



Koel as a brood

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THE Indian koel (*Endynamys scolopacea scolopacea*), like many of its cuckoo cousins (family *Cuculidae*), neither incubates its eggs nor feeds its young. But these activities are stealthily forced upon the house crow (*Corvus splendens*) and the jungle crow (*Corvus macrorhynchos*), and thus the koel earns the reputation of being a brood parasite. Such a domestic association of the koel and the crow was known even to poet Kalidasa who wrote as early as 375 B.C. as '...the koels manage to have their young ones reared by other birds'. It is clear therefore that the prevalence of brood parasitism in the koel got into record before that of the European cuckoo which was made known by Aristotle (384-322 B.C.). Furthermore, clearly, natural

history appears to have interested Indians even before 3000 years, since the Vedas also describe the koel as the '...one reared by others'. Incidentally, it is also from India that the 'peck-order' system in birds (pea-fowls) was known much before scientists of the West were able to understand the existence of such a behaviour.

The many observations and experiments made on brood parasitism in the cuckoos during the past many decades have yielded new facts. Further, during the 1976 breeding season (April-May), we could watch and collect data on the private life of a koel-crow 'joint-family' at Calcutta. Hereunder the subject is reviewed in the light of our observations.

A koel neither incubates its eggs nor feeds its young, but surreptitiously forces its duties upon a crow. Why does it do so?

Brood parasites

A brood parasite is a bird that lays its eggs in the nests of other birds of the same or different species. The foster parents incubate the eggs and

bring up the young ones of the imposter. Such a phenomenon among lower animals is prevalent among certain bees, wasps and ants. But we are now more familiar with the brood parasites among the vertebrates, the cuckoos. Not all cuckoos are parasites, but about 80 out of a total of 130 species of cuckoos breed normally. The koel and other parasitic cuckoos do not choose the brood cuckoos or any other closely related species to lay in their nests. On the other hand, parasitic birds

Garrulax pectoralis. The pied crested cuckoo victimises chiefly the babblers of the genus *Turdoides*, also the laughing thrushes, large spider hunter (*Arachnothera magna*), Nepal shortwing (*Brachypteryx nipalensis*) and many small birds. The Indian cuckoo (*Cuculus micropterus micropterus*) is a brood parasite mainly on the drongos, the paradise fly catcher, the Ceylon black-headed oriole and streaked spider-hunter. Additional fosterers for the cuckoo (*Cuculus canorus canorus*) and a

trary, are surprisingly large for the size of the bird. The size of the egg varies between 2% and 25% of the weight of the mother. There is also good mimicry in the colour of the eggs. The colour of the eggs of the koel and crow is remarkably identical: greenish gray in ground colour, profusely blotched and speckled with reddish brown. Koel eggs are slightly smaller than those of crow (Fig. 1). The parasite lays her egg directly into the host nest and she usually requires just 5 to 8

parasite of Crow

such as the many honey guides of Africa and the black-headed duck (*Heteronetta aricapilla*) of South America rely entirely on their closest relatives in addition to other birds whose nests become handy. However, E. Otto Hohn of the University of Alberta, Canada, enumerates several hosts for the black-headed duck many of which are only distantly related. They are the coot, ibises, a carrion hawk (the chimgo), the night heron, spoonbill, crested screamer (a large bird of the size of a turkey), coscoroba swan, rosy-billed pochard, tree ducks, limpkin, the large maguari stork and so on. A few species of weaver birds and many weaver finches in Africa are also brood parasites. In their monumental *Handbook of the Birds of India and Pakistan*, Salim Ali of Bombay Natural History Society and Dillon Ripley of Smithsonian Institution, Washington, enumerate some fosterers for the Indian cuckoos. The red-winged crested cuckoo (*Clamator coromandus*) parasitises mostly on Himalayan laughing thrushes, the commonest being

few other Indian cuckoos are the pipits, warblers, chats, leaf warblers, wren-babblers, ioras, bulbils, orange minivet, little minivet, yellow-backed sunbirds, forktails, etc.

The fosterers for the koel in India are almost exclusively the house crow and the jungle crow. But in Palawan and Southern China, magpies and other starlings take the place of crows. In Australia, as well as on the island of New Britain, koel is a brood parasite on honeyeaters.

