First description of the natal plumage of Black-crowned White-eye (*Zosterops atrifrons atrifrons*) from Sulawesi, Indonesia

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Summary. The breeding biology of tropical birds, including those that inhabit the Indo-Pacific region, remain poorly known. Here, we present the first description of the natal plumage of Black-crowned White-eye (*Zosterops atrifrons atrifrons*) based on a single observation in Sulawesi, Indonesia. On 13 May 2022, we observed a fledgling *Z. a. atrifrons* clinging to the lower branches of a large pine tree (*Pinus* sp.) in partially logged secondary forest. Provisioning by presumed parental birds allowed us to identify the species. The whitish underparts and dark olive green back of the natal plumage is similar to the adult plumage of *Z. atrifrons*. We suspect the young bird had recently fledged due to its very short tail, partially emerged remiges, and complete dependence on the adults for food.

Ringkasan. Biologi perkembangbiakan burung tropis, termasuk burung yang menghuni kawasan Indo-Pasifik, masih kurang diketahui. Berikut ini kami sajikan gambaran pertama mengenai bulu Kacamata dahi-hitam (*Zosterops atrifrons atrifrons*) anakan yang baru lahir berdasarkan pengamatan tunggal di Sulawesi, Indonesia. Pada tanggal 13 Mei 2022, kami mengamati *Z. a. atrifrons* menempel pada cabang bawah di pohon pinus (*Pinus* sp.) besar di hutan sekunder yang sebagian telah ditebang. Kehadiran induknya yang membawa makanan memungkinkan kami mengidentifikasi spesiesnya. Tubuh bagian bawah berwarna keputihan dan punggung bulu piyik berwarna hijau zaitun tua mirip dengan bulu dewasa *Z. atrifrons*. Kami menduga burung muda tersebut baru saja meninggalkan sarangnya, karena ekornya yang sangat pendek, bulu sayap yang hanya sebagian telah muncul, dan ketergantungan penuh pada burung dewasa dalam hal makanan.

Introduction

The natural history of tropical avifauna remains poorly understood. A recent review on the breeding biology of the world's birds highlighted tropical forest nesters in the Indo-pacific region as one of the most data deficient regions (Xiao *et al.* 2017). Indeed, over half of all Wallacean endemic birds have no published breeding biology information (Noske 2017). Here, we describe the natal plumage of the Black-crowned White-eye (*Zosterops atrifrons*), an understudied forest passerine endemic to Sulawesi and the Banggai Archipelago off E. Sulawesi. Though common in a variety of habitats, from primary forest to highly disturbed logged and cultivated areas in lowland Sulawesi and satellite islands (van Balen 2020), the species' breeding biology is not fully documented. This is due, in part, to both the fluctuating species limits within white-eyes as a whole and the inherent difficulties associated with studying the breeding biology of tropical birds (Xiao *et al*. 2017; Lim *et al*. 2019). Although recent work has greatly improved our knowledge of the breeding biology of Sulawesi avifauna (O'Connell *et al.* 2022), its scope was restricted to the south-east of Sulawesi where *Z. atrifrons* is absent.

Zosterops atrifrons was once considered a large polytypic species comprising eleven subspecies (Mees 1961), constituting a superspecies with *Z. atriceps, Z. minor, Z. meeki* and *Z. hypoxanthus* (Sibley & Monroe 1990). Rasmussen *et al*. (2000) split out this taxon after detailed morphological and vocal analyses revealed underappreciated species-level diversity. Currently, *Z. atrifrons* comprises four subspecies-level taxa with disjunct ranges across north and central Sulawesi and nearby satellite islands (IOC v. 12.1; Gill *et al*. 2022). Nominate *atrifrons* is found across the northern peninsula of Sulawesi, disjunct from the other central Sulawesi subspecies *surdus*. The taxonomy of *Z. atrifrons* is complex and could represent species-level taxa, pending further studies that incorporate dense sampling across its range. Due to the uncertain species-limits in this group, it is important to characterise its subspecific breeding biology pending future taxonomic revisions.

Observation

On 13 May 2022, we observed a solitary fledgling perched in the lower bare branches of a large pine tree (*Pinus* sp.) approximately 20–30 m above the ground. The tree was in partially logged secondary forest and less than 10 m from a paved road that led to the summit of Mt. Mahawu in North Sulawesi Province (1.3475949, 124.8702407, 1230 m elevation). The fledgling had bright, downy whiteish breast feathers, a yellow gape, and light pink legs (Figure 1). The characteristic white eye-ring was absent. Dark olive green characterised the fledgling's upperparts and head. Remiges were in sheath and ventrally olive. The tail was very short with partial emergence from the pin feathers.

Figure 1. A–B) Juvenile of the Black-crowned White-eye; C) juvenile begs for food from presumed parental bird; D), two presumed parental birds photographed near the juvenile (not pictured), one of which is holding food.

The fledgling sat completely motionless unless it was fed by one of the two presumed parents (Figure 1C–D). When the parents were nearby, the fledgling begged for food. When the fledgling did move, it could hardly hop from branch to branch and was scrambling to hold itself up during our observation. Our observation may have been within the first few days of fledging because of the dependence on adults for food and short remiges. Other white-eye species, such

as *Z. simplex* and *Z. mauritianus*, have been documented to fledge at a similar stage of dependency (ca. 10 days; Chungwei & Chingsong 2003; Nichols *et al*. 2005).

Though white-eyes commonly occur in sympatry, they are often separated by behaviour, elevation, or habitat preferences (Coulson & Lack 1972; Cowles & Uy 2019). Nevertheless, we observed two species of white-eyes in the immediate area. In the same large *Pinus* tree as the fledgling, we observed a small flock of both *Z. a. atrifrons* and Warbling White-eye *Z. japonicus montanus* (https://ebird.org/checklist/S110635280). We were able to confidently identify the fledgling species by observing two adult *Z. atrifrons* visiting and feeding it. Likewise, we did not observe *Z. j. montanus* approach the fledgling. We did, however, observe *Z. j. montanus* carrying food, which suggests the two species were breeding in syntopy.

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