VOL. XLVIII
No. 3

MARCH
1955

SOME OBSERVATIONS ON THE REPRODUCTIVE BEHAVIOUR OF ROOKS

By DEREK GOODWIN

THESE observations were made in the springs of 1953 and 1954. They were undertaken largely as an accessory to studies of the Jay (*Garrulus glandarius*) in the hope that the comparison would lead to better understanding of the latter species in particular. No attempt was made to obtain any statistical data as to the precise number of times any activity was performed, since my interest lay rather in comparing the behaviour of as many different individuals as possible. Most of the observations were carried out at a small rookery of some 28 nests at Windsor Castle, Berkshire. Here the nests can be observed at a relatively short distance, some at eye-level and others at a slight angle above, from a public terrace. As the birds are completely accustomed to people being constantly on this terrace it is ideal for observation, not only of Rooks but also of Woodpigeons (*Columba palumbus*), Stock Doves (*C. œnas*), Jackdaws (*Corvus monedula*) and other birds that are breeding below eye-level in other trees. The observations took place between 10 a.m. and 2 p.m. G.M.T. for the most part. Unfortunately one may not enter the castle-grounds until 10 a.m. so that early morning observations were not possible. Apparently identical behaviour was seen at brief visits to other rookeries and during a day's observation of one in Oxfordshire, so far as could be observed from the ground.

BUILDING

The birds showed complete agreement with those watched by Ogilvie (1951) as to the part played by the sexes and the astonishing prevalence of stick-stealing. This robbery was not confined to sticks: nest-lining was stolen in quantity by birds needing it, whenever a chance offered. The innate building movements were always

quite "blind", but the precautions (often vain) taken to prevent material from falling certainly gave an impression of conscious awareness on the bird's part. This was very noticeable in pairs "trying" to get the first stick lodged in the selected site. Again and again the bird would push the stick down into the fork and make the side-to-side vibrating movement. It would do this in a stereotyped manner and without any intelligent adaptations in reference to the kind of stick or fork concerned, but it seemed to realise the danger of the stick dropping, was very reluctant to let go of it, and after having done so would at once try to seize it in time if it started to slip.

An unpaired female built an apparently perfect nest by herself and another female who was paired to a yearling male appeared to do so. At least the male never gave any help—other than "moral support and encouragement"—whilst I watched them. Lorenz (1932) states that in the Jackdaw the female is capable of building a perfect nest but the male is not and if working by himself only gets as far as the foundations (*Unterlage*). I suspect that it may, in all corvids, be a matter of necessary stimulation rather than potential ability. Coombs (1952) states that the male Rook usually does rather more work on the nest at all stages than the female. The same is true of Jays and Lanceolated Jays (*G. glandarius* and *lanceolatus*). Yet a male of each species in my possesion that is known to be a "good" builder has got no further than the veriest beginnings of a nest on occasions when his mate never came into full breeding condition. It seems therefore probable that his mate's acceptance of the nest-site and interest—rather than practical help— in nesting procedure is necessary to release full nest-building behaviour in a male corvid.

THE FOOD-BEGGING, AND SUBMISSIVE DISPLAYS

The different ideas of observers as to whether particular wing-movements are best described as "flapping", "fluttering", "shivering", etc., appear to have helped obscure the fact that the Rook, like the Jay and the Lanceolated Jay (and I think all other corvids), has two *completely* different displays one of which is often, and the other usually, associated with courtship-feeding using the latter term in the wide sense. The difference is implicit in Ogilvie's (1949) descriptions (p. 67: *b* and *c*) although earlier (Ogilvie, 1947) he appears to equate them as, apparently, did Yeates (1934) and Armstrong (1947). At the 1952 Edward Grey Institute Students' Conference in Oxford Dr. Coombs described and illustrated both displays. The following descriptions and opinions are based on my own briefer observations and when Dr. Coombs publishes the results of his very long-term study of this species this will doubtless amplify and possibly modify them.

