

FIELD STUDY

The ecology of nestlings of Javan Kingfisher *Halcyon cyanoventris* observed in Jatimulyo village, Yogyakarta province, Java, Indonesia

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The Javan Kingfisher *Halcyon cyanoventris* is endemic to Java and Bali, Indonesia. It is a widespread, fairly common species found in diverse habitats from the coast to about 1,500 m (Eaton *et al.* 2016). Little information is available on its diet, with only basic data provided in Becking (1989). Here we report our observations of an active Javan Kingfisher nest to add information on its diet, especially the food provided by the parents to the nestlings.

Observations

On 26 April 2018, an active Javan Kingfisher nest was found at 600 m by villagers in Gunungkelir

All images were taken at Jatimulyo village, Yogyakarta province, Java, Indonesia.

Plate 1. The pair of Javan Kingfisher *Halcyon cyanoventris* perched by the nest-hole in the earth bank, 29 April 2018.



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sub-village, Jatimulyo village, Menoreh Mountains, a limestone area in west Yogyakarta province, Java. The area is predominately covered by an agroforest ecosystem, with many rivulets running through it (Taufiqurrahman *et al.* 2019).

The nest-hole was located in a steep earthen bank along one of the dry riverbeds, about 10 m from its base and 1 m from the top. It was found after a pair of Javan Kingfishers (Plate 1) were seen frequently coming and going carrying food, confirming that at the time of discovery they were already feeding at least one chick.

Soon after the nest was located, we built a hide from natural materials on the opposite side of the riverbed, about 20 m from the nest. We commenced observations but found it difficult to identify food items brought to the nest (Plate 2). In order to improve our recording of the provisioning, we had the idea of putting twigs in front of the nest so that the birds would perch before entering the nest-hole. However, although this was successful, because of the distance we were only able to identify some large prey items. A second hide was then built at the side of the nest, about 3 m away from it and from this position we were successful in studying

Plate 2. Parent flying directly into nest-hole carrying food, 29 April 2018.



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Table 1. Observation time and records of provisioning of Javan Kingfisher nestlings, Jatimulyo village, Yogyakarta province, Java, Indonesia, May 2018.

Date	Observation time (hours)		No. of food deliveries
	am	pm	
1 May	4	0	4
2 May	5	2	13
3 May	6	2	14
5 May	6	4	10
6 May	6	0	6
7 May	7	0	5
9 May	7	0	9
10 May	5	0	9
11 May	4	3	6
12 May	6	3	13
13 May	5	4	6
14 May	3.5	0	5
15 May	6	0	6
16 May	5.5	0	8
17 May	2	2	4
18 May	3	3	7
19 May	6	4	6
Totals	87	27	131

and documenting the birds' activities without disturbing them (Plate 3).

Our observations can be divided into three phases. The first by KS & ISD consisted of short visits of 1–3 hours duration between 27–29 April using the first unsuccessful hide. The second phase, using the repositioned hide, spanned the period between 1 and 19 May, but with no visits on 4 and 8 May. In this period we observed for 114 hours in total, with 87 hours in the morning between about 06h00 and 13h00, and 27 hours in the afternoon between 14h00 and 17h00. The observation periods varied day by day, from 3.5 to 10 hours (Table 1). The earliest observation started at 05h55 and the latest finished at 17h30. The third phase of observations, during the post-fledging period from 19 to 21 May, totalled eight hours. In this report, we are focusing on the second and third phases of observation.

Provisioning

During 114 hours of observation, food delivery was documented 131 times; on 99 occasions the adult first perched on the twigs we had provided before delivery was made and the prey items were clearly seen and documented (Table 2). The other 32 deliveries were made directly into the nest-hole and the prey was not identified (Plate 3). The

Table 2. Prey fed to Javan Kingfisher nestlings, Jatimulyo village, Yogyakarta province, May 2018.

