The impaling of prey by shrikes

Geoffrey Beven and M. D. England

There still appears to be some uncertainty concerning the function of 'larders' of shrikes (Laniidae). These collections of impaled prey can conveniently be considered under two largely separate headings: (1) the use of the spike; and (2) the use of the larder.

THE USE OF THE SPIKE

It is well established that, since the feet of shrikes are not always sufficiently powerful to hold down birds, small mammals and frogs while these are being eaten, such prey may be firmly impaled on thorns, dry stalks, barbed wire and other spiky projections—once repeatedly on the prongs of a garden fork lying on its back (D. I. Sales *in litt.*)—or wedged in the clefts of branches; pieces can then be torn off with ease (innumerable references from at least as far back as Morris 1851-57 through to the recent detailed study of Lorenz and Saint Paul 1968). For example, Montagna (1939) observed how a Northern (Great Grey) Shrike *Lanius excubitor borealis* impaled an 'English' Sparrow *Passer domesticus* on a jagged stump and then pulled its victim with forceful tugs as if to make sure that it was well anchored before beginning to tear off large pieces with its hooked bill by jerking backwards, each jerk being accompanied by a slight flip of the wings. This behaviour of shrikes is one of the few recorded examples of birds using feeding aids; the others mostly relate to the active mandibulation of tools in the form of sticks (Galápagos Woodpecker-finch *Cactospiza pallida* and Mangrove Finch *C. heliobates*) or stones (Egyptian Vulture *Neophron percnopterus*), or the dropping of stones held in the claws (Black-breasted Buzzard *Hamirostra melanosternon*) (see Millikan and Bowman 1967).

The habit of spiking food has been extended so that such small prey as insects, millipedes and portions of earthworms are frequently impaled, even when they could be held in the foot while being eaten, as indeed they often are. Large prey is usually killed before being impaled, but small animals, especially insects, are frequently left alive. Faecal sacs and pellets from the young, shells of hatched eggs and pieces of wool may also be spiked in this way (Owen 1948).

Impaling of ripe dates in north Africa

Some circumstantial but remarkable observations which E. D. H. Johnson (*in litt.*) made in 1968-69 in Algeria show that even fruits are occasionally impaled. In the oases between Reganne and Adrar, and also below Timmimoun, he found the pale north Saharan race of the Great Grey Shrike *L. excubitor elegans* common and breeding in early

February. Wherever these shrikes were present, the spikes at the bases of the fronds in the lower parts of the crowns of some palms *Phoenix dactylifera* had ripe dates impaled upon them. 'These varied from one or two to perhaps twelve in number in a single tree, and their position at the bottom of the crown of the palm tree corresponded to the positions of the two nests found and to the common perching positions of the adult shrikes. Once a shrike was seen carrying a date, but on no occasion was a bird actually seen in the act of impaling. Some of the dates were partially eaten at one end. At first it was put down to chance having impaled the dates when falling from the upper parts of the tree, but, since in almost every case the spikes on which they were impaled were very nearly horizontal, this was ruled out. The dates themselves were well spiked rather like a cocktail sausage, the point of the spine often projecting well beyond the fruit.'

Development of impaling techniques

To spear prey, a shrike carries it in its beak to a perch, seizes it by the head and takes aim at the top of a thorn or other suitable spike. With a downward movement the thorn is driven through the head or thorax of an insect or the throat of a bird or mouse. Lorenz and Saint Paul (1968) made an important study of the impaling habit among captive shrikes. They concluded that spiking was to a certain extent innate as they found that young and old shrikes alike would sometimes spear such inedible objects as leaves, flowers and India rubber. They doubted, however, whether the whole act was inborn and considered that perhaps only the co-ordinating movement of the final action was inherited, while the most suitable site for impaling possibly had to be learnt by experience. They quoted experimental evidence in favour of this and recorded the development of the habit among young shrikes.

These young shrikes first nibbled and investigated everything, lifting up stones or leaves and dropping them. After a few days they held objects for longer periods and soon made short and feeble dabbing movements with them against other things. This dabbing might be noted at any age between the second and sixteenth day after fledging in the case of Red-backed Shrikes *L. collurio*. Those individuals that made the first dabs were later on the most eager to impale prey, while the last to begin never came to do this very much. As the performance improved, the shrikes developed a tendency to dab at favourite spots, especially the free ends of perches, which they also investigated by nibbling. Soon the sight of a thorn would stimulate a shrike to fly down to pick up an insect, a leaf or even a small piece of paper. Working first with its beak, and then with its beak and one foot, it would bring the prey to the spike and dab about it. The downward pressure of the first spearing was usually too weak to bore through the prey and that of later spearings was sometimes too strong, with the result that an

insect would be torn to pieces; the accuracy of aim was also variable.

