

On Cainism in the Lesser Spotted Eagle (*Aquila pomarina*) and a possible Explanation for the Phenomenon in this and other Eagle Species

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Detailed observations were made of Cainism (fatal Cain-and-Abel struggle) in a Lesser Spotted Eagle's (LSE; *Aquila pomarina*) nest in Slovakia from a hide in which the second chick could be closely observed from hatching to death. At a second eyrie in Germany a remotecontrolled video camera was used to record on tape the events leading up to the death of the second chick. In a third case in which the strife between the siblings was studied, both chicks had clearly passed the age at which the second chick has usually perished. Here observations were conducted for several days from a blind. Meyburg, B.-U. 2002. On Cainism in the Lesser Spotted Eagle (*Aquila pomarina*) and a possible Explanation for the Phenomenon in this and other Eagle Species. Pp. 53-61 in: Yosef, R., M.L. Miller & D. Pepler (eds.): Raptors in the New Millennium. Eilat: Intern. Birding & Research Center.

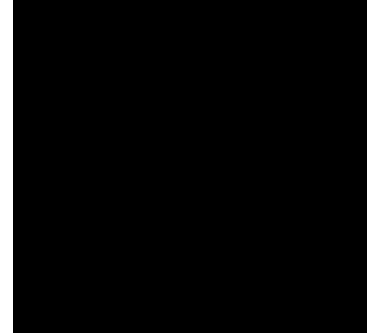


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ON CAINISM IN THE LESSER SPOTTED EAGLE (*AQUILA POMARINA*) AND A POSSIBLE EXPLANATION FOR THE PHENOMENON IN THIS AND OTHER EAGLE SPECIES

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ABSTRACT. – Detailed observations were made of Cainism (fatal Cain-and-Abel struggle) in a Lesser Spotted Eagle's (LSE; *Aquila pomarina*) nest in Slovakia from a hide in which the second chick could be closely observed from hatching to death. At a second eyrie in Germany a remote-controlled video camera was used to record on tape the events leading up to the death of the second chick. In a third case in which the strife between the siblings was studied, both chicks had clearly passed the age at which the second chick has usually perished. Here observations were conducted for several days from a blind.

The strife between Cain and Abel generally leads to the death of the second chick a few days after hatching. The food supply plays no part in this. At this time the nest contains an ample supply of prey. The following factors are responsible for Cainism in the LSE:

1. The time lapse of several days between the hatching of the two chicks, giving the first-born (Cain or C1) a more or less considerable developmental advantage.
2. Cain's greater weight at the time of hatching. It usually also hatches from the larger egg.
3. The aggressiveness of the chicks towards each other.
4. The acceptance of intimidation by the inferior chick, even when there is virtually no difference in weight (e.g. in translocation experiments), to the extent that this chick hardly ventures to take part in feedings.
5. The scant attention paid by the female to the second chick, given its smaller size and, above all, its greater clumsiness in taking food due to its retarded development, shows that it holds a waning power of attraction.

Up to now there has been much disagreement over the meaning of second-egg laying, leading as a rule to the fledging of only one young, and over the significance of Cainism within the framework of evolution in this and other eagle species. None of the attempts to explain it so far published is really convincing. One possible explanation for the phenomenon of Cainism may well be that the species is at an evolutionarily intermediate stage of transition from two-egg to one-egg clutches. For unknown reasons, and in contrast to earlier times, the raising of one young per breeding season is today sufficient to maintain the species. At a later stage in the course of its evolution this species, which at present lays a second egg clearly smaller than the first – one could regard this as vestigial – may well confine itself to laying no more than one egg per clutch.

The most interesting phenomenon in the breeding biology of the Lesser Spotted Eagle (LSE; *Aquila pomarina*) is without doubt the premature disappearance of the second chick not long after hatching. This event was first termed Cainism by Wendland (1958a), derived from the Old Testament tale of the murder of Abel by his brother Cain, since the death of the younger sibling is due to the presence of the chick that hatched first. Accordingly the first chick to hatch (C1) will here be designated as Cain and the second (C2) as Abel.

