First description of the eggs of the Sumatran Partridge *Arborophila sumatrana*

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Summary. The breeding biology of forest partridges (genus *Arborophila*) is poorly understood, with nest and eggs described for just over half of all 20 recognised species. Herein we provide the first formal description of the eggs of the endemic Sumatran Partridge, based on a single preserved clutch in the Naturalis Biodiversity Centre, Leiden. Information about clutch size, egg characteristics and breeding phenology for the Sumatran Partridge is consistent with the published data available for other members of the super-species from South-East Asia.

Ringkasan. Biologi kembang-biak Puyuh gonggong (genus *Arborophila*) masih sedikit diketahui, di mana tersedia deskripsi untuk hanya separuh dari semua 20 jenis yang diakui. Di tulisan ini kami memberikan deskripsi pertama mengenai telur Puyuh gonggong Sumatera, berdasarkan satu set telur yang genap, yang diawetkan dan disimpan di Naturalis Biodiversity Centre, Leiden. Informasi mengenai jumlah telur, cirikhas telur dan fenologi kembang-biak ternyata sesuai dengan data yang telah dipublikasi untuk anggota lain di super-species ini di Asia Tenggara.

Introduction

The genus of forest partridges (*Arborophila)* is comprised of 20 species, which predominately occur in southern and eastern Asia (del Hoyo & Collar 2014). Members of this genus inhabit primary hill forest and although similar in size, their plumage characteristics differ greatly (Madge *et al.* 2002; del Hoyo & Collar 2014). Information about the general ecology and life history is lacking for most species, especially those of SE Asia and Indo-Malaysia region. Nests and eggs have been described for only twelve species to date (Madge *et al.* 2002).

The Sumatran Partridge *Arborophila sumatrana* is one of four species that were formerly considered subspecies of the Grey-breasted Partridge (*sensu lato*) *A. orientalis* (Mees 1996; del Hoyo *et al.* 2020). Of the four newly recognised species in this super-species, three are endemic to Sumatra and Java, whereas the Malaysian Partridge *A. campbelli* is restricted to the central mountains of Peninsular Malaysia (Wells 1999). The nominate Grey-breasted Partridge *A. orientalis* occurs in East Java, while the other two species are endemic to Sumatra: the Sumatran Partridge *A. sumatrana* occurring in the southern and central part of the island, and Roll's Partridge *A. rolli* in the north (Madge *et al.* 2002). Although two nests have been described for the Malaysian Partridge (Wells 1999; Madge *et al.* 2002), almost nothing is known about the breeding biology of the three Indonesian endemic species.

Methods and results

While analysing database records of partridges we discovered an overlooked clutch of *A. rolli* in the Naturalis Biodiversity Centre (NBC), Leiden. According to the label, the clutch originated from a captive pair of Roll's Partridge kept by F. Bleijenberg, in Nieuw-Namen, the Netherlands. In May 1995 these infertile eggs were sent by Bleijenberg to J.H. Becking, who

preserved and donated them to the Zoological Museum of Amsterdam (catalogue number ZMA.AVES.63129; Plate 1), before they were moved to NBC.

According to his archived correspondence, Becking visited Bleijenberg on two occasions in 1993 and 1994, providing an inventory and brief description of the breeding activities of the species kept by Bleijenberg. Becking distinguished in his notes between two distinct forms of the former *A. orientalis* super-species kept by Bleijenberg: the "white-faced" form from Java (Grey-breasted Partridge) and "black-headed" form from Sumatra, identified by Becking later as the Roll's Partridge. According to Becking's notes, Bleijenberg kept two pairs of "*rolli*" during the above-mentioned period but had only one pair left by 2003. In 1993, Bleijenberg sent Becking photographs of all of his captive *Arborophila* partridges, comprising Grey-breasted Partridge, Sumatran Partridge (Plate 2) and Chestnut-bellied Partridge *A. javanica*, yet there were no photographs of Roll's Partridges.

Plate 1. Preserved clutch of the Sumatran Partridge, mislabelled as Roll's Partridge, in the Naturalis Biodiversity Centre, Leiden. Photo by Pepijn Kamminga.

Plate 2. Pair of Sumatran Partridges *Arborophila sumatrana* kept by F. Bleijenberg. Photo by Freddy Bleijenberg.

The photographed Sumatran Partridges can be distinguished from Roll's Partridges by their (1) blue-grey breast vs. reddish brown breast; (2) roundish white spot on ear coverts vs. large white patch on the ear coverts and white stripe on the cheek; (3) dark grey throat and neck vs. blackish throat and white bar across foreneck, bordered below with black; and (4) black crown or forehead vs. dull brown crown with dark speckles (Figure 1; see illustrations in del Hoyo & Collar 2014).