In the light of these aviary studies, a field observation by G.B. in South Africa is of some interest, as it seems to confirm that the impaling site has to be learnt by experience. In March 1943 a young Fiscal Shrike *L. collaris*, with an insect larva in its bill, flew up from the ground on to a thornless bush, although there were many thorny ones near-by. The shrike tried to impale the grub on several twigs, but they were all too short to hold it. Then it simply held the food down on to a branch with one foot, but this method was also clearly unsatisfactory. Finally, it was able to tear off small pieces by pulling the larva over a short and rather blunt twig, but this required much effort and persistence because the grub kept slipping off the twig. In arctic Alaska Cade (1967) observed that the Northern (Great Grey) Shrike worked its prey on to potentially suitable spikes after seemingly 'random' trials of various possible impaling devices.

Further observations in captivity

A captive shrike sometimes wedges a dead bird in between food cup and cage wire before tearing pieces off it. In the absence of any thorns or spikes in their aviary, two male Woodchat Shrikes *L. senator* kept in captivity by M.D.E. habitually wedged items of food in crevices or holes before eating them. This was often the cause of bickering, because one shrike would find a tasty meal, wedge it somewhere and leave it, whereupon the other, which had been watching, would immediately retrieve it. The two would then fight over the food and many a locust or mealworm was torn in halves in this way. Lorenz and Saint Paul (1968) found that, when a captive young Great Grey Shrike had difficulty in impaling a cricket on a nail, it stuck the insect through the netting of the cage; they thought that it was trying to find a hole in which to hide the prey. Other individuals stuffed food into an angle of the cage before spiking it.

The importance of the impaling habit to some shrikes is well demonstrated by the behaviour of a male Bay-backed Shrike *L. vittatus*, one of a pair which M.D.E. had kept for some years. This bird fell sick and was brought from its aviary into a cage indoors, where it refused all food. It was decided, therefore, to try the effect of providing a piece of twig with a thorn. Immediately the shrike seized some food, impaled it and then ate it. Thereafter it even impaled small pieces of cheese before swallowing them whole, spiking them just as carefully as, for example, a locust which needed tearing apart. Nevertheless, all the Woodchat and Bay-backed Shrikes kept by M.D.E. also habitually grasped food with one foot during feeding, either to grip it on the perch for tearing up or to lift it to the bill. This use by shrikes of one foot to hold food up to the bill seems to be a habit rarely recorded for passerines, though, according to Simmons (1963), only in

the drongos (Dicruridae) is there full emancipation of the hind limbs, enabling them to be used as hands for grasping and lifting food.

THE USE OF THE LARDER

The larder is most in evidence during the breeding season, when a store of food is often laid up in the vicinity of the nest. It may even be started before the nest-site is chosen (Owen 1948). In some cases almost all the female's food during incubation is brought by the male (Durango 1956), so that such a reserve at this period seems likely to be of value. Yet no larder was ever found at a nest of the Red-backed Shrike which M.D.E. watched in June 1935 for most of the day on which the eggs were hatching, although virtually all the food for the female and young was being provided by the male; and Donovan (1929) recorded that one male Red-backed Shrike ceased making a larder as soon as the nest contained the full clutch of eggs. Both Owen and Durango found that Red-backed Shrikes particularly returned to larders to feed in bad weather or in the early morning when insect activity was low.

Many writers have given the impression that the impaling habit is confined to the breeding season, but this is not the case. Miller (1937) considered it vital to the existence of shrikes at all times of the year. Great Grey Shrikes often keep territories in their winter quarters (Mester 1965) and we have found a freshly killed Chaffinch *Fringilla coelebs* and a still-living dung-beetle *Typhaeus typhoeus* impaled on thorns in such a territory in Suffolk in March. Medlicott (1945) located the warm body of a Blue Tit *Parus caeruleus* spiked on a thorn in Yorkshire in February or March soon after a Great Grey Shrike had been seen chasing one. Reinsch (1955) recorded a Great Grey Shrike impaling a Song Thrush *Turdus philomelos* on an iron spike on Heligoland in October. D. I. Sales (*in litt.*) tells us that he found that Great Grey Shrikes wintering in Kuwait regularly used larders and G.B. has seen grasshoppers, beetles and caterpillars freshly impaled by Fiscal Shrikes in Africa during the southern winter. Red-backed Shrikes will spike prey when on passage (Owen 1948) and an immature impaled bumblebees *Bombus smithianus* on barbed wire on Fair Isle in September (Williamson 1949); Ferguson-Lees (1967) found birds impaled on palm spikes by migrant Masked Shrikes *L. nubicus* in Jordan in April.

