

## ARTÍCULO/ARTICLE

**Observations on the nest of Brown-bellied Swallow *Orochelidon murina* (Hirundinidae) in Quito**

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**Observaciones de un nido de la Golondrina Ventricafé *Orochelidon murina* (Hirundinidae) en Quito****Resumen**

Describo las observaciones de un nido, pichones y cuidado parental de la Golondrina Ventricafé *Orochelidon murina* en La Armenia, valle de Los Chillos, 7 km al sureste de Quito. Las observaciones se realizaron cada dos días entre 26 de abril–20 de mayo 2020, con periodos de observación de 1,5–2 h y un total de 20 h. El nido se encontraba en un tubo de drenaje en el muro alrededor de una casa, a una altura de 2,15 m. El tubo tenía un diámetro de 10 cm y una profundidad de 25 cm. El nido, que cubría el tubo en su longitud total, consistía de un montículo poco profundo de fibras vegetales, plumas y heces de los ocupantes del nido. La puesta fue de tres huevos. Los polluelos se quedaron en el nido por lo menos 25 días. Fueron alimentados en promedio 8 veces/h (DS = 3,4; n = 11) durante todo el periodo de observación. El intervalo promedio entre visitas fue 5,3 min (DS = 5,4; n = 106) y la duración promedio de las visitas fue de 0,3 min (DS = 0,9; n = 103). Se observó en varias ocasiones a un tercer adulto cerca del nido, pero no se pudo determinar un rol activo en la crianza de los polluelos.

**Palabras clave:** Adulto extra, cuidado parental, estructuras artificiales, Golondrina Ventricafé, nido, *Orochelidon murina*, polluelos.

**Abstract**

I present observations on the nest, nestlings and parental care of the Brown-bellied Swallow *Orochelidon murina* in La Armenia, 7 km southeast of Quito, province of Pichincha, Ecuador. I observed the nest from 26 April–21 May 2020, every other day for 1.5–2 h, with a total of 20 h of observation. The nest was located in a drainpipe at 2.15 m above ground, in a wall surrounding a residence. The drainpipe had a diameter of 10 cm and a depth of 25 cm. The nest, which covered the drainpipe's entire length, consisted of a shallow mound of vegetal fibers, feathers and feces of the nest dweller. Clutch size was three and nestling period at least 25 days. Nestlings were fed on average 8 times/h (SD = 3.4; n = 11) over the observation period. The overall mean interval between visits was 5.3 min (SD = 5.4; n = 106) and mean visit time 0.3 min (SD = 0.9; n = 103). A third adult was observed around the nest on several occasions, but no active role in nestlings' care could be determined.

**Keywords:** Brown-bellied Swallow, nestlings, extra adult, human-built structures, nest, *Orochelidon murina*, parental care.

**INTRODUCTION**

Brown-bellied Swallow *Orochelidon murina* ranges along the Andes, from western Venezuela to central Bolivia, and often forages in association with other hirundinids, including Blue-and-white Swallow *Pygochelidon cyanoleuca* and Pale-footed Swallow *Orochelidon flavipes* (Turner, 2020). In Ecuador, it is found

from 2,500–4,400 m a.s.l. in open paramo and adjacent open fields (Freile & Restall, 2018). It is rarer in anthropogenic habitats and dry valleys, such as in Quito and surroundings valleys, where it is outnumbered by *P. cyanoleuca* (Cisneros *et al.*, 2015; Freile & Restall, 2018).

*Oreochelidon murina* nests alone or in small groups. Nests, consisting of dry grass, moss and feathers (Turner, 2020), are made in burrows in (road) banks and occasionally under eaves of houses or beams of bridges (Kiff *et al.*, 1989; Greeney *et al.*, 2011). The species possibly also uses cup nests of other species (Kiff *et al.*, 1989). In Ecuador, clutches of 2–3 sub-elliptical white eggs have been found in September–November and January (Kiff *et al.*, 1989, Greeney *et al.*, 2011, Turner, 2020), whereas in Colombia nesting activity has been reported in September–October (Turner, 2020). In northwestern Ecuador, juveniles have been observed in July (Fjeldså & Krabbe, 1990).

