Additional information on the breeding biology of Azure-shouldered Tanager Thraupis cyanoptera

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Additional information on the breeding biology of Azure-shouldered Tanager *Thraupis cyanoptera*

by Guilherme Willrich

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Summary.—I report new data on the breeding biology of Azure-shouldered Tanager *Thraupis cyanoptera* based on two nests found in Santa Catarina, southern Brazil, in 2021 and 2023. Nests were shallow cups attached by the base, and their composition included large dry bromeliad leaves, long filaments of a *Microgramma* vine, small sticks, pine needles, dry bamboo leaves and fungal rhizomorphs. Clutch size was three in both nests. Eggs were oval (mean 25.6 × 17.9 mm; 4.7 g), with a white/cream background and small brown spots distributed throughout but concentrated at the larger end. Incubation period has not previously been reported; it is 14–15 days, similar to congeners. Newly hatched nestlings had closed eyes, pinkish skin and a brown down covering their head, back and wings; they were fed by both adults.

Knowledge of avian breeding biology is still scarce even after more than a century of natural history surveys, with 70% of species lacking basic breeding data (Xiao *et al*. 2017). This knowledge deficit is particularly obvious in the Neotropics, where even common and widespread species are poorly known (Xiao *et al*. 2017, Lees *et al*. 2020, Fierro-Calderón *et al*. 2021). For example, the Tyrannidae and Thraupidae, two of the most speciose families of passerines in the Neotropics (Winkler *et al*. 2020ab), include many such under-studied species (Crozariol 2016, Batisteli *et al*. 2019, Zima *et al*. 2019, Lima & Guilherme 2020).

Azure-shouldered Tanager *Thraupis cyanoptera* is one member of the Thraupidae whose reproductive biology is known from scant data (Zima *et al*. 2019). This species is endemic to the Atlantic Forest biome (Vale *et al*. 2018) and is currently considered Near Threatened on the IUCN Red List (IUCN 2024). Our knowledge of its breeding biology is restricted to the description of four eggs by Ogilvie-Grant (1912; repeated in Isler & Isler 1987) and Schönwetter (1981), the observation of a nest site by Kirwan (2009) and the description of three nests, two eggs and four nestlings by Zima *et al*. (2019). Here I report new information on the species' breeding biology based on two nests found in Santa Catarina, southern Brazil.

Nest 1.—Found on 1 January 2021 in a wooded garden (*c*.0.2 ha) in the municipality of Brusque, Santa Catarina, southern Brazil (27°08′43.9″S 48°55′16.2″W; 46 m). It was constructed 6 m above ground in a tangled hemiparasite mistletoe (*Struthanthus polyrhizus*) (Fig. 1A) that had parasitised an *Alchornea glandulosa* tree. The nest was cup-shaped and attached at the base (low cup/base *sensu* Simon & Pacheco 2005) to small branches of both the mistletoe and the tree, and contained three well-developed nestlings (Fig. 1B–C). Due to its height above ground, it could not be measured. Externally, it comprised large dry plant fibres (e.g., bromeliad leaves) and filaments of ferns of the genus *Microgramma* (vine) (plant identifications by the author).

Both adults were observed feeding the nestlings simultaneously on three occasions (6 January 08.35 h and 18.24 h; 7 January 15.30 h). Nestling diet included fruits of *Psidium cattleyanum* (n = 2; 6 January 18.24 h and 7 January 14.20 h) and *Archontophoenix*

