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# First Captive Breeding of the Lesser Spotted Eagle *Aquila pomarina* in Riga Zoo

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## I. CONDITIONS IN CAPTIVITY AND PRELIMINARY WORK WITH BREEDING PAIR

### CONDITIONS

The breeding pair of Lesser Spotted Eagles has been in Riga Zoo since the early 1970s. Their exact age is unknown; they are most probably wild-caught birds.

Up to 1984 four adult Lesser Spotted Eagles were kept in one of a complex of enclosures. This was situated between enclosures containing pairs of *Falco cherrug* and *Aquila heliaca*, the wire dividing the latter being screened with cane wattle-work, to decrease possible stress.

The Lesser Spotted Eagle enclosure measured 3.6 x 4.1 x 3.6 m and was roofed over. The shelf used for nesting was situated at the back of the enclosure against a board wall 2.12 m high. It was 80 cm wide and stretched all along the back wall.

### Situation until 1991

In 1984 the first signs of a mating pair were recorded in the group of eagles. On June 2 the first egg was laid on the shelf. The two other birds were now transferred to another enclosure, leaving the newly formed pair on their own. As a result of this disturbance the egg was eaten.

In February 1985 the first mating signs were again observed. On May 5 the female laid an egg and started brooding, while the male defended the nest aggressively. On June 20 a check of the nest revealed that the egg was addled.

On March 24, 1986, copulation was first recorded. An egg was laid on May 3, but brooding was irregular and the egg was finally eaten.

The same situation occurred in 1987, when two eggs were laid and subsequently eaten.

In 1988 Riga Zoo acquired an incubator. An egg laid on May 3 was placed in this incubator and on June 9 a chick hatched but died shortly after.

In 1989 the female brooded one egg. On June 10-11 the chick began pipping but died unhatched. The embryo had a huge unabsorbed yolk sac.

On May 4 1990 the female laid an egg which was later eaten.

At last, in 1991, breeding was successful.

**Preliminary Work with the Pair, 1991.**

*Feeding*. Until February 22 the birds were fed alternately with beef and freshly dead rats and mice. (One day a week no food was given.) In February and March the birds were taught to capture live food, developing their preying instincts (following the instinctive reaction stimulation methods advised by Kazan Zoo ornithologist Yuri Pavlov).

They were fed twice a day: at 10 a.m. with live food and at 4-5 p.m. with live food and cattle bones with meat. On average the pair received between them 600g of live food and 200g bones with meat per day.

*Stimulation*. At the onset of the breeding season (from March 2) vitamin stimulation in the form of Trivit and Soldrovit was begun, given with food every day over the course of two weeks. During the second week calcium carbonate was also given in the same way. To stimulate sexual activity Vitamin E was used as well, given to each bird with food for five days in March. On March 7 Folliciline stimulation was carried out (injected into mice):

**Methods of observation and initiation of behaviour.**

In 1991 we began to work with all raptors in Riga Zoo, using the method advised by Yuri Pavlov. We carried out 30 minute observation sessions during the birds' highest activity, between 9-10 a.m., before feeding. The stages in the relationship of the birds were recorded as follows: (1) walk, voice; (2) run; (3) wing flapping; (4) courtship flight; (5) nest building; male feeding female; (6) dancing; (7) mutual preening; (8) flying together; (9) pre-copulation games; (10) copulation. Based on the activity level recorded, the birds were gradually initiated into the next activity levels.

On February 22, 1991, regular observation of the eagle pair's activity was begun. As soon as the birds were taught to prey on live food, feeding up of the male began, leaving the female partly unsatisfied, so that she begged food from the male.

On March 2 we made an artificial nest out of branches (75 cm) and placed further branches in the enclosure with which the birds could build it up. Initially an egg was put into the artificial nest.