Not much is known about the breeding behavior of *O. murina*. In this note, I provide observations on the nest, nestlings and parental care of *O. murina* in La Armenia, Valle de los Chillos. I present novel information about the nestling period, brooding bouts and feeding frequency of nestlings, along with new information about breeding dates in Ecuador.

## METHODS

I observed a nest from 26 April through 21 May 2020, with a total of 20 h spread over 13 days. I made observations every other day for 1.5–2 h, between 6h45–9h30. With a stopwatch, I recorded when adults entered and left the nest. I considered a feeding visit every time an adult entered the nest, except on occasions where the adult only approached the nest but stayed on the edge or entered and left the nest immediately. I counted the number of feeding visits/total observation time/day, and then calculated the average number of visits/h/day. Average time between feeding visits and the length of feeding visits could not be calculated exactly for the first 4 observation days, and therefore were excluded from data analyses, because I did not have a chronometer with seconds but only a watch showing minutes. I also took notes on interactions between individuals and development and behavior of nestlings. I measured the nest and took photos of nest material on 28 July 2020, more than two months after fledglings had left the nest.

## RESULTS

### *Nest description*

The nest was placed inside a drainpipe at a height of 2.15 m in a concrete wall of approximately 4.5 m high surrounding a residence (Fig. 1a). There were two other holes with drainpipes and 21 holes without drainpipes in the same wall. The residence was located in a quiet, suburban neighborhood along a secondary, infrequently used street bordering a water reservoir of the Quito Electricity Company (-0.269861, -78.452806) at 2450 m a.s.l. in La Armenia, Valle de los Chillos, 7 km southeast (straight line) from Quito. The drainpipe had a diameter of 10 cm and a depth of 25 cm. The nest covered the drainpipe's entire length and was a very shallow platform that consisted of a thin mound of feathers, vegetal fibers and feces of the nest dwellers, without any particular form (Fig. 1b).

### *Nestling development and behavior*

On 26 April, when I started observations, adults frequently flew in and out of the nest. I also observed an adult leaving the nest with a fecal sac in its bill, thus nestlings must have been present. On 3 May, I saw a nestling with closed eyes, orange bill, greyish/brownish plumage and two tufts of nessoptile on its head. On 6 May, I saw two nestlings and heard them giving a 'hissing' sound. On 17 May, three nestlings were visible at the entrance of the nest; they had brownish-grey feathers dorsally, pale rufous feathers ventrally and yellow gapes. They did not present any nessoptile. On 18 May, the nestlings approached the entrance of the nest after being fed and followed the adult with their gaze. On 20 May, one fledgling had already left the nest when I arrived. It approached the nest and sat on the edge but left again. Later, an adult sat twice on the edge, but it did not feed the two nestlings that were still inside the nest. The adult then flew twice past the nest and called, but did not enter. Eventually, the two nestlings left the nest and perched on a window ledge nearby. An adult perched two more times on the edge of the nest and called. Later the three fledglings were fed by an adult on the window ledge and then flew after the adult. From the previous observations, I estimate a nestling period of at least 25 days (26 April–20 May) (Fig. 1c).

On 21 May, one of the fledglings sat inside the nest. Two adults flew three times past the nest while calling. On a fourth visit, an adult fed this fledgling and then they flew away together. Two days after fledging, I saw an adult flying into the nest. On 28 July, an adult was startled when I wanted to measure the nest and flew out. I could not determine if there were eggs or nestlings in the nest.