Owen (1929) recorded that young Red-backed Shrikes impaled food which they did not require at the time of catching. The Loggerhead Shrike *L. ludovicianus*, which feeds regularly on certain lizards in New Mexico in autumn and winter, was observed to return to impaled prey several weeks later when the weather turned unusually cold and no live lizards were evident; in the very dry climate the impaled lizards had not decayed, but had been perfectly 'cured' and were very hard and dry (Watson 1910). Usually, however, prey is eaten within 24 hours by Loggerhead, Red-backed and Woodchat Shrikes (Miller 1937).

Differences in use by males and females

According to Bannerman (1953), the female is believed to take little interest in the larder habit of the male, but we saw a female Red-backed Shrike return to feed on a partially eaten juvenile Chaffinch impaled on a blackthorn in Suffolk in August. D. I. Sales (*in litt.*) informs us that he observed two female Red-backed Shrikes impaling prey in Kuwait (where this species does not breed) in May and also a female Woodchat Shrike feeding on an impaled locust there in March. Simmons (1954) watched a female Masked Shrike impale a large larva upon a point of barbed wire in Egypt during April. Owen (1948) thought that, when settled down to nesting, all Red-backed Shrikes would have larders if they caught more food than they could eat. Though the male was much more given to the larder habit than the female, he found that in general the female fetched food from the larder more often than the male did, although the latter alone might have provisioned it. He had also seen a female keep a larder stocked after a hawk had taken her mate. The greater readiness of the male to impale was indicated, however, when this same author himself placed a dead bird in a larder. Almost immediately the female came and tried to tear it up, but the position was wrong and she gave up. The male then arrived, pulled the prey free and impaled it to his satisfaction. Both birds at once started to pull bits off and demolished the carcase quickly. Of the shrikes kept in captivity by M.D.E., only the males were ever seen to impale prey. All the fledglings studied by Lorenz and Saint Paul (1968) impaled prey, though to a varying extent; the sexes were not recorded.

Incidental observations

Owen (1929) described how shrikes utilised carrion, such as small Rabbits and birds that they could not lift, by tearing off portions and feeding these directly to the young; or, if too large, the portions might be transferred to a larder for future use. Owen (1948) also mentioned that breeding pairs of Red-backed Shrikes sometimes had several larders, once as many as six. These were usually near the nest, but one was 150 yards away. On the other hand, Cade (1967) found that larders of Northern (Great Grey) Shrikes in Alaska were not near the nest, but 50-200 yards away; if a carcase was moved and hung closer than 50 yards, the shrikes quickly removed it to a position further off, perhaps thus avoiding attracting foxes or other predators to the vicinity. In these arctic regions, where there are no thorny trees or shrubs and no barbed wire, Cade found that only 25% of the birds and mammals in larders were impaled and that the jagged tips of broken twigs and branchlets were used. Incidentally, some shrikes may attempt to defend their larders when a human being approaches (Miller 1937).

Some of the points mentioned are illustrated by the following observation which also suggests that the male may lead the female to an

item of food which he has impaled. On 6th June 1967, near Chessel, Lac Leman, Switzerland, we found a nest of the Red-backed Shrike eight feet up an ash sapling 30 yards inside a small wood of ash and pine. At 11.15 hours the male arrived carrying in his bill a dead fledgling Great Tit *Parus major* which he firmly impaled on a small sharp twig of a shrub willow at the edge of the wood. (The fact that he flew straight to this twig, which was within ten feet of where we were hiding, suggested that it had been used before, although there was no other prey impaled on the bush nor indeed any other likely spike to impale it on.) He immediately started to tear meat off the carcase and fed for a while before flying off. On returning with Dr I. F. Keymer at 14.00 hours, we found that the head of the Great Tit had been removed in the interval. Shortly afterwards the pair of shrikes arrived together: the male quickly disappeared, but the female remained and proceeded to tear off and swallow lumps of flesh from the breast of the prey, which was so firmly held by the twig that the whole branch visibly shook as she did so. Incidentally, subsequent close inspection showed that the Great Tit seemed young enough to have been taken from its nest by the shrike. In June 1968, while with us in Portugal, Jack Hulbert mist-netted a Woodchat carrying in its bill a headless nestling Blue Tit not more than seven or eight days old, which presumably had also been taken from its hole by the shrike.

