

TOOL USE BY BRISTLE-THIGHED CURLEWS FEEDING ON
ALBATROSS EGGS¹

JEFFREY S. MARKS

Cooperative Wildlife Research Unit, University of Montana, Missoula, MT 59812

C. SCOTT HALL

U.S. Fish and Wildlife Service, P.O. Box 50167, Honolulu, HI 96850

Key words: Bristle-thighed Curlew; *Numenius tahitiensis*; tool use; egg predation; Northwestern Hawaiian Islands.

In the strictest sense, tool use is "the use of an external object as a functional extension of mouth or beak, hand or claw, in the attainment of an immediate goal" (van Lawick-Goodall 1970). Tool use by birds has been reported for a number of species but is considered uncommon (Morse 1968, van Lawick-Goodall 1970). Examples include Woodpecker Finches (*Cactospiza pallida*) and Green Jays (*Cyanocorax yncas*) probing for insects with twigs (Lack 1947, Gayou 1982), Black-breasted Kites (*Hamirostra melanosternon*) and Egyptian Vultures (*Neophron percnopterus*) dropping stones onto ratite eggs (Chisholm 1954, van Lawick-Goodall and van Lawick-Goodall 1966), and a Fan-tailed Raven (*Corvus rhipidurus*) striking a ping-pong ball with a rock (presumably mistaking the ball for an egg; Andersson 1989).

Here, we report five cases of tool use by Bristle-thighed Curlews (*Numenius tahitiensis*) feeding on albatross eggs and suggest that tool use is an extension of the "slamming" behavior commonly employed by foraging Bristle-thighed Curlews. To our knowledge, tool use has not been reported previously for any shorebird.

Bristle-thighed Curlews breed in western Alaska and winter on islands in the central and south Pacific (AOU 1983). We observed curlews on Tern Island (23°45'N, 166°10'W) and Laysan Island (25°46'N, 171°44'W) in the Northwestern Hawaiian Islands, which extend for 2,000 km WNW of the main Hawaiian Islands and comprise the northern limit for wintering Bristle-thighed Curlews. The natural history of Tern Island and Laysan Island is described by Amerson (1971) and Ely and Clapp (1973), respectively.

In the Northwestern Hawaiian Islands, Bristle-thighed Curlews forage in terrestrial habitats, feeding primarily on spiders, land crabs, and a wide variety of insects (J. S. Marks and R. L. Redmond, unpubl. data). Food items too large to be swallowed whole often are slammed against the ground until they are broken (J. S. Marks, pers. observ.). In a typical slamming event, the curlew holds the food item in the tip of its bill, raises it overhead, and then vigorously slams it against

the ground. This sequence is repeated until the food item is broken into pieces. Usually, the curlew slams the food item against a flat rock. On Laysan and Tern islands, the most commonly slammed items are ghost crabs (*Ocypode laevis* and *O. ceratophthalma*). Flightless chicks on the breeding grounds slam nonfood items such as lichen, moss, and plastic flagging (R. E. Gill, pers. comm.), and hatching-year curlews newly arrived on Laysan often slam seabird feathers, old crab shells, and seaweed. Adult curlews confine slamming behavior to food items and in Alaska have never been observed to slam food during the brood-rearing period (R. E. Gill and B. J. McCaffery, pers. comm.). Therefore, slamming behavior is probably innate.

Between 2 and 10 January 1991, Hall observed four cases (involving two banded adults and at least one unbanded bird of unknown age) of tool use by curlews feeding on abandoned eggs of Black-footed (*Diomedea nigripes*) or Laysan (*D. immutabilis*) albatrosses on Tern Island. In each case, the curlew picked up a small piece of coral (<2 cm diameter) and threw it at the egg repeatedly, breaking a hole in the shell (Fig. 1). The curlew then inserted its bill into the hole, enlarged the opening, and fed upon the contents. Marks saw an unbanded adult curlew use the same behavior to open a Black-footed Albatross egg on Laysan Island on 13 February 1991.

Except for the substitution of a stone for a food item, the use of stones to open eggs is identical to slamming behavior and very likely is derived from it. Tool use by Bristle-thighed Curlews is similar to that by Egyptian Vultures in that the stones are thrown forcefully at eggs rather than dropped onto them (van Lawick-Goodall and van Lawick-Goodall 1966).

Bristle-thighed Curlews are well-known predators of seabird eggs (Bailey 1956, Ely and Clapp 1973). On Laysan Island and Tern Island, curlews break smaller eggs (e.g., shearwater, petrel, and tern eggs) by pecking them with their bills or by slamming or dropping them on the ground. Bailey (1956) reported that Bristle-thighed Curlews eating albatross eggs "would tap the eggs with their curved beaks and drain the contents." In hundreds of hours of observation, we never saw a curlew open an intact albatross egg with its bill. We have seen curlews pecking at albatross eggs that have been opened by Ruddy Turnstones (*Arenaria interpres*), however, and it is possible that turnstones initially opened the eggs that Bailey observed.

Bristle-thighed Curlews often feed by probing, and

¹ Received 20 April 1992. Accepted 10 July 1992.