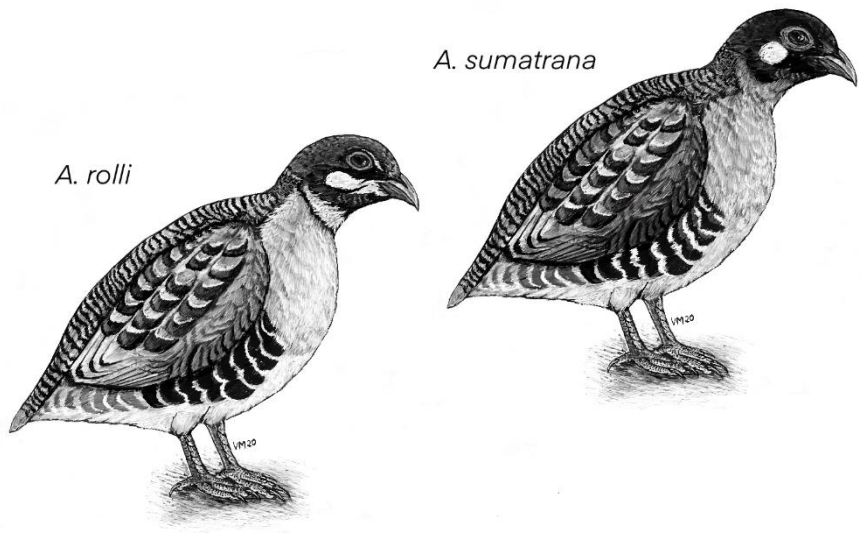

Figure 1. Illustrations of Roll's Partridge (*left*) and Sumatran Partridge (*right*), based on descriptions in del Hoyo & Collar (2014) Illustrator: Vladislav Marcuk.

These facts strongly indicate that the partridges which produced the eggs under discussion were misidentified and consequently mislabeled, and that they must have been laid by Sumatran Partridges. This view is confirmed by the hand-written note on the back of the photograph (Plate 2) of the two disputed birds: "Sumatraanse Bospatrijs *Arborophila rolli*". In addition, one of the eggs shows a pencil-written "Suma", which was Bleijenberg's label for "*rolli"* (F. Bleijenberg *in litt.* 1995).

The three eggs are white and ovate to round-ovate in shape. According to the specimen card they were laid from 22 to 24 April 1995, indicating a laying interval of 24 h. The lengths and widths of the eggs (from smallest to largest), measured in 2020, were 41.0 × 32.0, 41.5 × 32.0 and 42.0 × 32.0 mm. In Becking's notes, the dimensions of these eggs showed slightly less variation in length and greater variation in width: 41.1 × 32.0 mm (fresh weight, 22.00 g), 41.5 × 31.6 mm (21.98 g), and 41.6 × 31.6 mm (21.55 g).

Discussion

Information about the breeding biology for the four members of this super-species is very limited (Madge *et al.* 2002; del Hoyo *et al.* 2020). In captivity, all are known to lay three to four eggs (up to five in *sumatrana,* J.H. Becking, unpubl. data), and the incubation period of the Malaysian Partridge and Grey-breasted Partridge is around 23 days (Wells 1999; van Wijk & Slijkhuis 2008; Fürstaller & Fürstaller 2014). Captive Grey-breasted Partridges are reported to produce up to three clutches in a single season (Robbins 1993). Two nest records of wild Malaysian Partridges comprised one undated nest containing four white eggs, and another with two white eggs (42.0 × 32.0 and 42.0 × 31.5 mm) found in March (Wells 1999). The latter dimensions are very similar to those of the clutch that is the subject of this report. Recent breeding records of Malaysian Partridge include photographs of three downy chicks on 4 April

(photo by Choy Wai Mun), one downy chick on 23 May (photo by David Cook) and a well-grown chick attended by an adult on 18 August (photo by Thang Nguyen) from Fraser's Hill, Pahang, Peninsula Malaysia. The egg-laying season of this species, therefore, appears to extend from March to July.

The nest and eggs of wild Grey-breasted Partridge and Roll's Partridge remain undescribed (Madge *et al.* 2002; del Hoyo *et al.* 2020). Marle & Voous (1988) report the collection of a large chick on 19 April 1917 from the Batak Highlands, Sumatra, which considering the locality, likely refers to Roll's Partridge. The collection date is consistent with that of the clutch in question (22-24 April 1995), suggesting that the breeding season of both Roll's and Sumatran Partridges, like that the Malaysian Partridge, includes April. Months of laying of 25 clutches of the closely-related Chestnut-bellied Partridge were January (2 clutches), February (1), March (2), April (6), May (1), June (1), July (1) August (6), September (3), October (1), November (1), indicating a year-round breeding season in the wild, with peaks in April and August-September (Hoogerwerf 1949; Hellebrekers & Hoogerwerf 1967). It remains to be determined whether members of the *A. orientalis* super-species have similarly long breeding seasons in the wild.

Unfortunately, no details are given on the labels about the nest characteristics, but captive males of the Sumatran Partridge, as well as Grey-breasted Partridge and Malaysian Partridge, are reported to build a dome-shaped nest on the ground (Robbins 1993), in the same way as described for wild-living Chestnut-bellied Partridge (Hoogerwerf 1950).

In conclusion, while this short note adds some information about the endemic Sumatran Partridge, the basic ecology and breeding biology of this elusive species remain poorly understood, and further field work with systematic research is highly desirable to achieve to a better understanding of the biology of forest partridges. In addition, our analysis of the NBC clutch, and the correspondence with which it is associated, reminds us that museum collections, including archived notes, diaries and letters, represent a valuable, but underused, resource with potential to unveil overlooked or unpublished information about the natural history and general biology of little-known taxa.

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