

## ON INCUBATION.\*

AN OBSERVATIONAL AND EXPERIMENTAL PROOF OF THE  
VALUE OF THE OVITEGOUS HABIT IN BIRDS.

BY

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As the best means of ascertaining the value of the ovitegous habit to birds, I devoted some time during the breeding-season to watching the Herring-Gull (*L. argentatus*), which I had previously found normally incubated from the laying of the first egg. Various experiments were also made. All these observations and experiments are not given in the following pages, but sufficient evidence is brought forward to make, I believe, the value of the ovitegous habit undeniable.

On May 8th the first eggs of the Herring-Gull were noted, two nests containing single eggs: the breeding-place was on a small island. One of the nests was in full view of a blind which had been previously erected; soon after I had entered the blind and the boat had left, one of the birds belonging to this nest settled and stood about ten feet from it. An American Crow (*C. brachyrhynchos*) shortly after settled in a near-by tree and made a sudden swoop down towards the nest: the Gull rushed forward with upraised wings and drove him off, the Gull's mate coming up and assisting. After a while the Crow returned and flew past; the Gull ran forward as fast as it could and sat down on the nest and egg (it had retired a few feet from the nest and stood there after the first raid). The bird now incubated for a while and then returned to its former stand. Again the Crow flew near, and yet again the Gull ran forward and covered the egg. The Crow settled in front of the nest and the black one's mate also came up and settled behind. The Gull was very uneasy, calling continually; a raid on the egg was no

\* For previous articles on this subject see Vol. IV., pp. 137-45, Vol. V., pp. 322-27, Vol. VII., pp. 105-14.

doubt intended, but the sitting Gull's mate rushed at one of the Crows with upraised wings and put him to instant flight: the other Crow was also driven off. The Gull continued to incubate the egg for most of the afternoon, though the bird left the nest for a short time now and again and sat near. This nest eventually held three eggs.

On another island where a blind had been erected, some time was spent on May 14th watching the birds belonging to two nests. The first nest held two eggs. The Gull stood near it for some time after the boat left, two Crows then came along: the bird at once covered the eggs. It sat some time and then went off, returning again shortly after.

The second nest held one egg (eventually both these nests held three). One of the Gulls, after standing near for some time after the boat left, covered the egg: it left it for a minute or so, more than once, but soon returned. Some time later the other bird came to the nest and covered it for a few seconds. It then went off, and the bird which had previously been incubating mounted it and coition ensued: therefore it is evident that the male was taking a share in incubation during the laying period. After a few moments a Crow flew over once or twice: the male called uneasily and then went to the nest and incubated. Later, the female went on to the nest and remained until a disturbance among the Gulls put her and her mate off in flight.

On May 16th these nests were again kept under observation. At the first nest one of the Gulls soon commenced to incubate after quiet had been restored; after a while its mate came and uttered the "challenge" call: the sitting bird at once left and the other walked on and incubated. The nest now held three eggs. Later the bird left the nest for a short time; a Crow settled near: both Gulls at once flew up to the nest and one of them soon went on. The Crow walked nearer to the nest, when the non-incubating bird at once flew towards it and drove it off. It was frequently noted that when

a nest was threatened by Crows, the non-sitting bird always hastened to the assistance of the incubating bird.

At the second nest, after one of the Gulls had settled near it, it stood there for a time. On a Crow flying past, the Gull ran towards its nest and almost at once settled down on it. It left it again, but a Crow flying over caused it to run on again. The Gull called in an agitated manner whilst the Crow was about. After one and a half hours the other Gull took up incubation. This bird remained on for the last hour and a half that I was in the blind. The non-sitting bird in each instance stood near at hand.

When I entered the blind at 2 p.m. the nest held two eggs: when I left at 5 p.m. it contained three. At about 4.30 I noticed the sitting bird was very restless, and I have no doubt that it was the second bird that went on that laid the egg.