Food items	Number
Freshwater crabs	19
Frogs (<i>Chalcorona calchonota</i> & <i>Fejervarya limnocharis</i>)	17
Cicadas (Cicadidae)	16
Geckos (<i>Ptychozoon kuhli</i> & <i>Cyrtodactylus marmoratus</i>)	12
Scorpions (<i>Heterometrus</i> sp.)	7
Freshwater shrimps	5
Skinks (<i>Eutropis multifasciata</i> & <i>Sphenomorphus sanctus</i>)	4
Orthoptera (grasshoppers, crickets)	4
Praying mantis (Mantidae)	3
Lizards (<i>Draco</i> sp., <i>Takydromus sexlineatus</i> & <i>Gonocephalus chamaeleontinus</i>)	3
Unknown species	2
Moths (adult & caterpillar)	2
Birds (unidentified)	2
Earthworm	1
Spider	1
Beetle	1

interval between one delivery and the next varied from three minutes to four hours.

Due to the parents' similar appearance we were unable to differentiate between them. Most of the deliveries were made by a single bird and only on a few occasions did the parents arrive together and deliver food in turn, with one of them waiting in front of the nest. The arrival of a parent bird was signalled by repeated soft *thck* calls as they approached. Each delivery took about 2–4 seconds, from the time a bird arrived at the perch or entered the hole to when it returned to the perch or flew directly away.

Plate 3. Monitoring nest of Javan Kingfisher under the nest adoption scheme described in Taufiqurrahman *et al.* (2019), 13 May 2018.



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Plate 4. Adult Javan Kingfisher with freshwater crab, a major item of the nestlings' diet, 2 May 2018.

Plate 5. Adult Javan Kingfisher with a Brown Stream Frog *Chalcorana calchonota*, 15 May 2018.

Plate 6. Cicada, one of the main diet items of the Javan Kingfishers' nestlings, 15 May 2018.



KIRYONO



KIRYONO



KELIK SUPARNO

Plate 7. Kuhl's Flying Gecko *Ptychozoon kuhli*, one of the arboreal animals in the diet of the nestlings, 5 May 2018.

Diet of nestlings

Becking (1989) included an unpublished manuscript by H. J. V. Sody entitled 'Diets of Javanese birds' in which the latter recorded identifiable stomach contents of Javan Kingfishers. These consisted of insects—Orthoptera, Coleoptera (larvae of Dytiscidae) and Isoptera (termites)—scorpions *Heterometrus cyaneus*, crustaceans (shrimps and crabs), gastropods (snails), earthworms, amphibians (frogs), reptiles (lizards) and fishes. Mason & Jarvis (1989) recorded eels, frogs, lizards and large insects as the species's main prey.

During our observations, we recorded more than 20 species brought by the adults to feed their nestlings (Table 2), including freshwater crabs (Plate 4), two species of frog (Plate 5) and three unidentified species of cicada (Plate 6); these were the three prey items brought most frequently, recorded 19, 17 and 16 times respectively, making up more than 50% of their total diet. The next most numerous item was Kuhl's Flying Gecko *Ptychozoon kuhli*, brought to the nest 11 times (Plate 7).

Woodall (2020) notes that the Javan Kingfisher takes land and water animals, without specifically mentioning any arboreal species. However, we found that arboreal fauna such as cicadas, Kuhl's Flying Gecko and other geckos (Plate 8) and lizards

Draco sp. were a significant part of the diet of the chicks. Other noteworthy records were two small unidentifiable birds, probably juveniles (Plate 9), and a spider; to our knowledge neither of these forms has previously been reported to be part of the species's diet. Of all the previously known prey of Javan Kingfisher, Dytiscidae, termites, snails, eels and fishes were not seen during our survey.

Fledging

There is a lack of published information on the ecology of the Javan Kingfisher, including its incubation and fledgling periods (Woodall 2020). In our case, the chicks fledged on 19 May 2018; on 10 May, or nine days before fledging, the nestlings started to softly imitate the calls of the parents in an abbreviated form from inside the nest tunnel with increasing frequency, especially in response to the parents' calls from outside.

On 15 May, four days before fledging, one of the parents brought a cicada to the nest but did not enter the tunnel. Instead, it flew around in the vicinity of the nest tunnel, making *thck* calls with the cicada still in its bill, before returning to the perch. Over about 17 minutes the adult carried out this routine five times in all, each time returning to the perch still carrying the prey. After



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Plate 8. Adult Javan Kingfisher with Marbled Bow-fingered Gecko *Cyrtodactylus marmoratus*, 6 May 2018.

approaching the tunnel for a final time it swallowed the cicada itself. We assumed this behaviour was an attempt to encourage the chicks to leave the nest. The same behaviour was repeated two days later, on this occasion using a frog as the bait.

