

and as the birds of the first brood reached maturity they were attacked by the father and had to be removed. The birds were released several hundred yards away on the shore of the river. They returned, however, and unable to enter through the narrow mesh of their former cage, they soon settled down in the neighbouring otter cage with its much wider wire mesh. In order to stop further breeding in the original cage the pipe

was blocked. The birds tried to tunnel new nesting places in the sides of the mound but as the walls were concrete they were unsuccessful. Shortly afterwards the exhibition had to be closed and all the birds were released about 20 km away at a secluded spot on the shore of Lake Malawi.

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## Breeding the Green-billed toucan

*Ramphastos dicolorus*

### at the Walsrode Bird Park

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We acquired our Green-billed toucans *Ramphastos dicolorus* in 1961 from a Dutch animal dealer. They consisted of three adult specimens. They were fed primarily on fruit, boiled rice and meat. For fruit they preferred tomatoes, sliced into small pieces, together with cherries and grapes. Apples, oranges and boiled carrots were eaten only sparingly. Boiled rice was preferred to similar kinds of food such as boiled potatoes and boiled maize. As a supplement, pullet concentrate and minced meat was given. Our birds spent the winter in a room with a minimum temperature of about 3°C (37°F), and although they had access to an electric heater only a little use was made of it. They were able to go out into an open air enclosure at any time. The enclosure in which the toucans were kept during the summer was 2 × 2 × 4 m and one half was roofed over.

In May 1965 the three toucans, which had so far been kept together, became quarrelsome for the first time and it became necessary to remove one bird from the aviary. It was interesting to observe that the clumsy toucan bill was used as a weapon, not for pecking but as a 'flying dagger' with which the two partners tried to hit the unpaired animal. At high speed and with outstretched bills they flew straight at it, so that it had to drop from the perch fluttering helplessly and, finally, creep away into a corner of the aviary. At a later time we experienced the same method of

attack ourselves, and it was only with great difficulty that we were able to avoid the head-high attacks of the animals, as we sought to take the chicks from the nest to photograph them.

After the unpaired animal had been removed from the aviary the pair quickly became calm and began to hollow out a depression, about 30 cm in diameter and 20 cm deep, in the corner of the aviary. The first egg was laid on 15 June 1965. It was pure white, oval and had a length of 40 mm and a diameter of 28 mm. Four eggs were laid at intervals of one day. Sixteen days after the last egg had been laid four blind and naked chicks were hatched. The hollow was by now lined with stones from the cherries which we had offered intact to the parent animals. On the seventh day after hatching the parents became restless, called loudly and continuously, and would not feed. Suddenly, they dragged the living and still blind chicks out of the nest hollow, tore them to pieces and devoured them. During 1965 there was no further attempt at breeding. All three toucans were able to spend the winter together without any quarrels arising.

By March 1966, however, it was necessary to separate them once more, as the pair had again become broody. As Green-billed toucans are known to be hole-nesters we had brought a tree trunk about 1 m in height into the aviary. This had a nest-hole prepared in it with an internal

diameter of 28 cm and depth of 42 cm. This nest-hole was at once closely inspected by the toucans, and cleared of the foliage inside it. Contrary to expectations, however, in May a depression in the earth was once again excavated and four eggs laid in it from which, after an incubation period of 16 days, four chicks were hatched. These were well fed but, despite an increase in the amount of meat they were given on the 11th day after hatching, the parents once more and in the same manner killed and devoured their young. In July a second attempt at breeding was made, this time in the nest hole. Once again four eggs were laid at daily intervals and all hatched. Unfortunately, on this occasion also the breeding was unsuccessful, the young toucans being eaten on the 16th day. No further attempt at breeding was made in 1966.

In 1967, we again separated the three animals early and experimented with a new diet. Instead of the fresh meat provided hitherto we supplied them with a prepared dog food consisting mainly of meat and rice, together with minerals and vitamin additives. We also supplied fruit and rice as before. Again the toucans decided to breed in the hollow. However, we kept filling this in because it was situated in a place unprotected from bad weather. Even so, we were only able to persuade them to lay in the nest-hole by putting a layer of sand about 5 cm deep in it.

The eggs were laid on 27, 28, 29 and 30 April 1967. They were incubated from 29 April. The first two chicks hatched on 15 May, the second two on 16 May, which corresponds to an incubation period of 16 days. The female fed the chicks by herself and only left the hole briefly in order to feed. The chicks were naked and blind, the skin almost transparent and rosy-flesh coloured. The horny pads which young toucans have on their heels from hatching were conspicuous. These appear to be there to protect the weak

heels, because from hatching to the time they first fly out of the hole the chicks have more or less the same sitting posture. These heel pads degenerate during the nesting period and by the time they can fly are no longer distinguishable. On the seventh day after hatching the male began to participate in the feeding. In this the food was bitten up and swallowed by the parents and then regurgitated with the bill inserted into that of the chick. At this time the food consisted of 70% meat and 30% fruit. On the 24th day the quills began to show and the eyes were opened for the first time. From this day on the parents slept separately outside the hole. In contrast, before brooding, they had slept close together, and from the time of hatching up to this moment one partner was in the nest hole, even at night. On the following day the male chased the female away and fed the chicks himself. A few days later, however, the disharmony was forgotten and both took part in the feeding. It was astonishing that the droppings, which were present in large quantities, were not removed by the parents. We removed the droppings regularly, finally twice a day, and the chicks sat with their bills towards the wall of the nest hole with their rumps steeply raised so that the middle of the hole was always unoccupied. The previously mentioned neel pads even made it possible for them to climb the wall a little in this posture. On the 44th day the first chick ventured out of the hole, two more on the 45th day and the last on the 46th day. They continued to be fed by their parents and still solicited them even after they had been able to take their own food for a long time. Their weight at different ages may be of interest:

1st day	18 g	19th day	185 g
5th day	30 g	27th day	270 g
9th day	55 g	34th day	280 g
12th day	95 g	41st day	295 g.