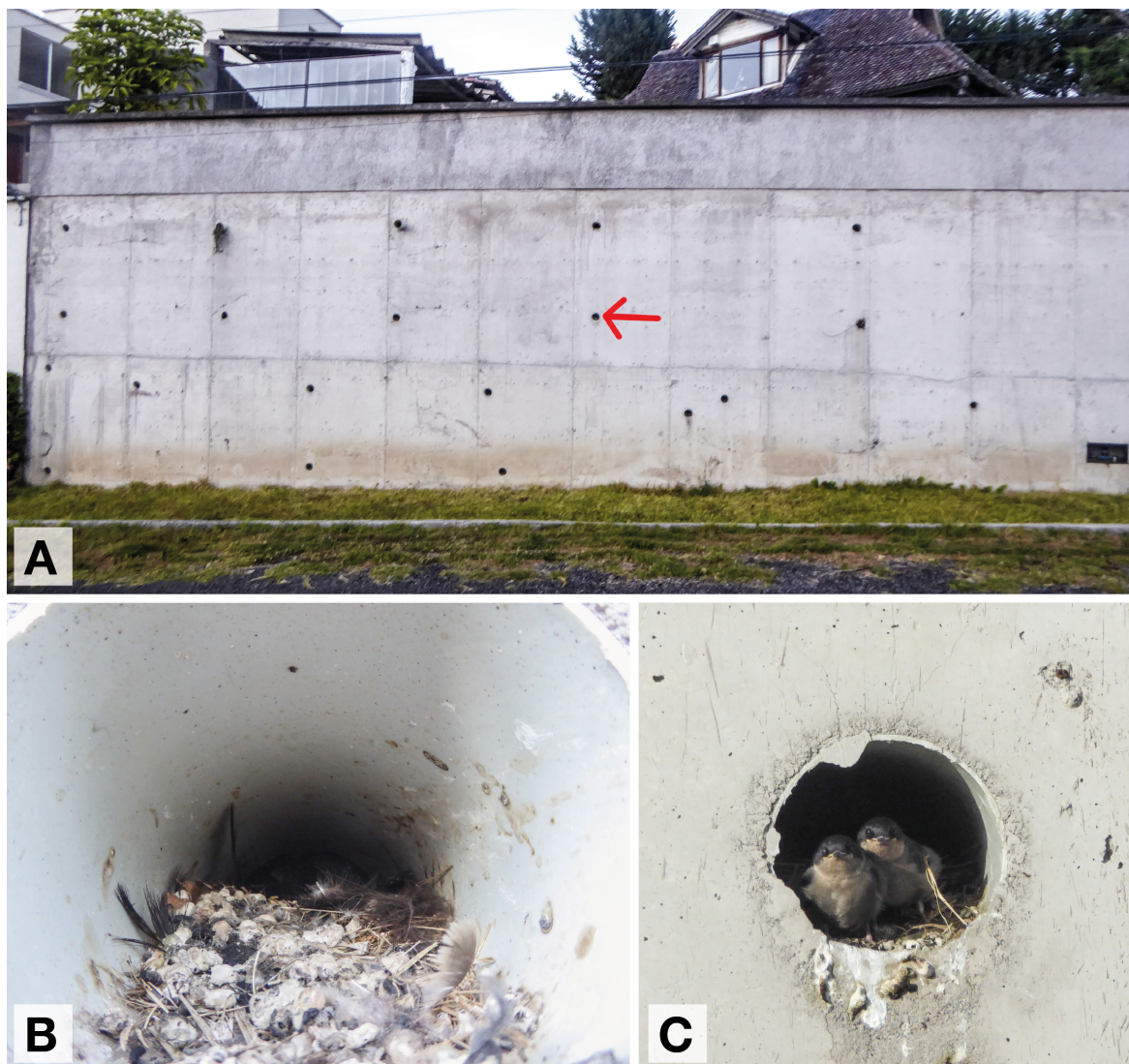


Figure 1: The studied nest of Brown-bellied Swallow *Orochelidon murina* in a drainpipe in La Armenia, southeast of Quito. A) nest entrance at 2.15 m above the ground in a wall surrounding a residence, 28 July 2020 (M. Musschenga); B) nest material consisting of feathers, vegetal fibers and feces, 28 July 2020 (M. Musschenga); C) two of the three chicks at the nest entrance on the day of fledging, 20 May 2020 (M. Musschenga).