When inviting coition the female Rook adopts a somewhat horizontal posture, the wings are partly spread and drooped in an

arched, strained-looking manner, suggesting stiffness at the shoulders, and may or may not be quivered, usually slightly if at all. The tail (including the upper tail-coverts where they rest upon it) is violently quivered. Apart from its primary—but by no means most frequent—function, this posturing like the homologous display of Jays (Goodwin, 1952), Ravens (*Corvus corax*) (Lorenz, 1940) and Jackdaws (Lorenz, 1952) appears to be used in a submissive or appeasing sense. It is a common greeting of the female to her mate in the early stages of the nesting-cycle and often accompanies courtship-feeding. It may be given by the male to the female. In one instance this happened just after the female had refused coition. The male went almost immediately from the pre-coitional (masculine) into the quivering display. I saw (at different times) each member of a pair of male Rooks (one an albino) at a Zoo give this display to its mate.

When about to lay or when incubating (occasionally at other times) the female Rook, like female jays (*Garrulus* sp.) begs food in a manner identical with that of the fledged young. She flutters or flaps her wings, lifting them quite high with a "loose at the shoulders" appearance which is the very antithesis of the submissive display. As she moves her wings she stretches her head forward somewhat (but the neck is seldom fully stretched, the bird usually being in a rather hunched posture), usually towards the bird from which she is begging, opens her bill and calls with the loud, pleading, "juvenile-type" note that is such a feature of any rookery in late March and April. Male Rooks, like male Jays, may also beg in this manner, although much less often. On 12th March 1954 at Windsor the presumed male of a pair sitting near each other on a bare branch begged repeatedly. Sometimes the female responded by false-feeding, and mutual billing followed for a few moments. On the few occasions when he was seen to feed his mate the yearling male begged to her for some moments—while she was also still begging to him—after having done so. His begging was less intense than the female's and he did not flap his wings. A tame captive male (sexed after death) regularly greeted his owner with this begging during the nesting season. One adult wild male habitually begged in intervals of feeding his mate and young.

In the female this begging display is usually, if not always, an appeal for food and in any one bird it appears to vary in intensity according to her degree of hunger. It is certainly not due to sexual desire. On the contrary it appears to inhibit any overt sexual behaviour from the male. On one occasion a male and his mate were watched for several (not entirely consecutive) hours. During this time the female begged almost continuously. The male made no sexual advances towards her whatsoever, yet made four attempts to rape sitting females on nearby nests, besides being involved in many other raping attacks initiated by other males.

The significance of begging-behaviour in the male is uncertain. I would tentatively suggest that the food-begging should be considered not simply as a method of eliciting courtship-feeding, but rather as an expression of a mood in which the bird feels dependent on, and intensely desires some specific response from, its companion; also that the mood evoking the submissive display may be fundamentally different. Expressed in human terms and grossly over-simplified one might imagine the begging bird as saying, in effect, "Please do this for me" and the bird in the quivering submissive display as saying, "Please don't hurt me, I want to stay with you, and fear to fight you".

SEXUAL ATTACKS AND COPULATION

The constantly recurring episodes in which a male Rook drops onto an incubating female, attempts to rape her and is at once attacked by neighbouring males are well-known and have often been described. In my opinion they have almost as often been misinterpreted. It would almost seem as though wishful thinking on the observers' side has played some part and that when the old fable about the Rook's meting out of summary justice in the matter of stick-stealing (Goldsmith, 1774) was completely exploded, the myth of morality (according to *our* ideas not the Rook's!) was transferred to its sexual life. It has been said that this mobbing of the male attempting copulation occurs only in "stolen matings", although the more cautious have suggested that this was due to a social defence reaction to the defensive hostility which the victim invariably shows to her would-be ravisher. My own opinion is that the Rook shows an homologous innate attacking reaction to the sight of others of its kind copulating, as do pigeons (Heinroth, 1949) and many other birds. The attack of another male Rook on the mating pair follows immediately he sees what they are doing. In the only five instances in which I have seen mutually willing copulation between paired birds at the rookery the attack of the neighbours was as speedy and devastating as in the "stolen matings". It is likely that at different stages of the reproductive cycle the male Rooks's reactions in this respect may differ, but, all other things being equal, I am of the opinion that when "lawful matings" are not interfered with the reason is simply *that they have not been noticed*. The attacking birds do not only attack the "erring" male, they often peck fiercely at the female as well. *Any* of the males who finds himself on top of the female attempts to copulate with her. The main work of freeing herself is done by the female. It is, however, made easier when several males become involved—as usually happens—since no one male can then give her his undivided attention. He may try, in spite of punishment, to continue but is invariably dislodged. Once the female manages to get up and perch the males normally give way before her. They then react to her as to the "territory owner"

