

# Oystercatchers and mussels

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(Plates 9-12)

IN THE SUMMER OF 1961, on the Drigg Peninsula near Ravensglass, Cumberland, a pair of Oystercatchers *Haematopus ostralegus* made their nest on a relatively bare sandy area about eight yards square and surrounded by a dense growth of nettles *Urtica sp.* with a scattering of burdock *Arctium minus*. A general impression of the site can be gained from plates 10b, 11 and 12. The first egg hatched on 17th June, but, although we had an observation hide at the spot, it was not until the end of that month that this brood attracted our attention when we noticed that the area had become littered with the empty shells of edible mussels *Mytilus edulis* (plate 10b). Upon inspection we found that the young Oystercatchers had not wandered off as they usually do, but were still living on and round the bare patch of sand. Presumably the dense and by now tall vegetation had made it impossible for them to leave, and the parent birds had obviously been carrying food to them.

From then on we observed the brood from the hide whenever our time allowed it. Naturally, we were particularly interested to see at close quarters how the mussels were dealt with, because published descriptions of the techniques used are conflicting. The observations turned out to be even more interesting than we had expected.

## TECHNIQUES OF EXTRACTING MUSSELS FROM THE SHELL

Every day the parent Oystercatchers spent high tide with their young and then flew out to the mouth of the estuary of the rivers Mite, Irt and Esk, about half a mile from their territory, soon after the ebb started. They would then begin bringing in marine worms of the *Nereis* type and an occasional crab (mostly *Carcinus maenas*). The worms were presented whole to the young in the usual way, that is in the bill tip; the crabs were first demolished before being fed to the young in bits. As the tide went further down, the tempo of feeding increased until each parent was appearing every five minutes or so; also the proportion of mussels in the food went up.

Some of the mussels had already been taken out of the shell and these were fed whole to the young without any further preparation, but others were still in the shell. As we suspected from the fact that the head and part of the neck of an adult were always wet when it returned with an unprepared mussel, and as we confirmed later by direct observations on the shore, the mussels were taken in pools

where the Oystercatchers walked in three or four inches of water. The mussels always slightly gaped when they were brought in, which showed that the Oystercatchers had damaged them when they caught them, but we were not able to see exactly how they did this.

Upon arrival on the territory with an unprepared mussel, the adult had to get it out of its shell, for up to 8th July (when we left the district) the young were not able to do this for themselves. As soon as it alighted, the adult would drop the mussel and begin to cut the mantle away from the shell by chiselling movements with its bill closed or nearly closed (plate 10a). The Oystercatchers had no means of pinning the mussels to the sand and so the chiselling made them skid about. They dealt with this by wonderfully adroit adjusting movements of their heads, and it was fascinating to see one walk about, pushing a mussel and, meanwhile, with most curious contortions of its neck, keep its bill oriented in the required way (plate 11a). In something between five and ten seconds it had usually worked its way round both sides of the mussel. On most occasions another movement was seen somewhere near the end of the chiselling sequence: the bird would turn at right angles to the mussel, insert its bill again and then open the shell by force (plate 10b), prizing the valves apart in much the same way as a Starling *Sturnus vulgaris* or a Rook *Corvus frugilegus* prizes open matted vegetation. Having thus forced the shell open, and sometimes after some more chiselling, the Oystercatcher would take hold of the mussel itself and, with a few short jerks, shake the shell off (plate 11b). It would then present the food to the chicks, who, throughout the preparation, had been crowding round their parent (plates 9 and 10) and who lost no time in grabbing the mussel when it was presented.

Thus the technique of dealing with these mussels appeared to differ from the methods observed by Dewar (1908, 1913) and Drinnan (1958). Dewar described how the Oystercatchers which he had watched usually stabbed a submerged mussel *in situ* through the dorsal slit between the valves, and then forced the shell open by a sideways pivoting movement of the bill. Another, less common, method involved a sideways lowering of the head and pushing against the inside of one of the valves. It is not clear from his description, however, whether he had actually seen that the turning of the bill (as in the first method) really forced the shell apart. His account seems to allow for another interpretation, which appears to be more likely from our observations: the stab might cut the adductor muscle; this would be followed by chiselling, and when the valves had come apart sufficiently to allow the bill to be turned at right angles they would be opened more widely by a prizing motion.

Drinnan's description, on the other hand, indicates a method which

is really different. He found that shells of both cockles *Cardium edule* and mussels were cracked by Oystercatchers. None of the (large) mussel shells which our birds carried in was damaged in this way.