### Brooding

On seven occasions, between 26 April–13 May, an adult entered the nest, moved to the rear section (where it was invisible to me) and later left the nest. On five other occasions, I observed an adult flying out of the rear section of the nest, without having seen it enter the nest previously. I assumed adults staying in the rear section to be brooding. Mean brooding bouts lasted 23.9 min (SD = 19.1; n = 7), range 10–62 min.

### Visits to the nest

Observations of visits occurred in the morning, mostly starting at c. 7h00. Adults' visits to the nest between 26 April–18 May are summarized in Table 1. Number of visits was lowest on 30 April (2.3 visits/h) and highest on 17 May (12.5 visits/h). The number of visits/h was variable over days and did not show a clear trend over the period; average number of visits over the entire observation period was 8/h (SD = 3.4; n = 11). Interval duration between visits was highly variable on the same day: sometimes, after longer absence periods, the adults would come to feed two or more consecutive times within a minute. The overall mean interval between visits

over the observation period was 5.3 min (SD = 5.4; n = 106); daily mean intervals range was 4.1–8.4 min. The overall mean visit time over the study period was 0.3 min (SD = 0.9; n = 103). The mean daily visit time did not show a trend over the period and ranged from 0.02–0.8 min. On 15 occasions, the adults sat on the edge of the nest but did not feed nestlings, or only removed fecal sacs. Raw data on visit times and intervals are presented in Appendix 1.

#### Additional observations

On one occasion, I observed one adult inside the nest and a second adult that approached the nest and perched on a drainpipe nearby. A third individual entered the nest, fed the nestlings and left the nest with a fecal sac. On another occasion, an adult sat on the edge of the nest, when a second adult approached. The first adult left the nest's edge, while the second individual entered and left the nest several times, feeding nestlings and removing a fecal sac. Later, a third adult left the rear part of the nest, and I observed the three adults flying nearby and calling to each other. This interaction was also witnessed on another occasion.

Saffron Finches *Sicalis flaveola* were observed on several occasions entering the drainpipes. On two occasions, they carried small branches into an unoccupied pipe. On another occasion, they entered the nest when *O. murina* adults and chicks were inside (no antagonistic interaction was observed). A pair of *O. murina* approaching the wall and inspecting a drainpipe was chased away by a juvenile and adult *S. flaveola*.

Table 1: Number of visits by adults, intervals between feeding visits, and length of visits over the period 26 April–18 May 2020 in a nest of Brown-bellied Swallow *Orochelidon murina* in La Armenia, Quito.

| Date (2020)  | Observation start time | Observation duration (h) | Total visits | Visits/h (± SD)        | Mean interval between visits, min (± SD) | Mean visit time, min (± SD) |
|--------------|------------------------|--------------------------|--------------|------------------------|--|-----------------------------|
| 26 April     | 8h50                   | 1.7                      | 14           | 8.4                    |  |                             |
| 28 April     | 7h08                   | 1.5                      | 4            | 2.7                    |  |                             |
| 30 April     | 7h10                   | 1.3                      | 3            | 2.3                    |  |                             |
| 2 May        | 9h00                   | 1                        | 11           | 11                     |  |                             |
| 3 May        | 7h15                   | 1.8                      | 17           | 8.7                    | 6.2 (± 4.1; n=16)                        | 0.6 (± 1.9; n=15)           |
| 6 May        | 7h13                   | 2.2                      | 12           | 5.5                    | 6.2 (± 4.3; n=11)                        | 0.3 (± 0.7; n=10)           |
| 8 May        | 7h10                   | 1.5                      | 15           | 10                     | 4.1 (± 4.2; n=14)                        | 0.3 (± 0.6; n=11)           |
| 11 May       | 7h15                   | 1.4                      | 12           | 8.6                    | 4.7 (± 6.3; n=9)                         | 0.7 (± 1.2; n=10)           |
| 13 May       | 7h21                   | 1.4                      | 10           | 7.1                    | 8.4 (± 9.5; n=9)                         | 0.8 (± 0.8; n=8)            |
| 17 May       | 6h46                   | 2                        | 25           | 12.5                   | 4.4 (± 5.3; n=24)                        | 0.1 (± 0.2; n=24)           |
| 18 May       | 8h22                   | 1.8                      | 21           | 11.4                   | 5.1 (± 5.1; n=20)                        | 0.02 (± 0.02; n=20)         |
| Overall mean |                        |                          |              | <b>8 (± 3.4; n=11)</b> | <b>5.3 (± 5.4; n=106)</b>                | <b>0.3 (± 0.9; n=103)</b>   |

