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Plates 61-64

Of all European eagles, the Lesser Spotted Eagle *Aquila pomarina* has the smallest world breeding range, the nominate race being confined to eastern parts of Germany, Poland, eastern Czechoslovakia, Hungary, Yugoslavia, Romania, Bulgaria, north-east Greece, western Turkey (Thrace), and the Soviet Union north to Leningrad and east to about 35°E. There are no published records of proved breeding in eastern Austria this century, though pairs from Hungary hunt

PLATE 61. Female Lesser Spotted Eagle *Aquila pomarina* with chick nearly five weeks old, Slovakia, July 1968 (pages 439-447) (photo: B.-U. Meyburg)





PLATE 62. Clutch of two eggs of Lesser Spotted Eagles, Slovakia, spring 1968; about 81.5% of all clutches contain two eggs. Below, the dead second chick which next day was partly eaten by the female parent and partly fed by her to the surviving young, Slovakia, July 1971 (pages 441-443) (photos: B.-U. Meyburg)





PLATE 63. Adult and well-grown young Lesser Spotted Eagles at Slovakian eyrie, August 1968: above, the male bringing the eaglet a mouse; below, the young bird testing its wings. Almost all the food is brought to the nest by the male, especially while the young bird is still small (pages 444-445) (photos: B.-U. Meyburg)





PLATE 64. Pair of Lesser Spotted Eagles at eyrie in fork of massive beech, Slovakia, June 1971. Nests are used again year after year, green twigs being added during the breeding season (pages 441, 444) (*photo: B.-U. Meyburg*)

over the land around Lake Neusiedl. There is no clear information on the current position in the Caucasus and the south Caspian lowlands. In Germany the breeding area stretches only to the north of Berlin, westwards beyond the rivers Oder and Neisse but stopping short of the Elbe. In 1969 there were 53 known broods in this area, and possibly a further nine (H. Weber in Glutz von Blotzheim *et al.* 1971). Even at the beginning of this century, the breeding range extended much further westwards, at least as far as the River Weser in Niedersachsen.

A second subspecies, *A. p. hastata*, breeds in parts of India, in particular the Ganges Valley and West Bengal, and also in Bangla Desh. Hardly anything is known about this form, which appears to be rare. The first autumn plumage is said to be quite different from that of the nominate race, which has led some authors to treat it as a separate species.

The Lesser Spotted Eagle presents a very difficult problem to field and museum ornithologists alike—the clear differentiation between it and the very closely related Spotted Eagle *A. clanga*. Even in the hand, it is sometimes impossible to distinguish the two with any certainty, which is why many authors over the years have questioned their independence as species. In all the newer handbooks, they are treated as separate species. According to Zhezherin (1969), who again took up this question recently, the Spotted Eagles breeding east of Moscow differ very substantially in size and markings from typical Lesser Spotted Eagles, but, on the other hand, it appears that this does not apply to specimens from areas further west where the breeding ranges overlap. Here, it seems, it is more a matter of manifold gradations from one form to the other. Zhezherin wanted to classify both eagles as 'semispecies' or even subspecies of a polytypic species. Yet, strangely, he did not discuss the tawny-yellow patch on the nape of first-autumn Lesser Spotted Eagles, which is the surest way of differentiating between the two. In areas where both species are found together, particular attention should be paid to this field mark, as well as to the possibility of hybridisation.

It is interesting that Christensen *et al.* (1972) recently asserted that, as a rule, it is possible to distinguish between the Spotted and Lesser Spotted Eagles in the field, whereas specialists living in areas where both are found maintain that this is often impossible. Thus Likhachev (1957), for instance, who studied the raptor population of a wooded area 200 km south of Moscow from 1938 to 1953, wrote only of the 'Lesser' Spotted Eagle, even though it is clear from the published measurements, especially those of the eggs, that about half the pairs he observed must have been *A. clanga*.