The first nestling emerged at 12h20 on 19 May. An adult came to the nest and its call finally persuaded one chick to fly out of the nest, whereupon it flew straight out and perched in a tree about 5 m in front of the nest and called repeatedly. A few minutes later, an adult came carrying a juvenile Chameleon Forest Dragon *Gonocephalus chamaeleontinus*. The prey was not given directly to the fledged bird—instead, the adult approached the newly fledged bird and then perched on twigs in front of the nest-hole, presumably to encourage the youngster to come to it to get the meal. This behaviour occurred three times, until finally the adult came to where the young bird was perched and fed it (Plate 10). During this period we heard the second nestling calling from inside the nest. Unfortunately, we were not present when the second chick fledged and left the nest.

The newly fledged birds appeared to be duller in colour than the adults, with shorter bills which were orange. The juveniles were observed to be

very active, calling from perches whilst waiting for food to be delivered. They also frequently moved from one perch to another, making observations difficult. On one occasion, we observed a parent delivering a scorpion to one of the fledglings. For up to two days after fledging, one of the newly fledged birds remained within about 10 m of the nest.

Woodall & Kirwan (2020) note that the incubation period of the closely related White-throated Kingfisher *H. smyrnensis* is 18–20 days, with a fledgling period of 26–27 days. Based on this, we could assume that the incubation by the pair of Javan Kingfisher we studied started at the beginning of April 2018 and the first chick hatched in late April 2018. Further observations from other locations, habitat types and different times of the year are needed and might reveal differences in the diet and help to build a better understanding of the ecology of the species.

[**Editor's note:** Whereas Woodall & Kirwan (2020) in *HBW Alive* refer to *Halcyon smyrnensis* as White-breasted Kingfisher, in *Birds of the World* the same species is allocated the common name White-throated Kingfisher by Woodall & Kirwan (2020).]



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Plate 9. One of two unidentified birds observed as the diet for the nestlings of Javan Kingfisher, 13 May 2018.

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Plate 10. The newly fledged bird (left) takes a juvenile Chameleon Forest Dragon *Gonocephalus chamaeleontinus* from its parent, 19 May 2018.



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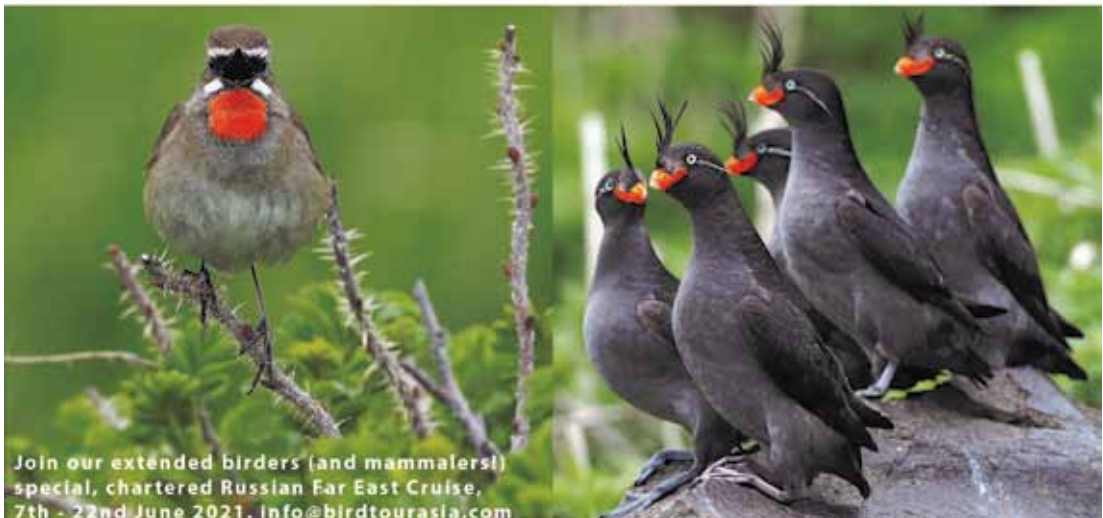
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