Contributions to the Breeding Biology of the Ruff *(Philomachus pugnax).*

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Introduction.

In the bird sanctuary "Tipperne", for which the author is inspector, ruffs' nests are found in a number varying between 10 and 40 (TÅNING 1941 p. 203). As not one of the ruffs ringed in this sanctuary has been reported, Å. VEDEL TÅNING Ph. D. in 1942 gave the instruction that as many young as possible of these species should be ringed and that observations on the species should be as detailed as possible.

The author therefore decided to keep a list of the nests; on every date, when a nest was inspected, the number of eggs was noted in the list, together with the number of breaking eggs. Out of these lists for 1942 and -43 it is now possible to get interesting information about the breeding biology of the ruff.

Length of incubation period.

The most interesting information to be read out of the lists is about the incubation period. NAUMANN's statement that the incubation period of the ruff is 17—19 days is generally quoted in the literature, but TÅNING (1941 p. 202) supposed that this is an understatement. This supposition can now be confirmed. Out of the 29 nests investigated, 4 have been known early enough to show that the period must be 20—21 days. The dates concerning these 4 nests are given in table 1. In nest no. 1 the incubation period was 20 days for the two eggs (provided that breeding did not begin before the third egg was laid, see p. 28) and 21 days for the third. Nest no. 2 showed an incubation period for all 4 eggs of 20 or (if the fourth egg was laid on the day before, on which the nest was not inspected) 21 days. Nests nos. 3 and 4 showed an incubation period for 6 eggs of at least 20 days.

Thus it can be stated that the incubation period of the ruff is 20—21 days.

Table 1.

Number of days after the last egg was laid	Nest no. 1	2	3	4
÷4				
÷3		1 egg		
÷2	2 eggs	2 eggs		
÷1	—			
0	3 eggs	4 eggs	4 eggs	4 eggs
1				—
2			—	—
3			—	—
4		—		—
5				—
6				—
7		—		—
8				—
9				—
10				—
11				—
12				—
13	—			—
14				—
15	—			—
16				—
17	3 br.		—	3 br.+1 egg
18		4 br.		—
19	—			—
20	2 y.+1 br.	4 y.	2 y.+1 br.+1 egg	3 y.+1 egg
21	3 y.			
22			1 dead y.+1 egg	
date for hatching	$7-8/6$ 43	$28/5$ 43	$29-?30/5$ 43	$12/6$ 42

y. = young; br. = egg(s) with breaking shell.

Interval between breaking of the shell and hatching of the young.

NAUMANN's understatement regarding the incubation period may perhaps be explained by the fact that ruffs' eggs are breaking 3—4 days before the young hatch, compared with 1—2 days in most other birds. If NAUMANN had watched the eggs only to the day, when the shell was breaking, and did not see the young out, his statement would be 2—3 days too low, if he reckoned with a breaking period of 1—2 days, as known from other birds.

In the present investigation 6 nests were inspected so often that it can be decided how long the eggs were breaking; of these 4 had the eggs breaking 4 days, and 2 had them breaking 3 days before hatching.

Beginning of breeding.

For the determination of the length of the incubation period it is of interest to know, when breeding begins. Observations have shown that in 15 out of 17 nests, in which it could be decided, all young hatched on the same day. In these nests breeding therefore did not begin before the last egg was laid. In two nests, however, one young did not hatch until the day after the others. In one of these nests (no. 1, table 1) one egg was laid 2 days after the other two, and breeding obviously began before this last egg was laid. The other nest (no. 3, table 1) was not found before all eggs were laid, but 20 days later the nest contained 2 young, 1 breaking egg and 1 unbroken egg; the two young were ringed. Two days later the unbroken egg was still in the nest, and an unringed young was found about 2 metres from it; the two ringed young were not seen. Also in this nest breeding most probably began before the last egg was laid, and apparently the last young hatched has not been strong enough to follow the two others, when they left the nest. (Also among other Limicolae such as *Recurvirostra* and *Vanellus* the author has often seen that one or two young hatch one day later than the others.) It can thus be stated that the ruff begins breeding just after or in some cases the day before the last egg is laid.

Rate of egglaying.