An alternation of woodland and open landscape meets the

habitat requirements of this eagle. In the lowlands of north-east Germany, Poland and White Russia, it prefers swampy woodland or that bordering on marshy meadows. In damp alder woods it can be more numerous than the Buzzard *Buteo buteo* (Wendland 1959). In a wooded region north of Berlin, some 50 km square, ten or eleven pairs nested during 1928-39, but by 1969 only two pairs remained; on the other hand, in another wooded area of only 11 square km surrounded by fields and meadows, as many as four pairs bred in 1969. In the 742 square km part of the Bialowieza primeval forest that lies in White Russia, 19 to 24 pairs nested from 1956 to 1958, and of the eleven species of raptors found there the Lesser Spotted Eagles represented 21.7-25.5% of all breeding pairs (Golodushko 1961a, b).

In the Balkans and Carpathians, however, this eagle breeds in completely dry mountain woods at middle altitude. From 1968 to 1971 I had an opportunity to study it in great detail in eastern Slovakia, where it is still found in relatively large numbers; during this time 26 broods were checked and events at five different eyries observed from hides for a total of 350 hours (plates 61-64). There were 18 eyries at 300-800 metres, their average altitude being a little over 500 metres (Meyburg 1970, 1974b). Their density there seemed somewhat less than in the marshy lowlands; nevertheless, there were three occupied eyries only 300-400 metres apart in 1967 (J. Švehlik in Meyburg 1970).

Lesser Spotted Eagles are migratory, arriving in their breeding areas during the first half of April. They reoccupy their old eyries or take over those of Buzzards or other raptors from previous years. Rarely is a new eyrie built, a process which, according to von Dobay (1934), takes only five to six days. Booted Eagles *Hieraaetus pennatus* sometimes clash with Lesser Spotted Eagles over an eyrie (Golodushko 1959), and in eastern Slovakia the remains of a Booted Eagle were found 50 metres from a Lesser Spotted Eagles' nest (J. Švehlik in Meyburg 1970). Five eyries in Slovakia had diameters of 50-150 cm and depths of 50-110 cm. The interior bowl of each was about 30 cm wide and 6-12 cm deep. There appeared to be no preference for any particular kind of tree: of 18 eyries in Slovakia, twelve were in beeches (plate 64) and six in oaks, at heights of 6.5-21 metres, averaging 13.5 metres. Nests were situated between 150 metres and 4 km inside woods, the average distance being 800 metres (Meyburg 1970, 1974b).

The eggs are laid at the end of April and beginning of May. Collated data on 178 clutches show that they averaged 1.8 eggs per clutch, two-egg clutches forming 81.5% of the total; as in plate 62a, the first egg is generally more heavily speckled (reddish-brown to violet) than the second and, as a rule, also larger—in 46 clutches

2.3 mm longer and 1.8 mm wider, on average (Meyburg 1970). This species appears to conform to the well-known rule that clutch size increases with latitude: in Macedonia it appears to lay only one egg as often as two; in eastern Slovakia only 19 of 29 clutches had two eggs, the average being 1.65 (Švehlik and Meyburg in prep.); while in north-east Germany and White Russia the average clutch is about 1.9 eggs. Six of the eight known three-egg clutches have been in White Russia, where they may form a not inconsiderable percentage of the total (five out of 43).

A second factor which may influence clutch size is the availability of food. In the damp lowlands of north-east Germany and White Russia, in the event of a population decline within the cycle of the Common Vole *Microtus arvalis*, their main prey, the eagles can fall back on amphibians to a far greater extent than in the dry subalpine habitats of the southern part of their range (Sládek 1959b, Palášthy and Meyburg 1973). Thus, in years when the vole population is at its normal level, the diet of the eagles in the Białowieża primeval forest has included approximately 78% voles and only 15% amphibians, whereas in years of vole scarcity they have largely compensated for the shortage of rodents by taking more amphibians: in 1956 for instance, the latter accounted for 64.1% of their prey, while mammals made up only 26.6% (Golodushko 1958, 1959, 1961a, b).

