned by Corellas (Trees 2–5). Examination of the ground under the canopies of these trees yielded American Sweetgum fruit in all four instances. A partially defleshed drupe of a Queen Palm *Syagrus romanzoffiana* was also encountered under Tree 4, and three fruit of London Plane *Platanus* × *acerifolia* were found under Tree 5.

The dispersed seed

Three Mediterranean Cypress cones, 16 fruit of American Sweetgum, three fruit of London Plane and one drupe of Queen Palm were encountered under the five Yellow Boxes. The details of the dispersed fruit and cones are shown in Table 1. The dimensions and weights of the fruit and cone fragments as encountered under the trees demonstrate the carrying capacity of the birds in terms of size (up to 57 mm in length) and weight (up to 11.9 g). All three Mediterranean Cypress cones, the Queen Palm drupe and two of the three London Plane fruit showed signs of partial

Table 1. Details of the cones and fruit as encountered on the ground. Tree species: MC = Mediterranean Cypress *Cupressus sempervirens*, AS = American Sweetgum (Liquidambar) *Liquidambar styraciflua*, QP = Queen Palm *Syagrus romazoffiana* and LP = London Plane *Plantanus acerifolia*; n.w. = not weighed as not collected.

Tree no.	*Specimen no.*	*Tree species*	*State*	*Length (mm)*	*Diameter (mm)*	*Weight (g)*
1	A	*MC*	Partially eaten at proximal end with 2 seed scales missing	44	24–37	7.9
1	B	*MC*	Eaten at proximal end with numerous seed scales missing	34	24	4.8
1	C	*MC*	Completely eaten bar 1 seed scale	32	24	1.7
1	D	*AS*	Green on 1 side, with chew marks on the other	35	35	5.8
1	E	*AS*	Chew marks on 1 side	43	32	3.8
1	F	*AS*	Chew marks on 1 side	42	32	2.6
2	G	*AS*	Chew marks on 1 side (stepped on)	24	41	6.6
2	H	*AS*	Light brown, no evidence of chew marks	57	41	8.4
2	I	*AS*	Heavily chewed, only top third with stalk intact	32	32	1.1
2	J	*AS*	Fragment, chewed	17	31	0.5
2	K	*AS*	2 fragments, chewed	10	8	>0.1
3	L	*AS*	Green on 1 side, with chew marks on the other	52	40	8.5
3	M	*AS*	Heavily chewed, only top third with stalk intact	36	34	1.0
3	N	*AS*	Chewed on all sides	39	30	3.0
4	O	*AS*	Green, no evidence of chew marks	40	39	7.4
4	P	*AS*	Green, with chew marks on 2 sides	48	49	11.9
4	Q	*AS*	Green on 1 side, with chew marks on the other	46	39	7.5
4	R	QP	Partly defleshed	22	19	2.4
5	S	LP	Small chew marks on 1 side	48	46	n.w.
5	T	LP	No evidence of chew marks	40	35	n.w.
5	U	LP	Heavily chewed, half intact	37	38	n.w.
5	V	AS	Heavily chewed, half intact	33	33	n.w.
5	W	AS	Chew marks on 1 side	38	40	n.w.

consumption. The state of the American Sweetgum fruit ranged from untouched to largely consumed (Figure 1).

In all cases, dispersal of the fruit to the ground underneath the canopies of the Yellow Box trees in question by means of gravity (downslope movement), wind or surface-water movement and terrestrial animals can be ruled out, as also can human agency.

Discussion

Little Corellas primarily feed mainly on grass and legume seeds as well as grains, but also bulbs and fruits (Higgins 1999). A systematic search of the scientific literature found no reports of this species feeding on fruit of the American Sweetgum, which is an introduced ornamental species endemic to northern and central America (Meyer 1997). There is, however, a plethora of reports in social media and the newspaper press commenting on Little Corellas feeding on American Sweetgum fruit in Canberra since at least 2018 (Mackey 2018) as well as in various suburbs in Sydney since at least 2005 (Anonymous 2005; Various authors 2012) and Melbourne since at least 2012 (Various authors 2012; Cunningham & Precel 2018; Anonymous 2020). The use of the fruit by Little Corellas, although undocumented in peer-reviewed literature, is not surprising, given that a range of Australian Psittacidae species has learnt to extract the seed from the American Sweetgum fruit. On record are Carnaby's Black-Cockatoo *Zander latirostris* (Mawson 2001; Groom *et al.* 2014), Gang-gang Cockatoo