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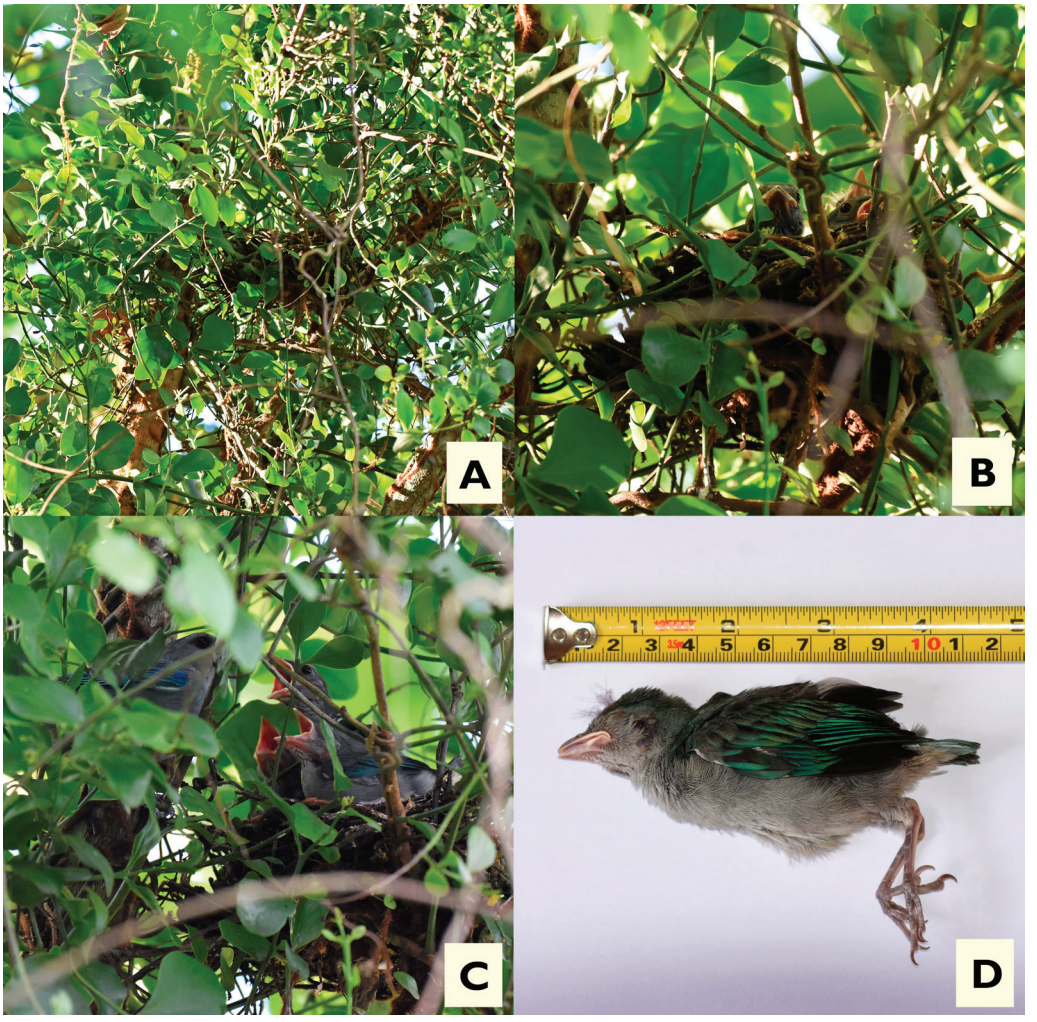

Figure 1. Nest of Azure-shouldered Tanager *Thraupis cyanoptera* found on 1 January 2021, municipality of Brusque, Santa Catarina, southern Brazil (27°08′43.9″S 48°55′16.2″W). A: nest site in a tangled hemiparasite mistletoe (*Struthanthus polyrhizus*); B–C: nest with three well-developed nestlings; D: nestling found dead on 9 January 2021 (Guilherme Willrich)

cunninghamiana (*n* = 1; 6 January 17.28 h), sited 20 m and 30 m from the nest, respectively. On 7 January 2021 (at 14.20 h), an adult was observed removing a faecal sac, that was deposited *c*.2 m from the nest; it contained an unidentified seed (3 mm) and parts of an unidentified insect. On 9 January at 09.00 h only two nestlings were present, whilst the third was dead on the ground (Fig. 1D). At 12.30 h on the same day, the remaining nestlings fledged. Presumably the dead one had fallen from the nest when attempting to fledge; using a ruler, it measured 11.5 cm in total length (from the bill tip to the tail tip) and had well-developed remiges and contour feathers, whereas the rectrices were still short (lacking a calliper, no other measurements could be taken).