Variations in use of larders

Much of the uncertainty surrounding larders may be due to the great variation in their use and to the frequency with which food is left uneaten. Coward (1923) wrote '. . . the term "larder" is misleading. The prey is spiked for convenience in preparing it for the young, not to preserve it for future use.' Meinertzhagen (1959) thought larders an unnecessary habit; despite having had many under observation, he had never seen the shrikes return to eat any of the impaled victims (apart from insects transfixed on blades of grass), though he had noted that they occasionally picked beetles and maggots off the bodies. In this connection, however, Owen (1948) believed that stale birds and mammals were generally discarded by Red-backed Shrikes from their larders. On the other hand, in the breeding season in Alaska, Cade (1967) found that the great majority of prey impaled was subsequently eaten, even after hanging as long as a week.

Not all species of shrikes use the larder habit equally: for example, Great Grey and Red-backed Shrikes, both of which take large prey, seem to make larders more frequently than Lesser Grey Shrikes *L. minor* which are almost exclusively insectivorous (Ferguson-Lees 1960), although these do occasionally impale larger insects such as Mole Crickets *Gryllotalpa gryllotalpa* (Stafford 1961). Ferguson-Lees (1957) published a photo by F. Göttschi of a Great Grey Shrike's larder.

There is clearly a great deal of individual variation in the extent of the impaling habit, even among fledglings of the same brood, as has been emphasised by Lorenz and Saint Paul (1968). This variation and the fact that shrikes often impale and then tear to pieces very small prey (which could easily be held in the feet) suggest that the main function of the impaling habit is that of the larder or store.

Prey left uneaten

Various suggestions have been put forward to account for the fact that impaled food is frequently left uneaten. Schreurs (1936) mentioned the breaking of routine by the destruction of the nest, the sudden departure of the young from the vicinity, and disturbances by other shrikes trespassing into the territory. Owen (1948) found that food was often deserted by shrikes on passage, and other obvious factors are any similar lack of fixity of territory and the subsequent death or injury of the shrike concerned. It may be that prey is left when it has become spoiled or dry, and some animals or parts of animals are perhaps less desirable, this poorer food being deserted if something preferable is obtained (for example, the skin and jaws of mice are often left on thorns). A shrike may also leave prey more often when there is plenty of food for itself and its young.

Other writers have commented on the strength of the instinct to pursue and capture prey being such that shrikes will impale insects when they are not hungry and they may then leave them uneaten (Miller 1937, Lorenz and Saint Paul 1968). Armstrong (1965) considered the habit of impaling prey which was never eaten to be a type of supererogatory activity, a procedure carried to excess for its own sake. M.D.E. has found that shrikes and many other species in captivity are unable to eat when the ejaculation of a pellet is imminent, the bird concerned looking distressed or even sickly: he has observed this in thrushes *Turdus spp.*, Rufous Bush Chat *Cercotrichas galactotes*, wheatears *Oenanthe spp.* and raptors, as well as in Woodchat, Red-backed and Bay-backed Shrikes. Miller (1937) also drew attention to the same behaviour; at such times shrikes presumably have to impale and leave uneaten any prey caught.

In conclusion, we are most grateful to Miss M. I. Collyer for translations from the German and also to K. E. L. Simmons for many helpful suggestions.

SUMMARY

The impaling habit of shrikes *Lanius spp.* is discussed under the separate functions of the use of the spike and the use of the larder, points being illustrated from field and aviary experience as well as from the literature. The spike undoubtedly assists the shrike to fix and break up its food and it may also stimulate hunting and appetite. Smaller and easily managed prey is frequently impaled as well, however, and the apparently regular spiking of dates on the palm *Phoenix dactylifera* by Great Grey

Shrikes *L. excubitor* in Algeria is recorded. The larder is used as a store when food is scarce or the demand for it is great. There is considerable variation in the extent of impaling, some species and many individuals doing so seldom or not at all. Larders are usually stocked by the male, but occasionally by the female. Attempts are made to explain why stored food may not always be eaten.

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Dr Geoffrey Beven, 16 Parkwood Avenue, Esher, Surrey
M. D. England, Mashobra, The Staithe, Neatishead, Norfolk NOR 37Z