

Nesting Behaviour of the Black-necked Grebe *Podiceps nigricollis* (Brehm) in Southern Africa

I. The reaction of disturbed incubating birds

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Introduction

In southern Africa the Black-necked Grebe usually occurs as a migrant. Stark and Sclater (1906) refer to this species in southern Africa as „by no means common“. Roberts' Birds of South Africa (McLachlan and Liversidge, 1957) mentions it as being „not common, a migrant, occurring during summer on large sheets of water, usually in flocks“. Mackworth-Pread and Grant (1962) only mention that the species occurs throughout but only as a summer visitor to the Cape. Breeding records are rather scanty although Layard (1867) found a breeding colony of this species at Vogelvlei near Wellington, Cape as early as 1859, while Ayres found breeding colonies in shallow lagoons in the Transvaal. In more recent times Black-necked Grebes have been recorded to breed on the Coega River (Niven, 1942), at Port Elizabeth (Liversidge and McLachlan, 1957), the surrounding of Cape Town (Brown and Morris, 1960; Broekhuysen, 1962), the Bredasdorp District (J. Martin pers. comm.), Bloemhof Nature Reserve, Transvaal (D. Skead *in litt.*), Dannhauser in the northern Natal (Lawson, 1967).

There are indications that the number of instances of breeding of this species in southern Africa is on the increase. A close watch should be kept for any new cases of breeding and these should be recorded.

The members of the Grebe Family all build a relatively shallow and floating nest and are renown for covering up their eggs when the incubating bird leaves the nest. This covering up of the eggs is an interesting behaviour feature which must have a very strong survival value and yet it is so rare among birds in general.

Apart from the grebes it is known to occur in the Kittlitz Sandplover *Charadrius pecuarius* Temminck, where it is very strongly developed, and in the White-fronted Sandplover *Charadrius marginatus* Vieillot, where some birds do it and others not (Hall, 1958; Liversidge, 1965; McLean, 1965).

In November 1961, while photographing birds on a vlei (lake) at Faure near Cape Town, G. J. B. noticed a Black-necked Grebe nest containing four eggs, which were not being covered when the incubating bird was

disturbed. Immediately the question arose „does the Black-necked Grebe cover its eggs?“ (Broekhuysen, 1962). A search through the literature did not give the answer and it was decided to investigate the matter as soon as an opportunity would present itself. This happened in the spring of 1967 when P. G. H. F. found the beginning of what later turned out a fairly large breeding colony of the Black-necked Grebe, on one of the artificial pans of the Strandfontein Sewage Disposal Works near the False Bay shore not far from Muizenberg. This matter of whether the incubating bird, when disturbed, covers up the eggs before leaving the nest or whether she fails to do so was further investigated and the results of this investigation are presented in this paper.

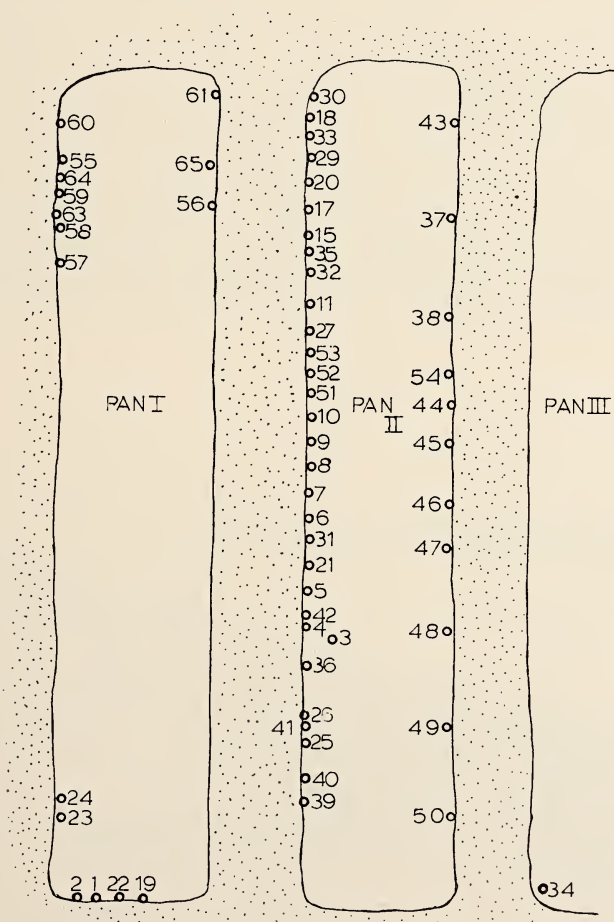


Fig. 1. A rough plan of the nests in the Black-necked Grebe colony at the Strandfontein Disposal Works.