During the incubating period, the male brings food to the female and takes over incubation from her while she devours the food near-by and then makes 'exercise' flights, all of which may sometimes take over an hour (Siewert 1932, Wendland 1932, Schroot 1938, Meyburg 1970, 1974b). After 38-41 days' incubation (Wendland 1932, Sládek 1957), the chicks hatch in the first half of June, in Slovakia between 5th and 13th June. The hatching process takes 24-28 hours (Hoffmann 1938, Meyburg 1970).

For a long time it was believed that the second egg is always bad, as only one eaglet ever leaves the nest. Wendland (1932) was the first to produce evidence, based on a large number of broods, that two chicks nearly always hatch but only one survives. In none of about 50 eyries was he able to establish that two eaglets left the nest (Wendland 1951), and the literature does not mention one certain instance of this. From the few facts given on the subject (e.g. Hoffmann 1931, Likhachev 1957), it is obvious that there has been confusion with the Spotted Eagle, which apparently rears two chicks relatively frequently; in the one case where such a mistake is excluded for geographical reasons, the reliability of the observer seems to be questionable.

Between 1968 and 1971 I studied this interesting problem in detail and came to certain conclusions. If the second chick hatches

after a relatively long interval—some five or six days after the first—the older chick is already far more skilful during feeding sessions and exerts a far greater attraction on the female. She does not exercise the patience needed to hold a piece of food in front of the still quite helpless second chick before it is able to take it properly. Thus it very soon dies of hunger, though plenty of food is always available in the eyrie (plate 62b). On 18th June 1971 I watched one such dead chick being partially fed to the older nestling by the female and partially devoured by the adult bird herself. This would appear to be the first direct observation of this behaviour among eagles anywhere. If the interval between the hatching of the two chicks is shorter—about three days—and as long as the female broods almost continuously, the younger one is able to participate in feeding sessions and thus to develop normally. But after a few days the female spends less time brooding and more in long vigils on the rim of the eyrie, which gives the older chick an opportunity to attack its sibling. The weaker chick flees from this pecking to the edge of the eyrie, where it is no longer brooded and fed, and it starves or freezes to death or falls to the ground. On 15th June 1968 I found one such dead chick under the eyrie: it weighed 128 gm, whereas a newly-hatched chick weighs about 50 gm.

The death of the second chick can be prevented either by rearing it in captivity or by transferring it to the nest of a pair of Black Kites *Milvus migrans*. Before it is ready to fly, the eaglet must be removed in good time and replaced with its sibling in its own eyrie. Both methods have been successfully used several times (Meyburg 1971). Widespread application of such methods could increase the reproduction rate of the Lesser Spotted Eagle by nearly 100%.

At great expense, and partly with the aid of artificial insemination, efforts are being made—especially in the United States—to rear Peregrines *Falco peregrinus* and many other raptors in captivity and so to increase their numbers. The methods used to achieve the same aim for the Lesser Spotted Eagle and other birds of prey appear to be far simpler and also eliminate the final obstacle of accustoming the young bird to conditions in the wild. In two cases investigated from this aspect, both eaglets were observed, together with their parents, long after they had left the eyrie. (J. Švehlík, pers. comm.).

Shortly after hatching occurs, the female broods almost continuously. At one eyrie, towards the end of the older chick's first week of life, she brooded the young for 85.9% of the observation time, stood on the nest rim for 4.9% and was absent for only 3.4%. Twice at another eyrie the male, after bringing food, brooded until the female returned; she had been disturbed from the nest shortly before, when I entered the hide. Normally the male hardly has an

opportunity to brood. By the time the chick in the latter eyrie was two weeks old, brooding went on during only 50% of the observation time, but the female still remained at the nest almost continuously. From the fourth week a third female brooded only occasionally, but she continued to do so during wet weather until the chick was 43 days old, by which time he was so big that only his head disappeared under her plumage. By day the female spent periods of several hours on the rim of the eyrie until the chick was 51 days old, though increasingly she stood guard away from the nest itself but in the immediate vicinity. She spent the entire night at the eyrie until the eaglet was at least 49 days old (Meyburg 1970), and if undisturbed females probably continue to do so until their young leave the nest (Schroot 1938).