Observations made by M.N-G. in 1963 seem to provide at least part of the explanation. He studied a large number of mussel shells left by Oystercatchers on the beach in our area and found (1) that small mussels (20-30 mm. long) were often damaged, whereas larger specimens (30-60 mm. long) were not; and (2) that small mussels were obtained both above and below the low tide level, while large mussels were taken almost exclusively below it. The explanation seems to be that small mussels can be cracked or stabbed open by a direct blow on the shell, whereas large mussels can be dealt with only when the bird is able to cut the adductor through the slit, which, in turn, is open only when the mussel is submerged and undisturbed. This would explain the stealthy, stalking behaviour of Oystercatchers feeding in pools: they have to take open mussels by surprise. One large mussel was abandoned before it was eaten; it had the adductor cut clean through and looked exactly like the mussels brought in by the parents of our 1961 pair before they had started their chiselling. However, Drinnan not only reported that large shells were also cracked by his birds, but that most of the mussels had been torn loose and hammered open afterwards. We cannot say at the moment why the Oystercatchers observed by Dewar, by Drinnan and by us all applied different methods, but a possible explanation is the following. The mussels in the Firth of Forth (Dewar) were all submerged and those in the Conway (Drinnan) were all exposed, whereas the Ravenglass ones were submerged in some sites and exposed in others. Dewar's birds could therefore rely on stabbing them under water when many would be open and Drinnan's had to open them when they were closed, whereas the Ravenglass pair were dealing with them according to varying circumstances. Why Drinnan's birds were able to damage large shells, which the Ravenglass ones failed to do, we must leave undecided.

It might seem surprising that the cockle shells which Drinnan (1956, 1957) found were usually damaged too, for these are much thicker than mussel shells. However, we found that the shell of a cockle is more brittle than the shell of a large mussel, and can be far more easily crushed by hand.

Thus the Oystercatcher seems to have more than one method of dealing with bivalves. In addition, our observations showed that adult Oystercatchers apply a different technique again in dealing with a crab. Crabs can be either dug up or picked up from the beach. The Oystercatchers kill them by throwing them on their backs and aiming a stab at the supraoesophageal ganglia, after which they demolish them in an expert way.

Finally, the ability of Oystercatchers to find buried worms, crabs and bivalves is of interest. Direct observations and observations of tracks of feeding birds showed that the soil is continuously probed with shallow, tentative stabs with the slightly opened bill. While most of the probes are not followed up, some are: the bird suddenly bores deep into the soil and often produces a prey.

After one to two hours of regular provisioning by both parents the young would cease to beg, and the parents' activity would fall off. One or both would then spend some hours resting, one usually with the young and the other some distance away outside the nettle area. A second (though decidedly lower) peak of feeding activity would occur towards the end of the low tide period; it was usually preceded by renewed begging on the part of the young. When the tide started to come in, feeding would stop and high tide was spent in the same way as the mid-period of low tide.

#### BEHAVIOUR OF THE YOUNG

When the parents were away the young would either rest (often in the nettles or under cover of the scattered burdocks) or walk round the bare area. At the end of June, when about ten days old, they were already showing interest in the empty mussel shells and pecking at them; they also pecked at many other objects, edible and non-edible alike. They were by then well conditioned to the sight of the approaching parents and to their calls. While young chicks peck occasionally at the adult's bill tip, the begging of these older chicks consisted of running back and forth in front of the parent, uttering a soft trill with open bill and pressing against the parent's breast. We have many indications that both types of begging stimulate the parents to feed. The most striking demonstration of this concerned the pecking at the bill tip and was seen in 1959 by N.T. in the case of a pair which had been given foster eggs of the Black-headed Gull *Larus ridibundus*. They hatched these and brooded the chicks. The chicks soon reacted to the foster parent's red bill by pecking at its tip. This they did much more frequently and violently than do Oystercatcher chicks. In spite of the fact that the adult Oystercatcher jerkily withdrew its head every time its bill was hit by a gull chick, it responded after a while by boring frantically in the bare, dry sand in front of it (this nest was situated on the shore just above the high tide mark) and finally presenting a small pebble to the chicks!

On 4th July, when the young Oystercatchers were approximately 17 days old, we observed for the first time that one of them was performing fast, rhythmic pecking movements very similar to the chiselling of the adults. However, these were directed not at a mussel shell but at the leaves of a burdock plant. Soon all three young were doing this

regularly with a variety of objects, including the bare toes of one of us when they were protruding under the front of the hide.

On 6th July Dr. Graham Phillips observed the next stage: a chick which was chiselling in an empty mussel shell suddenly made the prizing movement, but, instead of orienting itself at right angles to the mussel, it did it lengthwise. On 7th July we saw the same thing happen twice. This gave the impression that the chiselling and prizing movements themselves do not need to be learned (we think it unlikely that the young imitated the parents over this), but that the correct orientation to the mussel has to be acquired by trial and error. Unfortunately we had to leave the area on 8th July.

The contrast between the relative simplicity of the basic repertoire of feeding movements performed by the half-grown young and the amazing diversity and adaptation shown by the adults indicates that the Oystercatcher would make an excellent subject for a study of the ontogeny of feeding behaviour, for it looks as if there is an innate pattern which has to develop through actual experience with a variety of food animals, each of which require special methods.