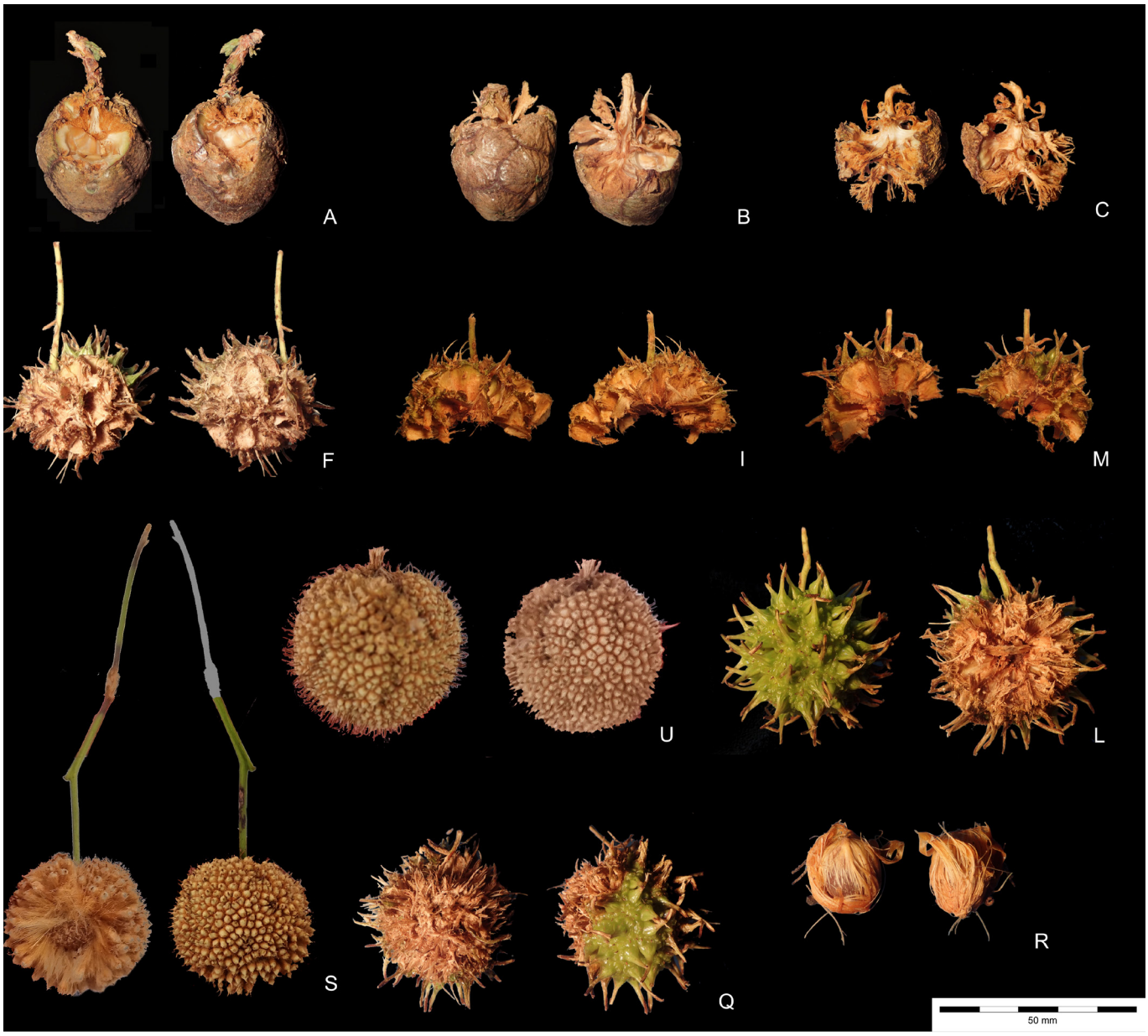

Figure 1. Examples of specimens dispersed by Little Corellas in Albury, NSW. The lettering corresponds with the details of the dispersed fruit and cones listed in Table 1. Photo: Dirk H.R. Spennemann

Callocephalon fimbriatum (Lepschi 1993), Sulphur-crested Cockatoo *Cacatua galerita* (Burgin & Saunders 2007), Red-rumped Parrot *Psephotus haematonotus* (Leonard 2011), Crimson Rosella *Platycercus elegans* (Lepschi 1993), Western Rosella *Platycercus icterotis* (Sedgwick 1988) and Australian King-Parrot *Alisterus scapularis* (Braithwaite 1977).