Cainism may be regarded as a special form of fratricide. The term Cainism or fatal Cain and Abel conflict should only be used for those species which practically always hatch two chicks and in which a shortage of food plays no part, or only a very subordinate one, as a cause of the second chick's death (e.g. LSE, Verreaux's or Black Eagle, *A. verreauxii*) as opposed to those species in which the smallest chicks often starve or are killed by their bigger siblings because of lack of food.

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In some species (e.g. Golden Eagle, *A. chrysaetos*) it is not always clear whether one should consider such events as Cainism or Fratricide and there is certainly some overlap.

Between 1968 and 1971 I was able to carry out a study of different aspects of the LSE biology in the East Slovakian Carpathians (Meyburg 1970, 1971, Palsthy & Meyburg 1974, Svehlik & Meyburg 1979). With regard to Cainism experiments were first undertaken in order to find a way of preventing the death of the second chick and thereby help to increase population numbers. After this has been found possible (Meyburg 1971) it was attempted to discover as far as possible the reasons that usually lead to the death of the second chick. All developments from hatching to Abel's disappearance were first recorded in one case from a hide in a nearby tree in 1971 (Meyburg 1974q, b).

In 1974 I was again able to study these events at one nest in Slovakia, the results of which are here presented. Observations concerning this problem at another eyrie in Slovakia are also described. In 1992 developments in connection with Cainism at a LSE nest in Mecklenburg-Vorpommern (Northern Germany) by means of a remote-controlled Video camera were also recorded and analysed.

All statements by other authors to date have merely been based on short observations during nest controls and not on longer direct observation from blinds. (Wendland 1932, 1951, 1958a, b, 1959, Sladek 1959, Gejlikman & Unanyan 1974).

MATERIAL AND METHODS

In 1974, at a nest site in East Slovakia (Nest No. 26), the course of events in connection with cainism was closely observed from a hide, from the second chick's hatching to its disappearance. In a second case (Nest No. 044) in which the strife between the siblings was studied, both chicks had clearly passed the age at which the second chick has usually perished. Here observations were conducted for several days.

In order to avoid any disturbance during the last days before hatching the eggs in nest No. 26 were replaced by dummies and artificially reared in an incubator. After both chicks had hatched they were returned to the nest and during the following days kept under observation from a hide about 80 m distant, using a telescope (20-60 x 80 mm). The hide was situated in a low cliff a little above the nest and provided a good view of the latter's interior. It could be approached and left without the adult at the nest becoming aware. In all, 37 hours were spent in observation.

On 6 July 1974 the second nest (No. 044) was found containing two young. From their weight (on 8 July 1200 and 590 g) and emerging feathers they were estimated to be three weeks old. Hitherto I had never seen a LSE's nest in which C2 had survived for so long. As a rule C2 perishes after about one week. From 7 to 10 July I kept watch for something over 26 hours in all from a hide ca. 70 m distant. The hide was on the ground, on a slope slightly above the nest, so that a good view of the latter was to be had.

Since 1990 a project had been in operation in Mecklenburg-Vorpommern (Northern Germany) to investigate the habitat requirements, migration routes and wintering grounds of the LSE (e.g. Meyburg et al. 1995). Within the scope of this project research was also undertaken in 1991, 1992 and 1993 into its breeding and feeding ecology by means of a remote-controlled video camera. Following an already published general overview of the whole breeding cycle (Scheller & Meyburg 1998), an established case of Cainism is here described in detail. During the 1993 breeding season it was possible to trace the events leading up to the death of the second hatchling.

The studies were carried out on a pair of LSE's in an areas called Mecklenburgische Schweiz which for at least 10 years had occupied a nest on a beech tree. The nest was ca. 20 m high up in a fork of the tree. The camera was installed about 15 m away in a neighbouring tree at a height of ca. 30 m, so that a good view was obtained into the nest hollow.