Like many other raptor species, the Lesser Spotted Eagle lines its nest with green twigs. During 320 hours I spent observing four eyries, these were brought only by the female, though at a fifth the male twice brought a twig. The female of the pair I observed particularly closely in 1968 once buried the half-grown chick under twigs. During 14 days' continuous observations from morning until night, I saw this female carry in 38 twigs, with a maximum of nine on one day and none at all on four.

The week-old chick in one of the five eyries was fed about six times a day at average intervals of 2 hours 20 minutes. Individual feeds lasted from three to 20 minutes, averaging nine minutes. At the relatively early age of about three weeks, the chick was already able to ingest food without assistance, swallowing prey—often very small—whole, which is astonishing, but the female continued to tear up larger prey for the chick until it was 51 days old. At about 58 days, the eaglet flies from the nest, though it continues to be fed by its parents for at least four weeks after that.

At the beginning of the nestling period, the male supplies both the female and the chick with food, bringing prey, on average, three to four times a day. In contrast to the larger eagles of the genus *Aquila*, the Lesser Spotted begins hunting quite early in the morning. At the five eyries I studied, the males were bringing prey regularly from 07.00 hours, and on three occasions even between 06.00 and 07.00. These prey-bearing flights reached their morning peak between 09.00 and 10.00, falling off perceptibly between 11.00 and noon. Between 12.00 and 14.00 the frequency again increased, followed by a steady decrease until 19.00. It is almost the exclusive task of the male to secure prey for the young chick; later (it is difficult to say when) the female also begins to hunt, though probably not enough to provide for herself entirely, since while feeding the chick she often helps herself to prey brought by the male. During 216 hours' observations at one nest, from the time the chick

was three weeks old until it left, 49 of the 65 prey animals were brought by the male (plate 63a), while the female appeared to have killed only twelve. The remaining four were delivered at the eyrie by the female after taking them from the male in the immediate vicinity. The total weight of prey animals brought to the eyrie each day varied between about 25 gm and 355 gm, and the eaglet's daily food requirements averaged approximately 167 gm, its total consumption from hatching to leaving the nest amounting to some 8.8 kg. Observations at the eyrie shortly after hatching indicated that adult birds each need about 150 gm per day, so that during their stay in the breeding area a pair and their surviving chick require some 56 kg of food, equivalent to about 2,250 Common Voles.

Twelve breeding attempts in Germany produced eight chicks (Wendland 1932). Of 33 broods in Slovakia only 63% were successful, at least half of the failures being attributable to human interference (Meyburg 1970, Švehlik and Meyburg in prep.); similarly, in the Bialowieza primeval forest, even after discounting losses due to humans, only about 60% of 35 broods were successful (Golodushko 1961b).

From the end of August until the end of September, depending on the locality, the eagles leave their breeding areas. Although some must migrate for part of their journey singly across the open sea—in Cyprus, for instance, this is the most numerous eagle on passage—the vast majority at some time evidently fly across the Bosphorus. In 1968 Porter and Willis (1968) counted 4,300 here, which would represent about 1,700 pairs and their surviving young; it seems unlikely, therefore, that the entire nominate form (with the possible exception of a population in the Caucasus) now numbers many more than this. Wandering birds have occurred in Finland, Sweden, Denmark, the Netherlands, Belgium, north-east France, Switzerland, Italy, Spain and Portugal. Some winter in the Middle East and north-east Africa, but the majority spend the winter in the savannahs of Africa south of the Equator, young birds apparently flying further south, on average, than older ones. In Rhodesia, for example, there is only one adult for every 17 immatures, and here the eagles arrive at the end of October, departing in mid-March (Brooke *et al.* 1972). Like all eagles, this species is long-lived; the oldest known wild bird survived for over 26 years (Kasparson 1966).

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Bernd-Ulrich Meyburg, Herbertstrasse 14, 1 Berlin 33, Germany