With regard to the part taken by the male in incubation in the case of ovitigious birds, undue emphasis should not be laid on the point, for in the case of various ovinudous Limicoline birds the male shares the duties with the female.

That the Crows frequently did succeed in purloining Gulls' eggs was a matter of common observation, the shells of sucked Gulls' eggs being found on various occasions under trees frequented by Crows. Selection was evidently close, any carelessness on the part of Gulls being promptly penalised by the loss of eggs.

To determine just how close this selection was, I moved several nests of the Herring-Gull from their original sites and placed them in natural situations some little distance away; as birds return to the site of their nest and not to the nest as such, the eggs were deprived of the protection of the adults. I found that as soon as a Crow came near the unprotected nest, it was detected and the eggs immediately sucked.

It is not unusual for the Herring-Gull to construct an extra nest near the one containing the eggs. Such

an unoccupied nest was situated near the blind: it had probably been constructed by a pair which had eggs in a nest about four yards further away. This was certainly strongly suggested by the behaviour of one of the Gulls belonging to this nest. Into this unoccupied nest I put a clutch of three Gulls' eggs. As soon as quietness had been established, one of the Gulls came from the near-by nest to these eggs and touched them with its beak without doing them any harm. A Crow then flew down towards these eggs, but was driven off by the Gull that had come up to the nest, assisted by another which had a nest in the vicinity. The Crow, undiscouraged, tried again, but was driven off by the Gull that came first to the nest, and which had evidently taken the eggs under its protection. In a short space of time the Crow made two more attempts to gain the nest, edging gradually towards it, though apparently thinking of anything but the nest, the sly thief. At the second attempt the Crow with a quick thrust evidently pierced one of the eggs before he was driven off and pursued several yards by the Gull. The Gull on returning philosophically devoured the damaged egg itself!

Another Crow having arrived (probably the mate of the first), both made repeated attempts to reach the nest, but the Gull chased them off: most of the time it stood on guard about a yard from the nest, once standing on it for a short time.

Whenever a Crow ventured near, the Gull chased it off with upraised wings. However, whilst the Gull was chasing one Crow the other reached the nest and was there some seconds, helping himself to an egg; the Gull on its return drove the Crow off and ate the remains of the egg itself. For the rest of the afternoon the Gull was successful in its endeavours to guard the remaining egg, though the Crow made repeated attempts to reach it.

This shows clearly that the Gulls cannot protect their eggs by simply guarding them. The first Crow to reach the nest was only there an instant, but it pierced an egg,

though the Gull was certainly doing all it could to guard them. It is the actual covering of the eggs by the bird sitting on them that saves them, for with birds it is undoubtedly largely a matter of "out of sight, out of mind." This is clearly shown by the success achieved by the method of protecting eggs by covering them with down or vegetation, as Ducks and other species do. How effective the covering of eggs is was accidentally shown in the case of one of the Gulls' nests moved from its original site. It was soon found and one egg devoured. In the process the contents of the first egg was smeared over the other, and pieces of the vegetation forming the nest adhered to it. This egg was left untouched, though the egg-sucker had it under its eye while devouring the first, the accidental covering through vegetation adhering to the egg having saved it. The egg was not beneath the nest material, the leaves, etc., were merely sticking to its surface.

THE COVERING OF EGGS CONSIDERED IN RELATION TO  
THE OVIFEROUS HABIT.

Ducks, Geese, the Partridge, and some other species which lay conspicuous eggs, preserve them by covering them with down or pieces of vegetation. This habit may be briefly considered in relation to the significance of birds incubating from the laying of the first egg.

The case of the Canada Goose (*B. canadensis*) and White Pelican (*P. erythrorhynchos*) may be taken as an example. These birds lay white eggs of approximately the same size. The Goose makes its nest in solitude, sometimes hidden in the bush, but also frequently on the exposed shores of islands, and protects its eggs by covering them with down. If the birds did not cover the eggs, in all probability few eggs would be left to hatch, for the Crows take toll of the nests of this species as it is, probably finding them when the Geese are off feeding after incubation has commenced, for under these circumstances the eggs are not always covered.