**Behaviour of the pair.**

On March 18 the birds cracked this egg and dropped it on the ground. They soon adopted the artificial nest. The male began to interlace it with small branches and pieces of cane torn off the cane screen. It also took food to the artificial nest and passed it over to the female. In addition to building up the artifical nest, both birds made a new nest nearby to which they gradually moved and the female took to brooding in this new nest.

Courtship activity was expressed as regular calling to each other and brief flights. Peak courtship behaviour did not set in simultaneously for both birds: the culmination point (the most active behaviour) of the female set in 12 days after that of the male.

The first copulation took place on March 20 at 10:40 a.m and lasted for 20 seconds. In all, 11 copulations were recorded, of which only a few could be considered successful. The last case was recorded on April 25.

The first egg was laid on April 28. On April 30 it was placed in the incubator. The second egg laid on May 5 was placed in the incubator on May 9.

The male continued to feed the female until the second laying on May 27. The single egg of this second laying was left for the birds to raise themselves, mainly because we hoped thereby to develop the birds' chick-rearing instincts. Until July 3 the female brooded but then (just as in other years) left the nest and we ascertained that the egg had been eaten.

In the subsequent years this Lesser Spotted Eagle pair ceased to exist because, on December 16, 1991, the female died.

## II. INCUBATION AND ARTIFICIAL REARING OF THE CHICK

In 1988 and 1991 eggs were incubated artificially. The egg laid on May 3, 1988, was placed in the incubator on May 10 (see Table 1). The chick pecked out the pointed end of the egg on June 9, on the 36th day, but died owing to a rupture of blood-vessels. In the course of incubation the egg lost 12 g or 16% of its initial weight.

Eggs laid on April 29 and May 5, 1991, were placed in the incubator one and four days after laying. Both eggs were pale grey with rare, indistinct light brown flecks.

Incubation proceeded as follows: 1st to 6th day, temperature 37.3-37.8°C, relative humidity 45-60 %; 7th to 21st day, temperature 37.3-37.8°C, humidity 50-60 %; 22nd - 32nd day temperature 37.4 - 37.8°C, humidity 55-65 %. Eggs were turned 180 degrees five times a day. During 32 days of incubation eggs were cooled only six times. Ovoscoping was impossible, therefore eggs were water-tested after 20 and 30 days. As one egg did not respond during the water test, it was opened on the 42nd day of incubation; it contained an embryo which had perished 5-7 days before hatching (the chick was in a normal position, however the yolk sac was not absorbed). The reason for this death might have been a small dent in the broader end of the egg. The embryo weighted 48g.

The other egg, as hatching approached (33rd 35th day) was put into a special final stage incubator at a temperature of 36.0 - 37.1°C and humidity 70-75 %. The egg was cooled once a day for five minutes. The chick hatched on June 12, 1991, on the 38th day of incubation. It weighed 54.7 g; the weight of the shell being 8.77 g. The yolk sac was completely absorbed. The navel of the newborn was smeared with 1% iodine solution. It was covered with down of varying length, except for the abdomen; on its back the down reached 20 mm.

The down on the back was light grey, on the head and neck silky dark grey reaching 10-13 mm on the head. The beak was black, cere and corners of the beak flesh-coloured. Opened eyes with dark "spectacles" around them. Colour of iris dark grey.

Canals of hearing closed, feet and claws pink. Length of hind claw 18.5 mm; depth of beak 12.5 mm; length of head (with beak) 41.5 mm; length of wing 33, of tarsus 23, of tibia 31.5 mm; total length 76 mm.