whom they fear to attack on its own ground. It is a remarkable proof of the strength of this impulse to attack mating birds that the Rook, like the domestic pigeon (*Columba livia*) will unhesitatingly invade other birds' territory and attack them "on their own ground" if it sees them copulating.

With a single exception I never saw a male Rook attempt to copulate with his *own* mate without any preliminary display and ceremonial, though Yeates (1934) regularly observed it. The exception was a male who arrived home at the moment that his incubating mate was the victim of an attack involving three other males. He at once joined the battle, and managed, with his mate's help, to dislodge them. Finding himself then on top of the female he at once "automatically" responded by attempting to copulate. She fought him fiercely, and it was not until, having dislodged him, she did not attempt to drive him from the nest-edge nor he to leave it, that I realised he was in fact her mate. On no other occasion did I see any male copulate with his mate when the latter was sitting. Often a male, after feeding his incubating mate, would become amorous and begin the male pre-copulatory display, but in each case the female circumvented him by stepping out of the nest before matters reached a critical point.

YEARLINGS AT THE ROOKERY

As the young Rook does not normally become bare-faced until its second summer, yearling birds are easily recognisable. These few that I have observed at rookeries have also appeared noticeably shorter of wing and tail as compared with the adults.

On 21st March 1953 two yearlings were present at the Windsor rookery for about two hours. They perched close to each other, displayed mutually, defended their immediate area from others and showed incomplete building and courtship-feeding movements. On 11th March 1954 a single yearling was present at this rookery. It approached various nesting pairs but was driven off, usually by the female. It gave the impression of being bewildered but intrigued by all the reproductive activity going on around it. It was often an onlooker at nest-robbing and once stole a stick itself and "toyed" with it for some minutes before dropping it. On 12th March it was still present. Between 10 and 11 a.m. G.M.T. it behaved much as it had the previous day. Thereafter it appeared to have attached itself to one particular adult, following it and perching near it. Whenever a fight broke out near-by—as happened several times—it at once went into a very intense version of the submissive tail-quivering display. It was the only bird seen to give this display that morning.

On my next visit on 7th April, a yearling, probably but not certainly the same bird, was paired to an adult. The latter appeared to be a female and the yearling a male. The adult alternately worked on the nest—which was in the finishing stages—

and begged her mate in vain for food. During the four hours that I watched, the yearling twice flew away, presumably to feed, returning after about twenty minutes. He made no attempt to feed the frantically begging female on his return. He gave no help with the nest but drove off any other Rooks that approached it. Two other yearlings appeared about 11 a.m., G.M.T. They alighted near a nest, were driven off by the female on it, perched a little way away, indulged in some display and false-feeding, but left after about half an hour. The same (?) two were present on 19th April and were driven fiercely from two nests which they tried to investigate.

On 19th April the yearling male's mate was sitting. The yearling did not return till an hour after my observations had started. He gave his begging mate a very little food and left shortly after. He did not return in the next two hours. On 30th April he was feeding his mate at approximately normal frequency during the short period (about two hours) that I watched.