Nest 2.—On 1 November 2023, a nest of Azure-shouldered Tanager under construction was found in the garden of Caldas Plaza da Imperatriz Resort & Spa, Santo Amaro da Imperatriz municipality, Santa Catarina (27°43′58.9″S, 48°48′37.7″W; 224 m). One adult was observed carrying material to the nest, while the other individual followed closely. The nest

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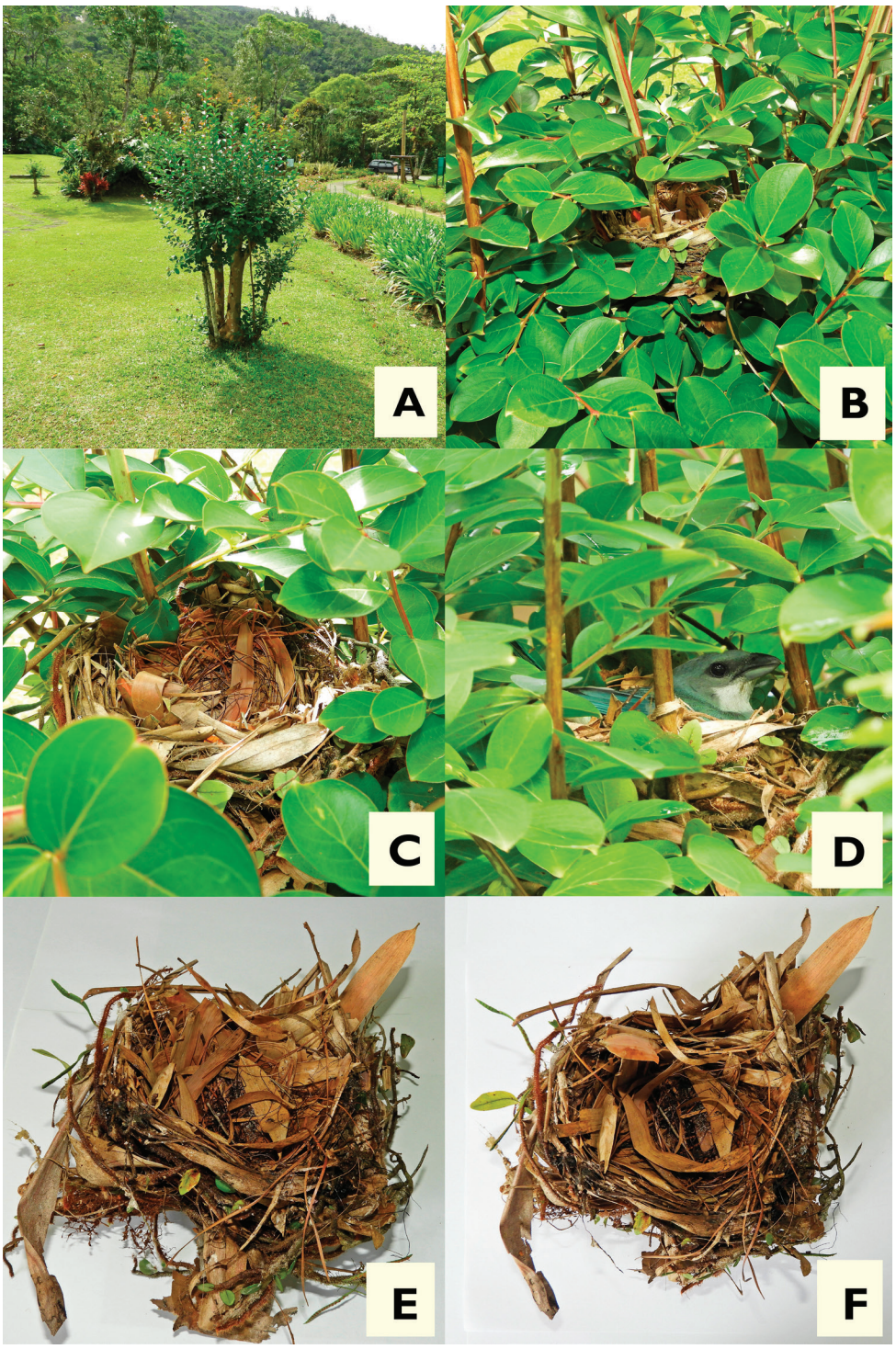