Adaptations of the parasite

Most fosterers of the cuckoos mentioned above weigh from as little as seven grams upto as high as 1000 grams and are seen rearing foster young ones which weigh about 25 grams to 1000 grams by the time they are ready to fend for themselves. But cuckoos usually lay small eggs for their size which is an adaptation to the parasitic habit corresponding to the fact that their hosts are generally smaller birds. The eggs of the parasitic duck, on the con-

seconds to lay the egg, a behaviour which again considerably helps a parasite to escape from the attack of nest owners. In the case of closed or globular nests, it is reported, the cuckoo clings to the outside in 'acrobatic postures' with her vent against the tiny entrance-hole and projects the egg directly into it. If the nest is not easily accessible, such as the nest of a wagtail in a wood pile, it seems the cuckoo inserts her egg with her beak. It is also reported that in those few seconds she spends around the nest, she not only deposits her egg but also removes one of the host's eggs with her beak, and either carries it away or swallows it. But such a precaution is meaningless because the fosterers brood unconcerned on even much larger clutches than theirs. However, it is known that many birds can indeed recognise and remember small numbers.

The parasites should make adaptations for their survival. The cuckoo, for example, has a fairly long egg-laying period as if to compensate for the high percentage of egg

mortality of a parasite. If every two days the female cuckoo were to see a host bird build a nest, she could lay an egg every second day. In an experiment with the meadow pipit, E. P. Chance (*Grimek's Animal Life Encyclopedia*, vol. 8, II, p. 371), made a cuckoo lay twenty-five eggs in the course of two months. The eggs of cuckoos have usually harder and thicker shells than those of the hosts and are especially protected against breakage. The young cuckoo in the egg is harder than its host siblings. In case the brooding is interrupted, it can stay alive longer than its nest fellows. Most of the cuckoo young are larger than their foster siblings.

Nest mates

The newly hatched cuckoo is naked, blind and for the first five days silent. But later, it becomes enormously active by possessing a curious sensitive patch or depression on its back. Any contact with this depression produces an impulse to heave upwards. By means of this adaptation the imposter manages to jettison the unhatched eggs (Fig. 2) and all the rightful hatchlings (Figs. 3-5) over the rim of the nest or out of the entrance hole. In this way it eliminates even its own brothers (or sisters) if there are more than one cuckoo young. Thereafter, this instinct dies out and the lone survivor monopolises the attention of the fosterers.

The innate drive of the cuckoo young, especially of *Cuculus canorus*, was first reported by E. Jenner (from *Grimek's Animal Life Encyclopedia*, 8, II, p. 373) in 1788. Although some naturalists disputed this behaviour, it is easy to demonstrate such a phenomenon with the young of particular age by supplying a number of small objects in the nest. The young cuckoo will load everything and eject them outside the nest by



Fig. 1. House crow nest having 4 crow and 2 koel eggs. Koel eggs are slightly smaller

climbing the nest backward. In some other species, the intruder young develops a sharp hook at the tip of the beak (Fig. 6) with which it hooks out other nest mates. After a few days the hook is shed and the young loses the instinct of hooking others. The cuckoo leaves the nest 21 days after hatching when its weight increases 40-50 times greater than its weight on hatching.

Unlike some cuckoos, koel hatchlings do not eject the contents of fosterer's nest. But the shorter incubation period of koel eggs (13-14 days) compared to 16-17 days for house crow (18-20 days for jungle crow) helps the parasite. Usually the koel lays in nests where the crow has already laid two or three eggs. Even then, the koel eggs hatch earlier and the young gets the advantage of gulping all the food brought by the fosterers. They gradually starve out the legitimate nest companions. Therefore, nests containing nestlings of both koel and crow are fewer than one expects.

Stratagem of koel

To befool the proverbially clever crow in order to lay in its nest, the koel requires considerable stratagem, craft and opportunism. The crow seems to know the selfish intentions of the koel very well and so the latter is attacked violently when she goes near a crow's nest. Such a behaviour can be clearly observed by using stuffed koel. B. S. Lama of the Zoological Survey of India described the stratagem of the koels succinctly:

'The crow, not liking to be exploited, guards its nest twentyfour hours, but the mere site of a koel prompts it to leave its nest and chase the koel. Knowing this weakness of their victim, the male and female koels seem to have worked out a clever bit of a strategy. When the female koel is ready to lay, the male flies up to the crow's nest and makes himself known by emitting loud notes. The very sight of him infuriates the crow who is usually in-

cubating alone. Leaving the nest unguarded the crow attacks the koel who turns tail the moment the owner or owners of the nest go for him. Being a better flier, the male koel manages to keep only a little ahead, thus encouraging the crows to chase further and leads them away from the nest. The female koel who sits hidden, watching the proceedings, then takes possession of the deserted nest and relieves herself of her egg. She then flies away emitting a shrill *kuii-kuii-kuii*, apparently to tell the male that the strategy has been successful. The male then shakes off the pursuers and proceeds at full speed to join the female. Sometimes, however, things go wrong and the male or the female koel is caught red-handed and punished for his crimes by the indignant crows. . . . Meanwhile, the crows, pleased with themselves for having successfully driven away the treacherous koel, return to their nest only to be confronted with a strange egg lying amongst their own. Whether they recognise it or not is a controversial question, but the fact remains that the crows neither desert the nest nor try to throw out the koel's egg.'