The situation of the breeding colony and the position of the nests within the colony

The habitat around the breeding colony consisted of typical „strandveld“ i. e. sand dunes covered with shrub and low sclerophytic vegetation. Practically all nests were built along the shore line of three fairly narrow rectangular artificial pans with a distinct preference for the middle one of the three. In figure 1 the position of the nests has been roughly indicated. The breeding activity was spread over the months September and October. The nests varied from flimsy half submerged accumulations of water plants and sometimes shore plants (fig. 3) to rather substantial and built up platforms. Although on the surface of the water, most of the nests were not floating freely as they were anchored to rooted bushes growing out of the water (fig. 2). This prevented the nests of following fairly extreme and rapid fluctuations of the water-level. Fluctuations of the water-level occurred daily due to intake and discharge of water in the pans. These fluctuations became extreme during strong wind conditions or when heavy rain fell. This happened at several occasions during the breeding period and resulted in heavy casualties of eggs. The flimsiness of many of the nests caused them to break up when the water became rather choppy especially when there was a strong on-shore wind and this also resulted in the loss of many eggs. It was interesting to observe how both birds of a pair would immediately start nest-building activi-



Fig. 2. Position of some of the nests, indicated by arrows, along the shore of the middle pan. Note the rooted bushes to which the nests are anchored. The dots on the water are Black-necked Grebes. (Photograph by G. J. Broekhuysen.)



Fig. 3. Typical, rather vulnerable nest of the Black-necked Grebe.
(Photograph by G. J. Broekhuysen.)

ties under these conditions even if the eggs were in an advanced state of incubation. One is rather inclined to assume this building activity at this late stage either to be or to have developed as a displacement behaviour. Armstrong (1950) suggested that in the Black-headed Gull *Larus ridibundus* L. displacement nest building was stimulated by the seepage of water into the nest during slow floods. Moynihan (1953) argues that displacement nest-building has „practical“ advantages and that it is perhaps because of the practical advantages that displacement nest-building is the commonest of the displacement activities that result from a thwarted incubation drive. It is of course possible that in a species which builds such vulnerable nests as the Black-necked Grebe, nest-repair building activity originated as a nest-building displacement activity but that it gradually became a normal autochthonous behaviour with a very necessary or perhaps better, practical function. It would be interesting to investigate how frequent nest-repair building activity occurs in other species of birds building flimsy nests either on or along the edges of the water. The actual progress in the Black-necked Grebe breeding colony at the Strandfontein Disposal Works and the survival rate will be dealt with in a separate paper. In the present paper we will only concern ourselves with the behaviour of the incubating bird when disturbed.

The behaviour of the incubating bird when disturbed

As has been mentioned in the introduction, one of the main objects of keeping the breeding colony under observation was to establish whether

Table 1. Condition of the eggs when the nest is visited.

[illegible]



Fig. 4. Nest with eggs completely covered up by departing bird.
(Photograph by G. J. Broekhuysen.)

the covering up of eggs when the incubating bird was disturbed and left the nest, was common or rare.

Information was obtained in two ways: —

- A. Whenever the colony was visited in order to check on the different nests, it was recorded for each of the nests present whether the eggs were covered (fig. 4), partly covered (fig. 5) or not covered at all (fig. 6).
- B. Series of observations were made on nests from within a hide near the nest or from a reasonable distance using field glasses of the behaviour of the incubating bird at leaving the nest when disturbed.

It may be stressed here that in the case of the observations under A. the birds could see the disturbing object (observer) from a long distance and, therefore, had plenty of time to cover the eggs if they had any urge to do so. In the case of the observations under B. the disturbance was more sudden and, therefore, probably somewhat more frightening. As the results, therefore, could be somewhat different the two were not lumped together but are presented here separately.

A. Reaction of incubating bird to observer approaching from afar

In Table 1 the information for each nest is given together with the number of eggs present at the time. The number refers to the number

of eggs, C means eggs completely covered, P eggs partly covered and U means eggs uncovered.

Summarising the figures tabulated in Table 1 we find that of a total of 297 cases where it was recorded whether the eggs were covered or were not covered, 70 or 23.6 % were covered, 111 or 37.4 % were partly covered and 116 or 39.1 % were not covered. If partly covered and completely covered are lumped together we find that 61 % were either partly or completely covered, while in 39 % of the observed cases no attempt at covering up the eggs was obvious.

There was the possibility that the incubating bird would be more inclined to cover up full clutches than incomplete clutches. The information tabulated in Table 1 can give the answer. In Table 2 nests containing 1—2 eggs and those containing more than two eggs have been separated.

Table 2. The occurrence of uncovered, partly covered and completely covered in nests with clutches of 1—2 eggs and 3 or more eggs.

| Condition of eggs | Clutches of 1—2 eggs | Clutches of 3-more eggs |
|-----------------------|----------------------|-------------------------|
| Total of observations | 103 | 193 |
| Completely covered | 17 or 17 % | 54 or 28 % |
| Partly covered | 22 or 21 % | 89 or 46 % |
| Uncovered | 64 or 62 % | 50 or 26 % |



Fig. 5. Nest with eggs only partly covered up by departing bird.
(Photograph by G. J. Broekhuysen.)