Figure 2. Nest of Azure-shouldered Tanager *Thraupis cyanoptera* found on 1 November 2023, municipality of Santo Amaro da Imperatriz, Santa Catarina, southern Brazil (27°43′58.9″S 48°48′37.7″W). A: nest site in a *Lagerstroemia indica* tree; B–C: empty nest, prior to laying; D: adult on nest; E–F: nest after collection (Guilherme Willrich)

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was in an exotic *Lagerstroemia indica* tree 1.18 m above ground. The tree was 2.40 m tall and isolated (being surrounded by grass; Fig. 2A). It too was a shallow cup attached by the base to the main trunk of the tree (low cup/base *sensu* Simon & Pacheco 2005) and surrounded by new growth (Fig. 2B–F). Externally, the nest was constructed of large dry plant filaments and leaves, especially dry bromeliad leaves, and long filaments of *Microgramma*. Internally, there was finer material, including small sticks, pine needles (non-native *Pinus elliottii*), many dry bamboo leaves (*Chusquea* sp.) and, to line the cup, black fungal rhizomorphs (Fig. 2E–F). The nest measured:(i) 88.8 mm min. outer diameter; (ii) 122.1 mm max. outer diameter; (iii) 57.1 mm min. inner diameter; iv) 73.5 mm max. inner diameter; (v) 61.3 mm external height (base to upper border); and (vi) 42.6 mm internal height (inner cup to upper border).

The first egg in this nest was laid on 9 November 2023, while the second and third eggs were laid on 10 and 11 November, respectively. Diurnal incubation shifts were noticed only after the third egg had been laid. The eggs were oval, with one end larger and rounded, whilst the other was smaller and pointed. They had a white/cream background colour, with small brown spots distributed throughout, but more concentrated at the larger end (Fig. 3A–B). They measured 25.5 × 18.0 mm, 25.3 × 18.0 mm and 26.0 × 17.8 mm, mass 4.7 g, 4.8 g and 4.7 g (measured using dial callipers and weighed using a digital scale).

On 21 November 2023 (ten days after the third egg was laid) one of the eggs was missing, probably having been predated. On the morning of 24 November at 08.30 h the first nestling started to hatch, while the second hatched on 25 November (nest checked at 07.45 h) (Fig. 3C–D). Therefore, the incubation period is between 14 and 15 days (as it was impossible to determine which egg was predated on 21 November). Nestlings hatched with closed eyes, pinkish skin, except the eyelids which were grey, and a brown down covering their head, back and wings (Fig. 3D). The first remiges started to appear on 30 November and the first contour feathers on 2 December (Fig. 3E). On 5 December, the nestlings started to vocalise when an adult approached the nest, and on 6 December both nestlings were predated. The nest was then collected and deposited in the bird collection of the Ecology and Zoology Department of the Federal University of Santa Catarina (CAUFSC), registration number CAUFSC 418.

Concerning parental care, again both adults were seen feeding the nestlings simultaneously (n = 2; 30 November, 15:55 h and 2 December, 08.25 h; Fig. 3F), and the only item identified was fruits of *Miconia formosa* (2 December, 08.25 h). As the birds were not ringed, it was impossible to determine if both adults incubated.