The much appealing, and what seems to be a seriously worked out



Fig. 2. European cuckoo young heaving eggs of nest owner (From *The Birds*, Courtesy R.T. Pateron and Editors of TIME-LIFE BOOKS)

stratagem of the koels, may not be necessary in most cases. The crow starts regular brooding only after laying the full clutch of about five eggs or just before the last egg is laid. Until then, the nest remains almost unguarded, and the female

koel could deposit her egg escaping the notice of the crows around. If, on the other hand, the koels have to disturb a brooding crow, the former should have very precise knowledge as to when the eggs of crow were laid. If the young of crow appear before

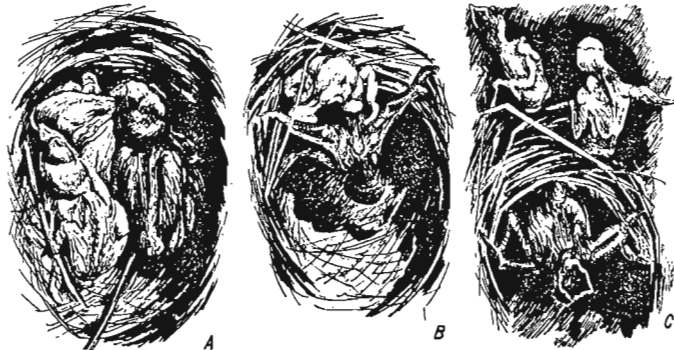


Fig. 3-5. Cuckoo young at stages of heaving out nest mates (Courtesy, Paul Hamlyn, *Pictorial Encyclopedia of Birds*)



Fig. 6. An African honey guide chick looking out a nest mate. The sharp hooks at the tip of back are deciduous (Courtesy, R.T. Paterson and Editors of Time-Life Books)

that of koel, the latter has very slender chance of competing with the young of crow, and so could die of starvation.

Number of eggs per nest

The European cuckoo almost always lays just one egg in a nest. If a nest contains two or even three cuckoo eggs, they probably are always from two or three females. Some other cuckoo species more frequently lay several eggs in the same nest. As many as thirteen eggs have been observed in a nest of the great spotted cuckoo in Africa. In a nest of the black-and-white cuckoo, seven eggs were found with only one host egg. These eggs are not always from the same female. As a rule, only one cuckoo is reared in each nest. According to *Grzimek's Animal Life Encyclopedia*, for almost every cuckoo egg, the foster parents pay with a clutch, and it is possible that in some areas the host loses so many clutches that their numbers decrease year after year. This in turn makes it more difficult for the cuckoo to deposit her eggs with that particular bird species. It will have to migrate or look for other foster parents to enable the afflicted species to recover.

In the nest of the crow we watched the crow laid her first egg most probably on April 18 (1976) and added an egg each during the next

three days. The first egg of koel was laid on 19th, when there were already two eggs of crow. The second egg of koel was laid the next day when there were three eggs of crow. Thus, the nest contained in all six eggs on 21st. We do not know whether the koel eggs were the products of one koel or two. Unlike most parasites, a crow nest may have more than one koel egg and more than one young along with the young of a crow. Humayun Adulali of Bombay Natural History Society had seen a crow nest containing eleven eggs of koel. According to E.C.S. Baker (author of a book on identification of Indian birds), there were as many as thirteen koel eggs in one nest. So, in the koel and the great spotted cuckoo group, several eggs are laid in one nest.

However, in the nest under our observation only one young, that too the koel's, survived upto adult fledgeling stage and left the nest. On May 10, i.e., on the 19th day after the last egg of crow was laid, one egg of koel and one of crow hatched (Fig. 7). The damage to the second egg of koel requires an ex-

planation. In Calcutta and some other regions in India and Bangladesh, the crow makes use of metallic wires for making a nest. In the present nest, the second egg of koel, being smaller than the crow's, slipped at the base of nest through such wires when it hatched. The lack of warmth for hours presumably killed the emerging chick. On May 11 (the next day), 2 more chicks of crow hatched out and after one more day the fourth chick of crow was born. The koel chick was much more agile and greedy and demanded most of the food brought by the foster parents. On May 15 (5 days after the first egg hatched) the two weaker chicks of the crow died and four days later (19th) the third crow young died. The last young of crow died on 23rd (Fig. 8). Thereafter the koel young monopolised the nest and attention of the crows (Fig. 9). On 28th, i.e., 18 days after its emergence from egg (when it was about to leave the nest), it was taken inside a cage and our colleague Monoranjan Ghose and his wife Bulbul are looking after the male koel as their pet. Now after five



Fig. 7. Young of crow (c) and koel (k) alongwith 3 eggs of crow in a house crow nest



Fig. 8. Young of crow (c) and koel (k) in crow nest

months, the koel has developed into a charming male with shiny dark feathers and red eyes and will likely be in search of a mate during the next breeding season in early 1977.