Fig. 6. Nest with eggs not covered up at all by departing bird.
(Photograph by G. J. Broekhuysen.)

From Table 2 it is clear that Black-necked Grebes on nests containing advanced or complete clutches do have a greater urge to cover the eggs when leaving the nest than those sitting on incomplete and small clutches.

However even in the case of advanced or complete clutches the number of birds which covered their eggs completely was rather small. Those which covered their eggs partly was relatively high. If we lump partly covered and completely covered together, we find that in the case of incomplete clutches 37 % attempted to cover up and 63 % did not attempt to cover up. In the case of large clutches 75 % attempted to cover and 25 % did not attempt to cover.

B. Reaction of incubating birds disturbed from a hide fairly nearby the nest or from a fairly short distance away

While carrying out this part of the investigation we realised that there were two colour phases in the birds. The one phase had brown on the flanks and the other had either no brown or very little brown on the flanks which, therefore, were light coloured. It was first thought that the brown-flanked birds were males and the light-flanked birds were females.



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Figs. 7—10. Bird leaving the nest without covering the eggs.
(Photographs by G. J. Broekhuysen.)

When the literature was consulted it was revealed that there is no difference in plumage between the two sexes in the Black-necked Grebe. Nevertheless, in these experiments the observations for brown-flanked and light flanked birds were recorded separately. A total of 14 pairs were tested by disturbing the incubating bird a relatively short distance from the nest. This was repeated a number of times but each time between two disturbances the bird was allowed to sit on the nest for at least five minutes. When the incubating bird left the nest its reaction towards the eggs and also which of the two birds was involved was noted. The number of readings per pair varied from 1 to 17. In this experiment no distinction was made between partly covered and completely covered and these, therefore, were lumped together.

The overall results have been tabulated in Table 3.

Table 3. The reaction of incubating birds to a disturbance from close quarters.

| Type of bird | Does not cover eggs | Covers eggs |
|----------------------|---------------------|---------------|
| Brown-flanked bird | 27 times 43 % | 36 times 57 % |
| Light-flanked bird | 29 times 47 % | 33 times 53 % |
| Both phases combined | 62 times 47 % | 69 times 53 % |

This table shows that both colour phases reacted in virtually the same way. In both cases there was a slight majority in the cases of egg covering over not covering the eggs.

This is what one would expect if the two different colour phases were not sex differences.

However, there is still the possibility that the two partners of a pair react differently. This can be tested by obtaining a more or less equal number of observations for each bird of a pair and then to compare the result. It was difficult to obtain equal numbers because of the change over pattern and, therefore, only a small number of comparable observations were obtained. These have been tabulated in Table 4.

Table 4. Observations on pairs with a comparable number of observations for each partner.

| Nest | Eggs not covered | | Eggs covered up | |
|------|------------------|---------|-----------------|---------|
| | Bird A. | Bird B. | Bird A. | Bird B. |
| I | | 5 times | 5 times | |
| II | 4 times | 1 times | | 2 times |
| III | 5 times | 2 times | | 2 times |
| IV | 5 times | | 3 times | 8 times |

The figures in Table 4 are too few to enable the drawing of any definite conclusions but they indicate that the partners of a pair react differently

Conclusions

The results of the present investigation show that the habit of covering the eggs by the incubating bird when it leaves the nest is only partly developed in the Black-necked Grebe. When disturbed rather gradually by an observer approaching from a considerable distance, 24 % of the tested birds covered the eggs completely, 38 % would do so partly and 39 % would not do so at all. If disturbed more suddenly from a much closer distance 47 % would not cover up the eggs. Further it became clear that incubating birds were more inclined to cover their eggs up when they left the nest, when the clutch was complete, or nearly complete, than when the clutch was incomplete and small. There were also indications that the birds of one pair could react differently. Further it was noted and even recorded on the film, that a bird coming on to a nest in which the clutch was not covered showed displaced egg uncovering movements whereby no actual nesting material was involved at all.

It, therefore, seems that the Black-necked Grebe represents an intermediate stage as regards the behaviour of covering up eggs. The interesting question is, is the habit developing or is it being lost? As this behaviour pattern has such a strong survival value in hiding the eggs so that it is more difficult for predators to locate them, we feel rather inclined to assume that it is developing.

It would be most interesting to investigate the egg-covering behaviour in the other members of the Grebe Family along similar lines as has been done in this paper for the Black-necked Grebe. We hope to do this in the near future for the Dabchick *Podiceps ruficollis* (Pallas).

Summary

The habit of covering up of eggs by the incubating bird when disturbed and leaving the nest has been investigated for the Black-necked Grebe. It seems that as regards this type of behaviour the species takes up a transitional stage where some birds do cover their eggs, others do it partly and again others fail to do so.

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