FEEDING OF THE YOUNG

Yeates (1934) found that, at the nests he watched, only the male Rook fed the young in the early stages, the female herself eating all the food the male gave her, and not feeding her young until she had commenced to leave the nest to seek food in the fields. The behaviour of the Windsor Rooks was different. Usually the male came to the nest and either gave some food to the female immediately or did so after first giving some to the young. In almost every case the female immediately fed the young with the food given her. One female, who appeared extremely eager for food, swallowed all (rather little) that was given on two occasions, although giving a share to the young at subsequent feedings. At one nest the female never fed the young. She did not appear very eager for food, but stepped aside when the male arrived, waited quietly till he had fed the young and then took her share. Once a female was given all the food. She at once commenced to feed the young as the male flew off. Another female twice retained all the food given her until the male had gone but then fed the young again herself. On 30th April most young were well-grown and partly feathered, but the females—with one exception—were still on or beside the nests. The males appeared more reluctant to give food to the females than before (17th and 19th April) and at two of the nests were not seen to do so during the two hours I watched. At one of these the female took a large bolus of worms from the throat of one of her young and immediately fed another with it. During feeding both adults eagerly removed any visible food from the young bird's mouths in the same manner as does the Jay (Goodwin, 1951). Obviously the female must consume sufficient for her own needs. Probably even when she feeds the young she often finally retains and swallows a portion of the food herself.

AN UNPAIRED BIRD AND A CRIPPLE

At the Windsor rookery in 1953 one of the sitting females had lost her right leg just below the ankle, only about a quarter of an inch of tarsus remaining. This unfortunate bird was not only the object of at least twice as many raping attacks as any of the seven others incubating in the immediate vicinity, but was not respected on her own territory. Whereas once any other female managed to get up on the nest-edge she was given way to, this lame bird was viciously attacked. She was knocked over again and again as she tried to balance herself and fight at the same time. Only when her mate was present was their territory respected. The tendency of many animals to attack injured or sick members of their own species is well-known. In his paper on the Carrion Crow (*C. corone*) Kramer (1941) describes Rooks that had been man-handled and then ringed and released being attacked by others as they sat or flew weakly about. Goethe (1940) gives many examples of such persecution in different species. One has the impression in many such cases that it is not simply a matter of an already aggressive creature being encouraged (or to speak ethologically having its escape-drive lowered) by signs of weakness in its adversary. An animal in an apparently "neutral" state often seems *to become enraged* at the sight of the abnormal movements of an injured fellow. It appears to be motivated by some feeling homologous with the "indignation" that humans often show towards one of their number who behaves in an abnormal or unconvential manner.

It is noteworthy that this Rook's mate obviously felt no animosity towards her because of her injury. Similarly a one-legged Black-headed Gull (*Larus ridibundus*) was persecuted by other members of the colony but was paired to a normal specimen (Kirkman, 1937). In man one finds many similar situations where individuals who are condemned for unconventional behaviour by most of their fellows have not thereby alienated those bound to them by strong ties of affection.

Somewhat to my surprise this female was still alive in 1954. She then had a nest at the opposite end of the rookery, on the extreme periphery of the colony. Owing to this nest being in a bad position for observation I did not make many notes on her behaviour. She was certainly less persecuted than in 1953, probably as a result of her nest not being in the immediate vicinity of many others.

In 1953 a single female was noticed in early April to spend much time sitting disconsolately on a half-built nest. No mate was ever with her and I imagine that he must have come to grief shortly before. This female had an injured right wing, which she always drooped when perched although she could fly quite well. By mid-April (when my observations in that year ceased) she had done no further work on the nest although often making half-hearted

building movements. On 11th March 1954 this bird was sitting in the same place, although the nest had evidently been blown down. The next day she had fixed the first stick into the fork. On 20th March her nest appeared complete from the outside. I watched her from 10 a.m. to 12 p.m. G.M.T. Most of this time she perched glumly by her nest. Occasionally she would beg towards other Rooks and sometimes did so *"in vacuo"*. Once she stole some nest-lining material from an unguarded nest and added it to her own.

