

Comparison of the Breeding Habits and Development of the Young of the Corncrake *Crex crex*, the Spotted Crake *Porzana porzana* and the Water Rail *Rallus aquaticus**

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There are differences in the breeding behaviour and the development of the young among corncrakes, spotted crakes and water rails, even though they are related and share certain common characteristics. The most obvious difference is in the mating system. Among spotted crakes and water rails, monogamy predominates, with biparental care for the young. In the case of the corncrake, there is successive polygamy, with only one parent rearing the chicks. This results in a difference in the migration behaviour and the length of stay in the breeding area. The variation in migration time correlates with the distance between the wintering and breeding sites. Water rail have the shortest distance to travel and stay longest in the breeding area. They, therefore, normally have time for incubating and for raising the young. The spotted crake stays only slightly longer than the corncrake, which has the longest distance to migrate. Most rails typically have a very secretive lifestyle. They can only rarely be observed in their natural surroundings and are consequently not much studied in Germany.

Birds that are difficult to observe out of doors can be investigated in an aviary under conditions that approach nature as closely as possible. This can lead to a better understanding of their behaviour. This study was carried out on birds in an aviary. In spite of much intensive observation of birds in captivity, many questions still remain about breeding behaviour, development of the chicks and calling habits.

The aim of this work was to examine and describe in a comparative manner breeding behaviour, calling repertory and, especially, development of the young birds. Because of the differences mentioned above (reproduction habits,

participation in rearing of the young and length of stay in the breeding area), variation could also be expected in the development of the young birds.

Most of the chicks were picked up by hand and measured and weighed almost daily (tarsus, middle toe, tarsus+middle toe, head, beak and eight and nine primaries). A comparison of these data using the modified logistic growth function produced characteristic parameters (absolute increase, growth constants, maximum increase and age at 50 % and 95 % of increase). These parameters were used to compare speed of growth of the chicks of different bird types. It was established that corncrakes grow the most quickly and water rails the most slowly. The female spotted crakes and water rails grow more quickly than the young males. In the case of precocial birds, corncrakes and spotted crakes show a more speedy growth.

A comparison was made of the time taken for feather development. Changes in the beak and eye colour were noted and linked with the relevant age data. The duration of feather development in corncrakes and spotted crakes hardly differed, while feather development in the water rails took quite a long time. The time the young took to develop correlated with the varying time spent by the three rail types in the breeding area.

A qualitative observation of behaviour was made with regard to courtship display, nest building, positioning of eggs, rearing of young and achievement of independence by the young. Some aspects of behaviour, such as mutual plumage grooming and courtship display, occurred in a similar way with all three types. However, feeding during courtship was seen only with corn-

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crakes, where it played a fundamental role in pair bonding. Corncrakes also had the shortest laying intervals and the shortest incubation times of the three types. The head coloration of the chicks is indicative of the stage at which birds leave the nest and is therefore a sign of the independence of the chicks. Thus, corncrakes, with their overall dark colouring, had a relatively high level of independence. Water rails were conspicuous because of their white beaks. Spotted crakes had the darkest colouring and were thus the most independent. They had a blue colouring above the forehead and a colourful beak. The length of rearing seems to be very dependent on the availability of food, since the chicks in the aviary (good selection of food) were fed for at least three weeks. The independence of the chicks seems to correlate with the beginning of wing growth. This first occurred with corncrakes at two weeks old, followed by the spotted crakes at exactly three weeks and finally the water rails, which began to show signs of wing growth at four weeks.

Using the growth curves, feather development and beak and eye colour, it was possible to make an age determination for all three types and test it successfully on an aviary bird that had not been hand reared. Weight data for corncrakes from outdoors normally matched up well with the data obtained from the aviary.

Calling characteristics, especially for corncrakes and spotted crakes, were recorded. The calling repertoire that had been familiar before was largely confirmed, whilst certain calls could be attributed more precisely to particular behaviour patterns. Some extension of knowledge of calling repertoires was achieved. Sonograms were made of most calling occurrences.

The knowledge gained from this study concerning calling, breeding habits and age estimation of the young should contribute towards better protection measures, especially for the endangered types corncrake and spotted crane.

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