

## A Note on Anthesis in a Thai Mistletoe and Its Relationship with a Flowerpecker

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I previously noted the importance of Scarlet-backed Flowerpeckers (*Dicaeum cruentatum*, Dicaeidae) as potential pollinators and seed dispersers of the mistletoe *Dendrophthoe pentandra* (L.) Miq. (Loranthaceae) in some Thai urban environments (START, 2011). I also noted that this mistletoe species flowered and fruited continuously so that both were available to the birds most of the time. Since then I have been able to examine aspects of the anthesis of this mistletoe and the roll played by the flowerpecker in the process.

**Methods.**—The observations were made on mistletoes infecting ornamental plantings of several hosts, particularly *Lagerstroemia speciosa* (L.) Pers. (Lythraceae) and *Terminalia catappa* L. (Combretaceae) in Chiang Mai, northern Thailand in May–June 2011. To determine the process of anthesis, mature buds and fruits were closely examined and manually manipulated. A  $\times 10$  hand lens was used where necessary. To ascertain potential pollinators and seed dispersers, mistletoes were observed at 5–10 m with  $\times 10$  binoculars. Observation time totalled about 10 h.

**Results.**—Immature buds were green, usually turning dull yellow to orange or, sometimes, purplish yellow at maturity. In mature buds, the basal portion of the corolla was inflated, narrowing distally and terminating in a clavate tip that enclosed the basi-fixed anthers and stigma, the latter extending about 1 mm above the anthers. Fenestration sometimes occurred in the narrow, mid-section of the unopened corolla tube (Fig 1. left). Pressure applied manually to either the inflated section or the clavate tip of mature buds caused the free, terminal portions of the petal lobes to separate in a mildly explosive action and reflex  $< 90^\circ$ , leaving the basal portions fused as an inflated tube. At that time, the anthers remained more or less adpressed to the style below the stigma but, by then, they had already dehisced by longitudinal slits (Fig 1, centre). With time, the free portions of the petal lobes reflexed further and the corolla colour deepened, usually to a dull orange, the style extended a little and the anthers became less adpressed (Fig 1, right). The colour changes in the maturing buds and flowers were mirrored in the maturing fruits, resulting in the corolla tube resembling the mature fruit in shape and size (Fig. 2).

Scarlet-backed Flowerpeckers were the only bird species seen to manipulate buds or probe flowers. They used their mandibles to apply pressure to the sides of mature buds, an action that caused the bud to open. The newly-opened flowers were usually probed immediately by the birds. The flowerpeckers were also observed probing already-open flowers. The probing action would have caused the birds' heads to brush over the stigma, depositing previously acquired pollen and acquiring fresh pollen. Although, it is not clear at what stage the stigma was receptive, the process is likely to have effected pollination at some time. In the case of

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fruits, a similar action by the birds' caused a circumscissile split of the pericarp, enabling the seed to be extracted and ingested.

No other flowerpecker species were seen in Chiang Mai's urban environments. Sunbirds, most commonly the Olive-backed Sunbird (*Cinnyris jugularis*, Nectarinidae), were present but never observed feeding on mistletoe flowers or fruits. However, WEE (2007) has posted images taken in Singapore of that sunbird applying mandibular pressure to the inflated portion of *D. pentandra* flowers to open them.

**Discussion.**—CHEKE *ET AL.* (2001) record the food of Scarlet-backed Flowerpeckers as 'Insects, spiders, small figs, green seeds, berries and nectar. Fruits of mistletoes.' but made no mention of nectar. However, for many other flowerpecker species they state the food 'Presumably includes fruits and possibly also nectar and/or pollen of mistletoes' but provide no evidence of nectar or pollen ingestion.

DAVIDAR (1983) reported that, in India, a flowerpecker was the vector for pollen and seed of another *Dendrophthoe*, *D. falcata* (L. f.) Ettingsh., and suggested that similarity of flower and fruit colour, as well as overlapping flowering and fruiting phenologies, were characteristics of mistletoe species that used flowerpeckers for pollination and seed dispersal. He noted that these characteristics contrasted with those of species that employ separate pollen and seed vectors. In those, 'flowers had a strong colour signal ... usually red or pink.' In Thailand, many mistletoes have strong, often red, flower colours that differ from those of mature fruits. Nevertheless, there are species with drab flowers, (e.g. *Taxillus* and *Scurrula* spp.). However, they have narrow corolla tubes and strongly coloured (usually red) styles, anthers, filaments and, often, the inner surfaces of the exposed, terminal portions of the petals. Those species commonly attract sunbirds to flowers and flowerpeckers to fruits (personal observations). Thus, the observations on Scarlet-backed Flowerpeckers' use of both flowers and fruits of *D. pentandra* in Chiang Mai support Davidar's hypothesis that similarity of flower and fruit colours, as well as overlap in the availability of flowers and fruits, comprise elements of a syndrome that attracts the same flowerpecker vector for pollen and seed dispersal. Added to that, in the case of *D. pentandra*, access to both floral and fruit rewards requires a similar action on the part of the birds.

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Figure 1. Bud and two flowers of *Dendrophthoe pentandra* from Chiang Mai. Left, The fenestration in the bud. Centre, The flowers have been open some time so that the anthers are no longer closely adpressed to the filament. Right, Bruising on the lower part of one corolla caused by pressure from the bird's bill.



Figure 2. Mature fruits of *Dendrophthoe pentandra* from Chiang Mai.