## DISCUSSION

This study is the first to report a nestling period of *O. murina* throughout its geographic range. Nestling period was at least 25 days because I observed an adult removing a fecal sac on the first observation day, indicating that nestlings were already present. Nestling periods for other *Orochelidon* species are unknown (Shogren, 2020). In comparison, *Pygochelidon cyanoleuca* fledge after 25–26 days (Collins, 2010) and Tree Swallow *Tachycineta bicolor* after 20 days (Michaud & Leonard, 2000).

On the day of fledging, I observed that one adult flew past the nest several times and called. In *T. bicolor*, parents increase their hovering and passes within 1 m of the nest in the period before fledging (Michaud & Leonard, 2000). This suggests that parental behavior stimulates fledging, but experimental observations are needed for more conclusive evidence. In addition, the present study also describes for the first time the frequency of visits to the nest in *O. murina*, even though data are limited to observations of a single nest. Due to poor light conditions inside the nest, it is not clear if nestlings were fed on all visits. However, the number of visits to the nest has been suggested as an accurate measure of feeding rate (McCarty, 2002).

*Orochelidon murina* has previously been reported laying a clutch of three eggs in natural or artificial burrows, in accordance to our observations (Greeney *et al.*, 2011; Kiff *et al.*, 1989). Since *O. murina* probably also uses nests of other species (Kiff *et al.*, 1989), it is possible that the nest in this study was not made by the swallows, but by *S. flaveola*, which was observed carrying nest material into a nearby drainpipe. However, *S. flaveola* also reuses abandoned nests of other species (Benítez-Saldívar & Massoni, 2017), so it remains to be determined how the two species interact regarding nest use.

In Ecuador, *S. flaveola* originally ranged in the southwestern lowlands and in the extreme southeast, but has been spreading towards deforested habitats in the northwestern and eastern lowlands, as well as into the northern inter-Andean valleys (Freile & Restall, 2018). It had apparently colonized the Valle de los Chillos region by 2004 (Buitrón & Freile, 2006). I found individuals of *S. flaveola* deterring *O. murina* from inspecting a potential nest site, which indicates interspecific competition. In Argentina, competition between White-rumped Swallow *Tachycineta leucorrhoa* and *S. flaveola* takes place over nest boxes, where the swallows lose clutches and probably also nestlings to the finches (Massoni *et al.*, 2007). As the population of *S. flaveola* grows in the inter-Andean valleys of Pichincha province competition might become more intense and the species could outcompete the already uncommon *O. murina* in the area. Alternatively, population growth of *S. flaveola* might provide more nest resources for *O. murina*.

After fledging, I observed on three occasions an adult *O. murina* inside the nest. This suggests that the nest site might also be used as a resting place or refuge, as observed in *P. cyanoleuca* (Linck *et al.*, 2019). Yet, another possibility is that a second brood was already in progress.