The video camera, a Panasonic WV-CL 302, in its weatherproof casing, like the microphone attached to it, was firmly fixed to the tree, but its direction could be changed by remote control and it could also be zoomed. The videos were recorded at a receiving station about 600 m distant from

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the nest by means of two video recorders. In this way, throughout the whole breeding period the uninterrupted course of each day's events between 4.30 a.m. and 9.30 p.m. (daylight hours) could be recorded on videotape.

RESULTS

Observations at Nest No. 26 in Slovakia. – On 10 June this nest contained two eggs (68.0 x 50.0 mm, 81 g and 62.0 x 49.5 mm, 76 g). On the following day, around 13.00 hrs, the larger egg showed a crack. On 13 June Cain finally hatched around 02.00 hrs. At that time C1 weighed 64 g. In the morning of 14 June Abel began piping its shell and finally emerged the following day around 14.00 hrs, 60 hours after its sibling. Thereafter the following observations were made: 16 June (observations from 10.10 to 18.10 hrs): At the only feeding between 16.22 and 16.38 hrs, both chicks received roughly the same number of bits of meat. The female spent the rest of the time brooding them. There was no sign of aggression between the chicks. The male for his part brought prey to the nest at 13.01, 13.28, 14.30, 15.48 and 16.22 hrs.

17 June (09.40-16.10 hrs): During the first feeding, from 11.50-12.05 hrs C2 only woke up after 12 minutes and even then made no serious attempt to get fed. The feeding over, it was fiercely attacked by C1 but defended itself. During the second feeding from 15.28-15.50 hrs C1 received 14 morsels. C2 completely disregarded the feeding female, which made her first offerings to C1, but continually pecked at the head of C1, which only now and then retaliated. At the end of the feeding the female seemed to be quite helpless in the face of the mutually attacking chicks. The male brought prey at 11.50, 12.01, 12.16 and 15.38 hrs.

18 June (10.35-17.00 hrs): During the first feeding, from 13.08-13.22 hrs, C1 received 19 morsels, C2 only one. The female always presented food to C1 first although it uttered fewer cries than its sibling, and ended the feeding despite the continued strenuous begging of C2. In comparison with its older sibling this begging was quite aimless and at first made with its back to the female. Whilst C1 was poking about with its beak in the bottom of the nest C2 gave its head five vigorous pecks. At the second feeding, from 16.05-16.20 hrs, C1 showed almost no appetite, did not beg and ate only one morsel. C2 received at least 12 pieces of food and constantly pecked C1 which, however, hardly seemed to notice. Although C1 showed no interest, the female had an unmistakable tendency to feed this young first. The male brought prey at 13.28, 13.45 and 16.40 hrs.

19 June (09.10-19.00 hrs): After I had entered the hide, C1 strenuously attacked C2 before the arrival of the female. At the first feeding, 11.55-12.05 hrs, C1 received 38 morsels. C2 made no attempt to take part in the feeding, at the end of which it was vigorously attacked by its older sibling. At 12.35 hrs C1 renewed its pecking of its smaller sibling as the female only brooded them for a short while. At the second feeding, from 14.25-14.36 hrs, only C1 again took part and received 14 morsels. The male brought prey at 10.26, 12.32 and 18.11 hrs. An inspection of the eyrie at the end of observation time revealed eight whole mice with a combined weight of 261 g in the nest. C1 weighed 128 g, its sibling only 46 g, thus 12 g less than four days previously on hatching.

20 June (9.04-13.30 hrs): When the female stood up to feed at 12.54 hrs C1 immediately attacked its sibling that never stirred. The male brought prey at 10.52, 12.54 and 13.27 hrs.

21 June (14.40-16.20 hrs): The female spent the whole time brooding. The male brought a prey at 14.45 hrs.

On 23 June a visit to the nest revealed no trace of C2. Whether, as observed in a previous case (Meyburg 1974 a, b), it was partly eaten by the female and partly fed to Cain could not be ascertained. C1 weighed 266 g; four complete mice in the nest had a combined weight of 111 g.

Observations at Nest No. 044 in Slovakia. – The most important observations are summarised in Table 1. At this nest I was able to determine the interesting fact that the arrival of an adult at the

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