Little Corellas feeding on London Plane Trees have recently been reported in the scientific literature (Melbourne: Polley & Lill 2020) and are frequently commented on in social media and the newspaper press (Gippsland: Fraser 2007; Ballarat: Thomas 2020).

Feeding on cones of Mediterranean Cypress has been reported from suburban locations in Melbourne (Hubregtse 2020) and Canberra (Dabb 1996). In Albury, Little Corellas have been observed feeding on Chinese Arborvitae *Platycladus orientalis* cones (See 2022), and in South Australia, heavy pruning by Little Corellas has been noted as a major problem impacting a range of conifers (Scanlon *et al.* 2017). Unlike other cockatoo species (Saunders 1974), Little Corellas have so far not been reported in the literature or in social media as dispersers of pine cones.

The occurrence of the partly defleshed drupe of a Queen Palm is noteworthy, but its dispersal cannot be unequivocally attributed to Little Corellas, since Grey-headed Flying-foxes *Pteropus poliocephalus* are also known to disperse these fruit in the region (Spennemann 2020b). There is little indication, however, that the Yellow Box in question (Tree 1) would have attracted Grey-headed Flying-foxes, as its fruit had begun to form and thus the tree no longer offered flowers and nectar. Although Grey-headed Flying-foxes had frequented this large Yellow Box during flowering, this had finished 6 weeks before the pruning event and Flying-foxes had not been seen since in that tree. On the other hand, there is evidence that psittacids also feed on Queen Palm seeds. In Brazil, Plain Parakeets *Brotogeris tirica* are known as incidental dispersers of Queen Palm seeds (Sazima 2008).

As a granivorous species, the Little Corella, like most species in the Psittacidae, is not considered a primary seed disperser. However, many psittacids are incidental dispersers, as the synzoochorous and primarily stomatochorous transport of branchlets and fruit has been reported for a range of psittacids, primarily when disturbed while feeding (Sazima 2008; Blanco *et al.* 2015, 2018; Tella *et al.* 2015*,* 2016; Spennemann 2020c; Silva *et al.* 2021). Although their role as seed dispersers has been discussed at length for their native ecosystems in South America (Baños-Villalba *et al.* 2017), explorations of their ecological function in the Australian setting have only just begun (Blanco *et al.* 2018).

In terms of dispersal distances for the observed incidents, the closest Mediterranean Cypress that was in fruit at the time was located 200 m south-east, and American Sweetgums were scattered in the area in a 300-m radius around the deposition trees.

The overall effectiveness of the Little Corella as a seed disperser appears to be low, primarily because of the low frequency of these transportation events in relation to total consumption. Yet, considering that between three and four fruit/cones were encountered following each visit of the flock, it can be posited that between 3 and 5% of the birds did disperse fruit (not counting any fruit that might have been dropped *en route*). Furthermore, the fact that American Sweetgum fruit were observed under all five trees suggests that such dispersal is not unusual.

The observed dispersal underlines the role of psittacids as incidental stomatochorous dispersers of seed in Australian settings. Partially frugivorous species, such as Sulphur-crested Cockatoos, augment a plant's dispersal primarily effected by dedicated frugivores. Other species, such as Little Corellas, are primarily seed consumers. Their actions may disperse seeds of plants that are normally not dispersed by frugivores (both American Sweetgum and Mediterranean Cypress are dispersed through primarily anemochory but also hydrochory) and carry these over distances well beyond a plant's normal seed shadow. Combined with their more erratic flight pattern, which seems to be influenced by the choices of other individuals in the flock, seeds dropped by psittacids may well facilitate true colonisation by plant species (Spennemann 2020d), rather than merely effect range intensification and range expansion. As corellas expand their presence in novel urban ecosystems (Burgin & Saunders 2007; Blythman & Porter 2020; Polley & Lill 2020), corella-mediated dispersal of seed into peri-urban areas, and the associated effects of such colonisation events, should not be discounted. Further systematic studies into the role of psittacids in seed dispersal in Australian settings is warranted. A systematic approach to opportunistic observational studies of feeding and dispersal behaviour accumulated through citizen-science methodology may yield valuable data.

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