The nests described herein are remarkably similar to the only three nests previously described for the species by Zima *et al*. (2019), including their size, support, shape and materials; they can be classified as a low cup/base according to Simon & Pacheco (2005). Large filaments of dry bromeliad leaves and *Microgramma* vines seem to be important for constructing the base and external walls of the nest, as they have been observed in all nests described to date (Zima *et al*. 2019, present study). Internal composition appears more variable, with different kinds of thin fibres, sometimes including fungal rhizomorphs in the inner cup (Zima *et al*. 2019, present study). Nest site was the main difference between the nests described here and those reported by Zima *et al*. (2019) and the observation by Kirwan (2009). All prior observations involved nests on epiphytic bromeliads (Kirwan 2009, Zima *et al*. 2019), while my data reveal that the species can also build nests in other dense or tangled vegetation, including non-native plants. My observations of nests in wooded gardens corroborate the species' tolerance of disturbed habitats described previously (Kirwan 2009, Zima *et al*. 2019).

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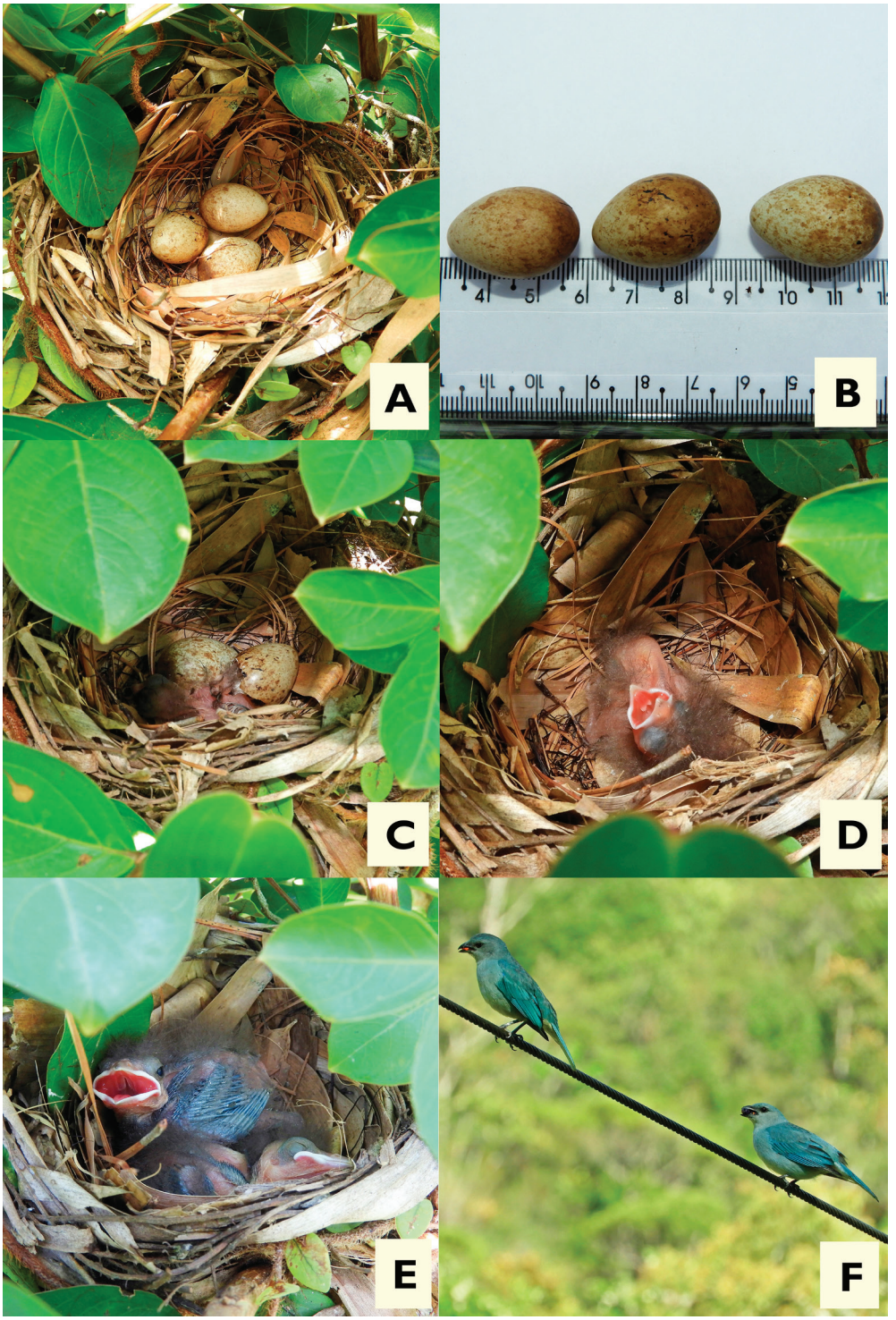