Nestlings outgrow the foster parents

Earlier it was believed that the female cuckoo selects nests of hosts whose eggs look like her own as in the koel. But it is not so, because the cuckoo places her eggs in the nests of that bird species that had raised her. Of course, some of the eggs are rejected. But whatever rejection the host bird can have on the parasite, it is present only in the initial stage. Once the host bird broods and the young cuckoo hatches, all previous hostility comes to an end. This attitude is very puzzling since the cuckoo nestling has hardly any resemblance to the young of the foster parents. Often the imposter grows twice or thrice as large as the foster parents before it leaves the nest

which necessitates the foster parents to mount on the imposter (Fig. 10) in order to feed it. Even at this stage the foster parents do not desert the intruder. The female young of the koel develops a plumage with spots conspicuously different from that of the crow. Yet the koel nestlings are fed not only as long as they are inside the nest, but also until some days later. One often comes across koel fledglings begging the crow for food outside and far away from the nest.

Food habits

While the cuckoo is generally carnivorous, it can also survive on berries. It selects mainly insectivores as foster parents for its progeny. This is true so far as the selection of the song birds is concerned. However, sometimes blossom-visitors, and those with mixed diet and even seed-eaters are also selected. With koel, the fosterers (the crow),

are both granivorous and carnivorous. Especially, while feeding the young, the crow parents prefer to bring vegetarian diet, mostly cooked rice if they live around human habitation. This enables them to feed more than one young during each nest visit. No wonder, in crow nests young of both koel and crow thrive reasonably well.

Motivation for brood parasitism

We have no idea why or how certain birds have developed brood parasitism where the instincts for nest building and incubating the eggs are absent. We do not yet know the physiological processes underlying instinctive behaviour. According to E. Otto Hohn of the University of Alberta, a researcher on endocrinology, the hormone prolactin produced by the pituitary gland of all vertebrates induces broodiness in chickens. It has been proved in a number of birds that the brood patch, an area of skin which undergoes particular changes like loss of feathers, in connection with incubation, requires prolactin and the female sex hormone for its formation. It, therefore, looks as if a bird needs prolactin in order to have the urge to incubate and to develop brood patches. If some chance mutation produced a hereditary disability to produce prolactin in some species



"Does it then mean that koel is black at heart too?"



Fig. 9. A koel fledgling, the lone survivor in the crow nest

of birds, they could only reproduce by nest parasitism. One can in fact measure the amount in a parasitic

species and compare it with that amount found in some related normally breeding bird. But Otto Hohn is depressed since the results in this regard are most disappointing.

Further reading

1. Grzimek's *Animal Life Encyclopedia* (1972), volume 8, Birds II: 361-389.
2. Lamba, B.S. (1963), The nidification of some common Indian birds—Part I, *J. Bombay Nat. Hist. Soc.*, 60, 121-133.
3. Lamba, B.S. (1963), The egg-laying of the koel, *Endynamys scolopacea* (Linnaeus), *J. Bombay Nat. Hist. Soc.*, 63: 750-751.
4. Abdulali, H. (1931), Eleven



"Darling, mistaking your coiffure for a crow's nest, the koel has dropped its eggs in it."

koel's eggs in a crow's nest. *J. Bombay Nat. Hist. Soc.*, 35: 458.

5. Hume, A.C. (1890), *Nests and eggs of Indian birds*, 2nd. Ed. H.R. Porter, London.
6. Baker, E.C.S. (1934), *Nidification of the Birds of the Indian Empire, III*, Taylor and Francis, London.



Fig. 10. Hedge sparrow about to drop insect in a cuckoo's mouth. The small-statured fosterer is perched on the enormous parasite to enable the former to feed the latter conveniently

7. Neufeldt, I. (1966), Life history of the Indian cuckoo, *Cuculus micropterus micropterus* Gould, in the Soviet Union, *J. Bombay Nat. Hist. Soc.*, 63: 399-419.
8. Ali, S. and Ripley, S.D. (1969), *Handbook of the Birds of India and Pakistan*, 3: 191-247.
9. Dewar, D. (1907), An enquiry into the parasitic habits of the Indian koel, *J. Bombay Nat. Hist. Soc.*, 17: 765-782.
10. Otto Hohn, E. (1976), It is a cuckoo's life for the black-headed duck, *Wildlife*, 18: 82-83.
11. Friedmann, H. (1960), *The parasitic Weaverbirds*, Washington.