Breeding in my study area occurred much earlier in the year than previously reported in Ecuador (September, in Papallacta, Napo province, Kiff *et al.*, 1989; September–November and January in Papallacta, Greeney *et al.*, 2011), but coincides with reports of juveniles in July from northwest Ecuador (Fjeldså & Krabbe, 1990). Papallacta, although only 37 km southeast from the nest location of the present study (in straight line), is in the eastern side of the Andes, so the two localities are separated by high mountain passes (c. 4000 m a.s.l). As a consequence, the two areas show different rainfall patterns during the year: in the Quito area, July is the driest month, whereas in Papallacta it is the wettest (Moore *et al.*, 2004). This affects breeding season in birds; for example, Rufous-collared Sparrow *Zonotrichia capensis* breeds in November–May in Pifo (13 km northeast of my study site), but in August–December in Papallacta (Moore *et al.*, 2004). This coincides with the nesting dates reported for *O. murina* in Papallacta (Kiff *et al.*, 1989; Greeney *et al.*, 2011) and in the Quito area (present study).

I observed on several occasions three adults *O. murina* around the nest. One adult did not seem to attend the nest, as I only observed it flying around or perching at the edge of or near the nest. Because I could not identify the swallows individually, it is not certain if it was always the same individual that did not attend the nest. In swallows, extra individuals at the nest are fairly common (Skutch, 1935), but their role differs from study to study. In Barn Swallow *Hirundo rustica*, a third individual sometimes followed the male or arrived at the nest before the food-bringer, and was then chased away (Moreau & Moreau, 1939). In another study of *H. rustica*, extra adults were present in 12 out of 13 nests and were tolerated by the breeding couple; they infrequently fed nestlings and on two occasions ended up mating with the male (Medvin *et al.*, 1987). In *T. bicolor*, extra adults never fed the young, but instead stole food from them and their parents (Lombardo, 1986). In the present study, I did not see any negative interaction between the adults attending the nest. On the contrary, all three individuals apparently gave contact calls to each other. More observations are needed on the behavior of extra individuals in the nest in *O. murina*.

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Appendix 1: Time intervals between visits and duration of visits by Brown-bellied Swallow *Orochelidon murina* adults to a nest in La Armenia, Quito, 3–18 May 2020.

| Date (2020) | Intervals between visits (hh:mm:ss) | Duration of visits (hh:mm:ss) |
|-------------|-------------------------------------|-------------------------------|
| 3 May       | 0:05:25                             | 0:00:01                       |
|             | 0:09:18                             | 0:00:03                       |
|             | 0:00:40                             | 0:00:03                       |
|             | 0:04:14                             | 0:00:04                       |
|             | 0:03:50                             | 0:00:04                       |
|             | 0:01:09                             | 0:00:02                       |
|             | 0:07:18                             | 0:07:30                       |
|             | 0:12:00                             | 0:00:03                       |
|             | 0:03:38                             | 0:00:03                       |
|             | 0:00:15                             | 0:00:02                       |
|             | 0:10:10                             | 0:00:01                       |
|             | 0:13:14                             | 0:00:02                       |
|             | 0:07:27                             | 0:00:01                       |
|             | 0:06:20                             | 0:01:00                       |
| 0:11:00     | 0:00:01                             |                               |
| 6 May       | 0:05:40                             | 0:00:02                       |
|             | 0:08:15                             | 0:00:02                       |
|             | 0:17:00                             | 0:02:17                       |
|             | 0:03:00                             | 0:00:01                       |
|             | 0:09:00                             | 0:00:01                       |
|             | 0:02:00                             | 0:00:02                       |
|             | 0:05:00                             | 0:00:01                       |
|             | 0:02:50                             | 0:00:01                       |
| 0:05:00     | 0:00:03                             |                               |
| 0:03:06     | 0:00:02                             |                               |