Figure 3. Nest of Azure-shouldered Tanager *Thraupis cyanoptera*, municipality of Santo Amaro da Imperatriz, Santa Catarina, southern Brazil. A: nest with three eggs; B: eggs; C: first nestling on 24 November 2023; D: nestlings on 25 November 2023; E: nestlings on 2 December 2023; F: male and female about to visit the nest to feed the nestlings (Guilherme Willrich)

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Clutches of three eggs had not previously been reported for Azure-shouldered Tanager, for which Ogilvie-Grant (1912), Schönwetter (1981) and Zima *et al*. (2019) described clutches of just two eggs. Such variation in clutch size is expected as it was already reported for other *Thraupis*, with for example clutches of 2–3 eggs in Sayaca Tanager *T. sayaca* (Almeida *et al*. 2012, Marini *et al*. 2012, de la Peña 2013, Batisteli *et al*. 2019).

The egg colour in Santa Catarina does not resemble the pale blue eggs with purplish-black spots described by Ogilvie-Grant (1912) or those with a light blue background and well-defined rounded purple-black spots reported by Schönwetter (1981). In contrast, it does match those described by Zima *et al*. (2019), except in the distribution of the brown spots, which were concentrated at one end in the eggs at Santo Amaro da Imperatriz. Ogilvie-Grant (1912) and Batisteli *et al*. (2019), reported much variation in colour, shape and markings in eggs of Sayaca Tanager, and similar variation can be expected for the closely related Azure-shouldered Tanager. Therefore, the slight differences between the eggs described here and those by Zima *et al*. (2019) can be considered natural variation. However, the eggs described by Ogilvie-Grant (1912) and Schönwetter (1981) seem quite different, and more information is needed to be sure if those were correctly identified or represent more extreme variation in the species. In fact, Schönwetter (1981) mentioned that the eggs he described differed from those of congenerics and raised the possibility that they belonged to a species of *Ramphocelus*.

The incubation period of Azure-shouldered Tanager was previously unknown, but is similar to that reported for congenerics, e.g., 12–14 days in Sayaca Tanager (Almeida *et al*. 2012, Batisteli *et al*. 2019, Hilty 2020a) and Blue-grey Tanager *T. episcopus* (Gomez *et al*. 2000, Hilty 2020b) and 14 days in Palm Tanager *T. palmarum* (Hilty 2020c). Zima *et al*. (2019) reported nestlings of Azure-shouldered Tanager with pink skin and grey down, whereas those I observed had brown down (Fig. 3D). Such variation has not been reported in other *Thraupis*.

The present study helps clarify the ecology and natural history of Azure-shouldered Tanager. However, our understanding of its breeding biology remains incipient. Nestling period, for example, has yet to be determined. Moreover, parental care requires detailed study of birds that have been ringed and sexed. In sum, long-term studies of the species' breeding biology, such as that by Batisteli *et al*. (2019) on Sayaca Tanager, are still necessary to fill those gaps.

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