For the first six hours after hatching the chick was kept in the incubator until completely dry at a temperature of 36.8°C, after which it was transferred into a box. Ten hours after hatching it held its head upright. For the first days the temperature in the box was kept at 32-36°C and then gradually decreased until on the 17th day it

**Table 1. Fertile Lesser Spotted Eagle's eggs and course of artificial incubation.**

| Day of laying | Egg | Sizes (mm) | Weight (g) | Incub. time (days) | %of drying | Notes |
|---|---|---|---|---|---|---|
| May 3, 1988 | 1 | 58.4 x 47.0 | 72.00 | 36 | 16.00 | Chick died |
| Apr 20, 1991 | 2 | 62.7 x 50.4 | 87.35 | - | 16.15 | Embr. died |
| May 5, 1991 | 3 | 61.3 x 50.1 | 81.56 | 38 | 16.79 | Chick hatched |

was room temperature 24°C. A bowl of water was constantly kept in the box to maintain humidity at a level of 55-65%. From the age of nine days the chick was taken outdoors for 20-30 minutes; 15-20 days for 1-5 hours; and at the age of 3-4 weeks it was outdoors for 12 hours. At the age of one month it was transferred to an outdoor enclosure, in which a nest had been made of poplar branches.

The first feeding took place nine hours after hatching. For first five days this was of minced quail meat, given with pincers in 0.5 cm pieces soaked in Ringer-Lokk solution. Starting on the sixth day this was mixed with crushed quail bones, gristle and feathers. At the age of two weeks forcemeat of day-old chicks, mice and quail with meat addition. All this was processed in a mincing-machine, removing heads and gut. At the age of a month forcemeat was replaced by pieces of meat size 3-5 cm. In 80 days the weight of the chick increased 27.4 times (from 54.7 to 1500 g) (see Table 2). It first killed its prey at the age of 50 days, but began tearing up the proffered live food only at the age of 72 days. The young bird grew quickly; in two weeks the length of wing increased 13 times, tarsus 4.8 times, wing extension reached 145 cm. with the growing feathers. At the age of eight days down change began. At the age of three weeks the growing wing - and quill-feathers started opening. At this age the chick moved round the nest flapping its growing wings. At the age of a month the feathers on the back of the head, thighs and tarsus began to open; however the belly was still covered with grey down. The young eagle was completely feathered at the age of 46 days, and flew out of the nest the very next day. At the age of 80 days it still showed no fear of humans. It should be noted that the feathering of a young bird differs considerably from that of an adult, with beige flecks at the ends of the coverts of wing, tail and tarsus. Such feathers also grow on the back of the head.

**Table 2. Development in size and weight of Lesser Spotted Eagle hatched on June 12, 1991.**

| Measurements | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 2 | 7 |
|---|---|---|---|---|---|---|---|---|---|---|
| Culmen (with cere) (mm) | 18.5 | 21.5 | 27.6 | 30.6 | 33.5 | 38 | 40 | 41 | 41 | 42 |
| Culmen (without cere) (mm) | - | - | - | - | - | - | - | - | - | 31 |
| Depth of beak (mm) | 12.5 | 14.1 | 16.7 | 19.4 | 21.4 | 21.5 | 22.8 | 23 | 23 | 25 |
| Length of head (with beak) (mm) | 44.5 | 51.9 | 66.0 | 79.5 | 87.5 | 91 | 96 | 96 | 96 | 96 |
| Wing (mm) | 33.0 | 41.0 | 79.0 | 130 | 210 | 265 | 325 | 380 | 430 | 440 |
| Tarsus (mm) | 23.0 | 37.6 | 67.5 | 86.2 | 104 | 107 | 108 | 108 | 110 | 110 |
| Tibia (mm) | 31.5 | 50.5 | 81.5 | 110 | - | 140 | 145 | 155 | 155 | - |
| Total length (mm) | 76.0 | 170 | 240 | 330 | 370 | 440 | - | - | - | - |
| Wing extension (mm) | - | - | - | - | 900 | 1100 | 1118 | - | - | - |
| Tail (mm) | - | - | - | - | - | - | - | - | - | 220 |
| Hind claw (mm) | 0.3 | - | - | - | - | - | - | - | - | 28.7 |
| Weight (g) | 54.7 | 156.6 | 424.0 | 801.0 | 1125 | 1310 | - | 1520 | 1300 | - |

In conclusion, as far as we can ascertain, this in the first care of successful breeding of the Lesser Spotted Eagle in captivity in the world.

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