On 17th April this bird remained on the nest from 10 a.m. till 1.30 p.m. G.M.T. (at which time I left) except for a break about 11.40 a.m. when she came off for a few minutes, preened, stretched and took a short circling flight. She did not leave to seek food. She appeared, in the last hour especially, to be suffering much from hunger. She had frequent bouts of fidgetting and preening (?displacement activity) and food-begging. Sometimes this food-begging was directed at other Rooks—who ignored her—but just as often it did not seem directed at any particular object. On the 19th her behaviour was the same. On 30th April, when most of the other nests held well-grown young, she was still sitting. She was then screened too much by newly-opened leaves for me to see her movements in detail, but between 10.30 a.m. and 12.30 p.m. she remained at the nest. Presumably her eggs were infertile, since, had they hatched and the young died (as they would inevitably have done from cold or hunger), she would surely have deserted.

It is of interest that in this species where the male usually plays so large a part in the reproductive activities an unpaired female should be sufficiently stimulated by internal physiological factors, and perhaps also the possession of territory and the breeding of the other Rooks about her, to build, lay and incubate. Also that she had remained in the rookery, nesting again in the identical fork, and not wandered off to try and find a mate else-where. The nesting of my first hen Magpie (*Pica pica*), which I have recorded elsewhere (Goodwin, 1951b) may have been a parallel case. The many records of unpaired female doves, pigeons and parrots laying eggs are highly suspect. Reading "between the lines" of such accounts it is usually at once evident that the bird concerned "considered itself" paired, either to its human owner, to another female (näively supposed by the experimenter to be supplying only non-sexual stimuli) or to some other creature. This Rook, however, showed no signs of considering herself paired to any particular male.

REFERENCES

ARMSTRONG, E. A. (1947): *Bird Display and Behaviour*. London.

COOMBS, C. J. F. (1952): Addendum to C. J. Skead's paper "A study of the Black Crow *Corvus capensis*." *Ibis*, 94: 450-451.

GOETHE, F. (1940): "Uber das "Anstoss-Nehmen" bei Vögeln." *Journ. f. Tierps.*, 3: 371-374.

GOLDSMITH, O. (1774): *An History of the Earth and Animated Nature.* Vol. II, p. 96.

GOODWIN, D. (1951a): "Some aspects of the behaviour of the Jay" Pt. 1. *Ibis*, 93: 414-442.

——— (1951b): "My Magpies, past and present" *Avic. Mag.*, lvii: 10-15.

——— (1952): "A comparative study of the voice and some aspects of behaviour in two old-world jays." *Behaviour* IV, 4: 293-316.

HEINROTH, O. and K. (1948): "Verhaltensweisen der Felsentaube (Haustaube), *Columba livia livia*, L." *Zeitschrift f. Tierpsychologie*, 6(2): 153-201.

KIRKMAN, F. B. (1937): *Bird Behaviour.* London and Edinburgh.

KRAMER, G. (1941): "Beobachtungen uber das Verhalten der Aaskrähe (*Corvus corone*) zu Freund und Feind." *Journ. f. Orn.*, Festschrift Oskar Heinroth: 105-131.

LORENZ, K. (1932): "Betrachtungen uber das Erkennen der arteigenen Triebhandlungen der Vögel" *Journ. f. Orn.*, 80: 50-98.

——— (1940): "Die Paarbildung beim Kolkraben." *Zeitschrift f. Tierpsychologie*, 3: pt. 3: 278-292.

——— (1952): *King Solomon's Ring.* London.

OGILVIE, C. M. (1947): "Observations in a rookery during the incubation period." *Brit. Birds*, xl: 135-139.

——— (1949): "Observations in a rookery in winter". *Brit. Birds*, xlii: 64-68.

——— (1951) "The building of a rookery." *Brit. Birds*, xliv: 1-5.

YEATES, G. K. (1934): *The life of the Rook.* London.