One of the investigated nests (no. 2, table 1) was found when it contained one egg only; the remaining 3 eggs were laid in 3 days, and that may be the normal rate in these species. (See also TÅNING 1941 p. 202: first egg found $^2/_5$ (1932) and 4 egg in the same nest $^5/_5$). On the other hand, two days elapsed between the second and third egg in nest no. 1 (table 1), but the fact that only three eggs were laid seems to indicate that one egg may have been laid elsewhere, so that this bird too may have laid the eggs at the rate of one a day.

Date of hatching.

The hatching dates for all ringed broods in 1942 and 1943 are given in table 2; it gives the number of nests hatched in

each 4-days period. In the table is included 2 broods of 3 days old young, which were not found in the nests.

Table 2.
Number of nests hatched in 4-days periods in 1942 and 1943.

month:	May	June						
date.....	28.—31.	1.—4.	5.—8.	9.—12.	13.—16.	17.—20.	21.—24.	25.—28.
no. of nests	6	0	4	3	1	2	0	4

The table shows that from 20 nests the young hatched from May 28th to June 28th, but there is no maximum in the middle of the period, as one could expect; on the contrary, in half of the nests the young hatched either in the beginning or in the end of the period. June 28th is however by no means the latest date on which ruffs' young are hatching on Tipperne; one young ringed August 6th 1943 hatched about July 12th, and TÅNING (1936, p. 167) found newly hatched young on August 3rd 1928.

Number of eggs and young in the nests.

Finally, it is possible on the basis of the lists to say something about the number of eggs in the nests and the number of young hatched from them. Of the 29 nests listed, 7 were emptied (by *Larus canus*), at 1 nest the female was found dead, and 3 hatched without the young being observed. The remaining 18 nests, in which the young were ringed are dealt with in table 3. The table gives the numbers of nests in which

Table 3.

	4 eggs or young	3 eggs or young	2 eggs or young	total no. of eggs or young	total no. of nests
Highest number of eggs.....	14	3	1	67	18
Number of eggs at breaking time	13	4	1	66	18
Number of young hatched...	10	6	2	62	18

the various numbers of eggs or young were found: in 14 nests 4 eggs was the highest number observed, in 3 nests 3 eggs was the highest, and in 1 nest 2 eggs was the highest number observed; one of the 14 nests lost an egg during the breeding

so that at the time, when the egg were breaking, 13 nests contained 4 eggs, 4 contained 3 eggs, and 1 contained 2 eggs. In 3 of the nests with 4 eggs and in 1 of the nests with 3 eggs 1 egg did not hatch, so that 4 young hatched from each of 10 nests, 3 young from each of 6 nests and 2 young from each of 2 nests. Thus 62 young hatched from 18 nests, and consequently the average number of young hatched per nest on Tipperne in 1942 and 1943 lay almost in the middle between 3 and 4.

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Literature.

NAUMANN, I. A.: Naturgeschichte der Vögel Mitteleuropas.

TÅNING, Å. V.: Ringkøbing Fjords Fugle; Ringkøbing Fjords Naturhistorie i Brakvandsperioden 1915—31 (København 1936).

—: Ynglefuglenes Træk til og fra Tipperne. Dansk Ornith. Foren. Tids., **35**, 1941.

Dansk Oversigt.

Bidrag til Brushønens Ynglebiologi.

Nærværende artikel bygger paa lister, som i 1942 og 1943 blev ført over samtlige fundne brushønereder paa fuglereservatet Tipperne, hvor forfatteren er naturfredningsraadets opsynsmand. Data for 4 reder er vist i tabel 1. (Kolonnen til venstre giver antallet af dage efter at sidste æg blev lagt, forneden er givet datoer for ungernes udrugning, og iøvrigt betyder egg(s): æg, y: unge(r), br: spraaede æg og dead y: død unge). I artiklen vises, 1) at brushønens incubationstid er 20—21 dage; derved bekræftes TÅNINGs antagelse (1941 p. 202), at 17—19 dage (efter NAUMANN og andre) er for lav en Angivelse. Endvidere vises 2) at æggene spraaer 3—4 dage, før de er udruget, 3) at rugningen begynder lige efter eller i nogle tilfælde dagen før det sidste æg er lagt, 4) at brushønen i almindelighed lægger et æg om dagen, 5) at datoerne for 20 reders udrugning er temmelig jævnt fordelt over tiden fra 28. Maj til 28. Juni (tabel 2) (en unge truffet 6. August maa dog være udruget saa sent som 12. Juli), og endelig 6) at det gennemsnitlige antal unger udruget pr. rede for 18 reder ligger meget nær midt mellem 3 og 4.