The Pelican, on the other hand, is a most conspicuous bird, much more so than the Canada Goose. It lays in exposed situations and in close colonies, the nests frequently touching each other. Everything tends to place its eggs in greater danger than those of the Canada Goose. It does not cover its eggs with vegetation or down in order to protect them. Instead, I have found that the birds incubate from the laying of the first egg. That this is a purely protective habit is, I submit, beyond doubt.

On the same lines as the Canada Goose and Pelican, compare the Black-crowned Night-Heron (*Nycticorax n. nycticorax*), which nests in colonies and sometimes on the ground, and the Double-crested Cormorant (*Ph. auritus*), which also nests on the ground (both of which in my experience incubate from the laying of the first egg), with Ducks, the coloration of the eggs does not differ greatly.

Or compare the Red Grouse (*Lagopus l. scoticus*), which frequently covers its eggs, with the Merlin (*Falco c. aesalon*), which incubates from the laying of the first egg.

A point worthy of mention is that the White Pelican, Double-crested Cormorant and Black-crowned Night-Heron void the *faeces* from the nest, the "whitewash" rendering its location still more conspicuous. This habit is not uncommon, though by no means general, among ovitegous birds, for they do not depend upon concealment for the safety of their eggs. Among ovinudous birds, which depend for protection upon the concealment of their eggs, I know of none which has this habit.

#### THE LACK OF DISCRIMINATION IN FEEDING YOUNG OF VARYING AGE.

In Vol. VII., pp. 105-14, I endeavoured to show that the great mortality amongst the young of certain species was directly attributable to the difference in age and size of

the young consequent on the ovitegous habit. I had then no observations bearing on the behaviour of the adults to the young in such cases. Whilst photographing the White Pelican, however, I was able to obtain some interesting data on the point. One such observation is as follows.

Some adult Pelicans were preening and washing on a point about a hundred yards away from the blind: one of these swam across to the shore near the blind and landed; the place of landing was evidently regarded by a Herring-Gull as its domain (it had young there), for it called loudly and made a rush towards the Pelican. The big bird snapped its beak and stood still. The Gull then took wing and flew over backwards and forwards, swooping at the Pelican each time it passed, the Pelican ducking. Several other Gulls joined in. Finally the Pelican, growing weary of his tormentors, made a rush, half flying and half running towards a herd of young Pelicans which were grouped near the blind. These young were evidently its objective from the first. As soon as the old bird began to approach, but an appreciable time before it reached the herd, two young birds started fighting together. They continued hard at it after the adult arrived, pecking at each other's beaks, etc., the old one standing quietly by and making no attempt to interfere. Finally the larger one (there was considerable disparity in size) beat the smaller off, and came back to their parent, which both young had obviously recognized at some little distance, and was at once fed. Almost immediately, however, the smaller followed and pecked viciously at the larger, whose head was now far down the parent's throat (this is the usual manner of feeding the young in this species) and in the circumstances incapable of retaliation. It then laid down by the feeding bird and also tried to get its beak down the parent's throat (at the same time that the larger one was feeding) with no success. When the larger had finished feeding, the smaller attacked it and then made determined efforts to get its

beak down the other's throat, in an attempt to get the food at second hand, as it had failed to get it at first. It had no success, however. It then went to the adult and secured a meal, but was not granted so long a feed, by any means, as the larger bird. Various other similar cases were observed. It was always the same, the adults showed no discrimination in tending to the requirements of the smaller young. It was therefore not surprising to find a heavy mortality amongst the young Pelicans.

In conclusion, it may be noted that I have found it to be the habit of the American Crow, Ring-billed Gull, Caspian Tern and Black Tern to incubate from the laying of the first egg.