|        |         |         |
|--------|---------|---------|
|        | 0:07:35 |         |
| 8 May  | 0:01:23 | 0:01:01 |
|        | 0:03:18 | 0:00:01 |
|        | 0:05:30 | 0:00:02 |
|        | 0:14:20 | 0:00:02 |
|        | 0:00:10 | 0:00:01 |
|        | 0:00:06 | 0:01:55 |
|        | 0:11:37 | 0:00:02 |
|        | 0:02:19 | 0:00:02 |
|        | 0:02:19 | 0:00:02 |
|        | 0:04:24 | 0:00:03 |
|        | 0:05:16 | 0:00:01 |
|        | 0:00:30 | 0:00:02 |
|        | 0:03:26 |         |
|        | 0:02:29 |         |
|        | 0:02:48 |         |
| 11 May | 0:11:00 | 0:00:08 |
|        | 0:00:01 | 0:00:14 |
|        | 0:21:51 | 0:00:02 |
|        | 0:05:19 | 0:00:01 |
|        | 0:03:27 | 0:00:14 |
|        | 0:03:12 | 0:00:04 |
|        | 0:06:17 | 0:03:25 |
|        | 0:01:00 | 0:02:14 |
|        | 0:00:04 | 0:00:04 |
|        | 0:00:04 | 0:00:08 |
|        | 0:01:00 |         |
|        | 0:02:35 |         |
|        | 0:00:18 |         |
| 13 May | 0:26:33 | 0:00:02 |
|        | 0:02:40 | 0:00:53 |
|        | 0:22:42 | 0:00:40 |
|        | 0:01:51 | 0:00:01 |
|        | 0:04:47 | 0:02:00 |
|        | 0:02:48 | 0:00:01 |
|        | 0:02:45 | 0:00:26 |
|        | 0:09:00 | 0:00:02 |
|        | 0:02:34 |         |
| 17 May | 0:00:06 | 0:00:01 |
|        | 0:16:04 | 0:00:01 |
|        | 0:01:13 | 0:00:16 |
|        | 0:04:04 | 0:00:18 |
|        | 0:13:00 | 0:00:01 |
|        | 0:07:28 | 0:00:25 |
|        | 0:01:55 | 0:00:07 |



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|        |         |         |
|--------|---------|---------|
|        | 0:18:05 | 0:01:05 |
|        | 0:00:15 | 0:00:03 |
|        | 0:02:50 | 0:00:19 |
|        | 0:00:37 | 0:00:01 |
|        |         | 0:00:01 |
|        | 0:07:00 | 0:00:01 |
|        | 0:01:55 | 0:00:02 |
|        | 0:01:11 | 0:00:01 |
|        | 0:05:32 | 0:00:02 |
|        | 0:00:38 | 0:00:02 |
|        | 0:06:11 | 0:00:01 |
|        | 0:07:57 | 0:00:01 |
|        | 0:08:58 | 0:00:01 |
|        | 0:00:22 | 0:00:04 |
|        | 0:00:04 | 0:00:01 |
|        | 0:00:24 | 0:00:06 |
|        | 0:00:17 | 0:00:08 |
|        | 0:00:15 |         |
| 18 May | 0:04:28 | 0:00:01 |
|        | 0:07:52 | 0:00:01 |
|        | 0:08:19 | 0:00:01 |
|        | 0:20:03 | 0:00:04 |
|        | 0:00:10 | 0:00:01 |
|        | 0:01:35 | 0:00:01 |
|        | 0:00:11 | 0:00:01 |
|        | 0:00:36 | 0:00:01 |
|        | 0:05:58 | 0:00:01 |
|        | 0:01:50 | 0:00:01 |
|        | 0:03:57 | 0:00:01 |
|        | 0:00:10 | 0:00:01 |
|        | 0:03:43 | 0:00:01 |
|        | 0:00:10 | 0:00:01 |
|        | 0:14:21 | 0:00:01 |
|        | 0:03:12 | 0:00:01 |
|        | 0:04:56 | 0:00:02 |
|        | 0:06:29 | 0:00:02 |
|        | 0:08:24 | 0:00:01 |
|        | 0:04:58 | 0:00:01 |
|        |         | 0:00:02 |
|        |         | 0:00:02 |

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