

FEEDING BY TOUCH

Tactile foraging techniques in ibises and spoonbills



Left In the marshland or mangrove swamps where they habitually forage, Roseate spoonbills detect prey through their sense of touch as they sweep their spatula-shaped bills from side to side through shallow water and silt. During this sweeping action, the bill is held almost vertical and partly open.

Right Elegant, slender, and curved, the bill of the Scarlet ibis is an ideal tool for probing in mudflats or around the prop roots of mangroves for crabs and mollusks. The birds' diet accounts for their vivid coloration, through synthesis of a pigment (carotene) present in the bodies of the prey items.

IBISES AND SPOONBILLS FEED ALMOST ENTIRELY by touch. Ibises probe with their long bills, whereas spoonbills wave their flattened bills back and forth in the water. Although tactile foraging occurs in other species, such as shorebirds and storks, it is nonetheless an evolutionary and ecological characteristic of fundamental importance to this particular family. Clearly the radiation of the family into two groups based on tactile foraging modes was a fundamental turning point in the birds' evolutionary history.

Both groups can, of course, also use sight when appropriate. The birds' line of vision tends to point to the tip of the bill. They use vision to decide where to forage, including where to place the bill. Terrestrial ibises will pick up items they see, although even in these cases they will often probe a little first to locate it. When it comes to actually catching food, however, it is the bill that feels out the prey item.

The bills are equipped with tactile sensors that allow the birds to respond quickly when a potential prey item is encountered. The bill snap captures the prey in a forceps grasp. Ridges on the bill hold the prey. A forward lunge of the head sends the prey item toward the head, either to be caught again closer to the mouth or else to pass straight down the gullet. Large items may be bitten several times before they are swallowed. Some species tear prey apart, stabbing and biting with their bill.

In shallow water, ibises insert the tip of the bill into the bottom or within submerged vegetation.

allow deep penetration. The birds also probe in soft mud, either under the water or exposed above it, in dirt or grass, or in fact in almost any sort of substrate that will allow penetration.

Terrestrial ibises poke, peck, or probe along the ground or in plant cover. They have relatively short bills, which are more efficient on dry land than the longer bills of the aquatic species. Even so, all ibises are perfectly capable of pecking and probing on the ground as well as in water. Various species, including some basically aquatic ones, can commonly be seen in pastures and on lawns, probing into the topsoil.





As a result of the birds' nonvisual approach to feeding, the ibis diet is broad, basically consisting of whatever can be encountered and captured in the places they choose to feed. Typical prey species are slow-moving; in water they tend to live close to the bottom, while on land they may be burrowers, or else found in grass or topsoil. Consequently, insects, crustaceans, snails, and other invertebrates tend to predominate. Fish are readily consumed, but they tend to be caught most effectively when at high densities.

Spoonbills use touch as they swing their open bills in the water. The bills' exceptionally broad surface area makes contact with a potential prey item more likely, and also aids in its subsequent capture. Spoonbills tend to swing their bill through the open water or along the surface of mud or sediment. They are more likely than ibises to encounter small fish, and they also take crabs, prawns, and other demersal (bottom-dwelling) species. So the tactile technique of spoonbills

takes more fish than does the probing technique used by ibises.

While probing and head swinging respectively dominate the feeding repertoire of ibises and spoonbills, it is notable that ibises also sometimes swing their bills back and forth, while spoonbills occasionally probe. The birds' ability to use both techniques suggests that both tactile behaviors were developed early in the evolutionary history of the family.

At hatching, the chicks have thick but rather normal-looking bills, which change form rapidly during the growing period. Tactile feeding is not a straightforward technique, and it appears that young birds have to learn to become proficient at it. Practice begins while the birds are still in their natal colony. Maturation is delayed in these species for one to several years, possibly in response to the bird's need to learn how and where to feed effectively. Once developed, tactile feeding techniques can be deployed in many different situations and habitats, from shallow water to semi-arid mountains, as evidenced by the diversity of species and the worldwide distribution of the family.

JAK