#### INTERACTION WITH BLACK-HEADED GULLS

Our Oystercatchers were nesting in one of the Black-headed Gull colonies, and at the beginning of July many of the gulls had fledged young which spent part of the day on their territories and part on the beach, flying in and out as they pleased. These young were still being fed by their parents, but were rarely guarded by them. Both adult and young Black-headed Gulls, when on their territories, used to rob the Oystercatchers and, indeed, would begin reacting to the arrivals of the latter even before they had landed with their prey. It was remarkable to see how much bolder the young gulls were than the adults. The young would charge the adult Oystercatchers without any sign of hesitation (plate 12) and often succeeded in grabbing the mussel before it could be fed to the Oystercatcher chicks. They always waited, however, until the mussel had been prepared (a young gull can be seen looking on in plate 11). The adult Oystercatchers were not aggressive towards the young gulls, but tried to outrun them instead. They used to charge the adult gulls, on the other hand, and these showed a healthy respect for one whenever it made one of its sudden dashes with its long bill pointing straight at the intruder. It seems likely that the adult gulls had learnt to fear the Oystercatchers whereas the young gulls had not.

Further, the adult gulls were not afraid of the young Oystercatchers and would dash at them as soon as they had been given a mussel. The young Oystercatchers used to run frantically hither and thither, meanwhile trying to swallow their food. We often saw young Oyster-

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catchers being chased by gulls and these in their turn being pursued by one of the Oystercatcher parents.

It was interesting that the adult Oystercatchers rarely chased the young gulls: they must have been intimidated by their uninhibited attacks. The fact that the adult Oystercatchers showed more aggression to the adult gulls than they usually do at other times of the year, when they are also occasionally followed by parasitic gulls, might well be due to the fact that in the breeding season Oystercatchers attack Black-headed Gulls whenever the latter come too near to their nests; they treat them then as predators, although not with the same violence as, for example, Carrion Crows *Corvus corone*.

Both adult and young Black-headed Gulls used to clean the discarded mussel shells. It was interesting to compare their clumsy attempts at this with the expert chiselling of the adult Oystercatchers.

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### SUMMARY

In 1961 a pair of Oystercatchers *Haematopus ostralegus* near Ravenglass, Cumberland, nested in a small sandy area completely surrounded by exceptionally dense vegetation, which apparently prevented the young from wandering off. The adults flew food in to the young during at least three weeks after hatching and we made observations on this from a hide. A large part of the food consisted of edible mussels, which were often taken out of the shell on the territory. The Oystercatchers obtained the large mussels in tidal pools, probably by stabbing them through the adductor muscle and then pulling them loose. On the territory they further prepared them by very efficient chiselling movements, by prizing the valves open and, finally, by shaking the shell off the animal.

We believe that the assumption made by Dewar (1908, 1913) that the valves are forced apart by torsion of the bill along its longitudinal axis may be wrong and that his observations may refer to the prizing movement. However, the birds studied by Drinnan (1958) seem to have used a different method of dealing with mussels.

When about three weeks old, the young Oystercatchers began to perform the chiselling movements, but they aimed them at a variety of objects and did not orient them well. The prizing movements were also seen a few times: these were aimed at mussel shells, but were not oriented at right angles to the shells' axes.

Oystercatchers deal in quite different but equally efficient ways with worms and crabs. The development of these various feeding patterns from the simple movements shown by the young would seem to be an excellent subject for a study of the ontogeny of a complicated behaviour.

## BRITISH BIRDS

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PLATE 9. Young Oystercatchers *Haematopus ostralegus* begging in front of their parent, Cumberland, July, 1961; they would run back and forth, giving a soft trill, and push against the adult's breast (page 68). Confined to the nest area by dense nettles, they were being fed mainly on mussels (pages 64-70) (photo: N. Tinbergen)



PLATE 10. Above, Oystercatcher *Haematopus ostralegus* chiselling at the mantle of a mussel with closed bill; the shell skids about in the sand and the young bird behind waits impatiently for the food. Below, the adult has inserted its bill to prize the valves apart (page 66); note the litter of shells (*photos: N. Tinbergen*)





PLATE II. Above, another shot of the bird chiselling, showing how it contorts its neck to keep its bill at the correct angle as the shell skids about (page 66;) one of the chicks and a juvenile Black-headed Gull look on. Below, the same scene later: it has grasped the mollusc and shaken off the shell (*photos: N. Tinbergen*)





PLATE 12. Oystercatcher *Haematopus ostralegus*, with a mussel in its bill, being attacked by a juvenile Black-headed Gull *Larus ridibundus* while an adult gull calls noisily without daring to approach. The young gulls would often rob these Oystercatchers, always waiting until they had prepared their mussels (cf. plate 11), but the adults seemed to be afraid of their long bills (page 69) (photo: N. Tinbergen)