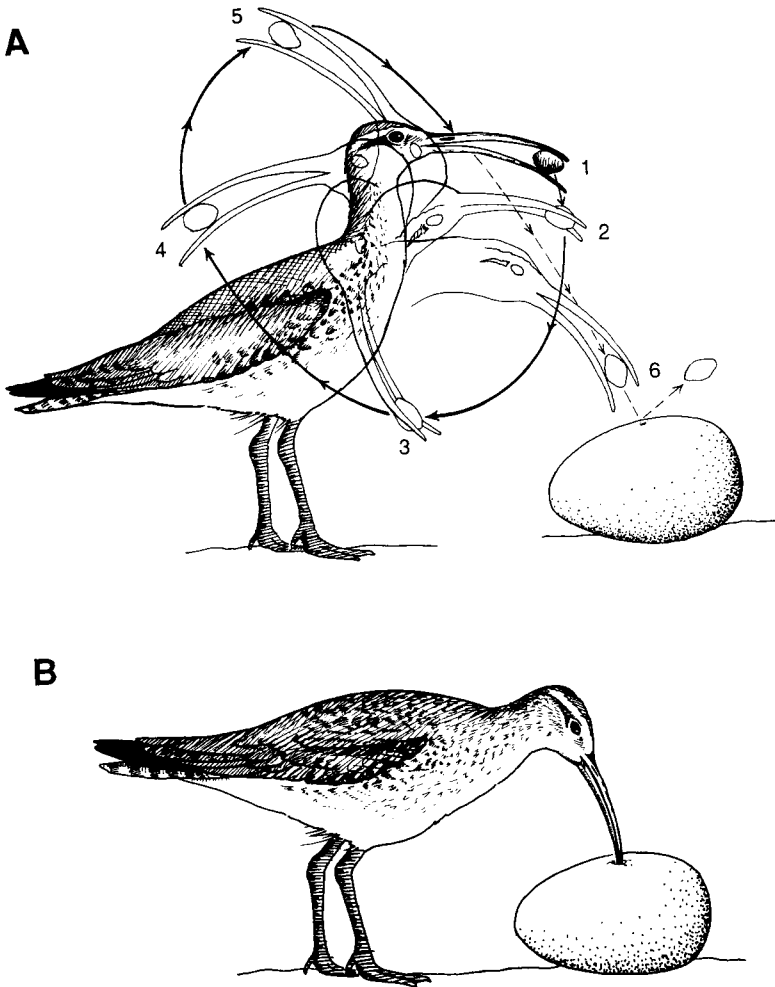


FIGURE 1. Bristle-thighed Curlew using a stone to open an albatross egg (A) for consumption (B).

the tips of their bills are kinetic (J. S. Marks, pers. observ.). Like other shorebirds that feed by touch, they have concentrations of nerve cells (viz., Herbst corpuscles) in the tips of their bills (Bolze 1968). Thus, their bills are probably highly sensitive to sharp blows against hard surfaces. Albatross eggs are too large for curlews to grasp, and the shells are probably too thick for curlews to pierce easily. Consequently, intact albatross eggs are probably unavailable to curlews that do not use stone tools.

We suggest that the frequency of tool use by Bristle-thighed Curlews on their wintering grounds depends on the size distribution of seabird eggs that are available. On islands where only smaller eggs are available (e.g., shearwater-sized and smaller), we would not expect curlews to exhibit this behavior. On islands where large numbers of albatrosses nest (e.g., some of the Northwestern Hawaiian Islands), we suspect that this behavior occurs at least occasionally. Additional stud-

ies may determine if curlews use tools to open the eggs of other large seabirds such as boobies and frigatebirds; these eggs apparently are at the upper size limit that Bristle-thighed Curlews can grasp (see Bent 1929:142-143).

We thank R. L. Redmond and an anonymous referee for comments on the manuscript, R. E. Gill, Jr. and B. J. McCaffery for information on foraging behavior in Alaska, and R. A. Petty for preparing the figure. Funding was provided by the U. S. Fish and Wildlife Service (Alaska Fish and Wildlife Research Center, Hawaiian Islands National Wildlife Refuge, Montana Cooperative Wildlife Research Unit), the National Geographic Society, the World Wildlife Fund, the Hawaii Audubon Society, a Sigma Xi Grant-in-Aid of Research, a Curby-Pavelsky-Harris Award, and a Paul A. Stewart Award. Logistical support was provided by the National Marine Fisheries Service, the U. S. Coast

Guard, and the NOAA research ship "Townsend Cromwell."

LITERATURE CITED

- AMERICAN ORNITHOLOGISTS' UNION. 1983. Checklist of North American birds. 6th ed. American Ornithologists' Union, Lawrence, KS.
- AMERSON, A. B., JR. 1971. The natural history of French Frigate Shoals, Northwestern Hawaiian Islands. Atoll Res. Bull. 150.
- ANDERSSON, S. 1989. Tool use by the Fan-tailed Raven (*Corvus rhipidurus*). Condor 91:999.
- BAILEY, A. M. 1956. Birds of Midway and Laysan islands. Denver Mus. Nat. Hist. Mus. Pict. 12.
- BENT, A. C. 1929. Life histories of North American shorebirds. U.S. Natl. Mus. Bull. 146.
- BOLZE, G. 1968. Anordnung und bau der Herbstschen Körperchen in Limicolenschnäbeln im Zusammenhang mit der Nahrungsfindung. Zoologischer Anzeiger 181:313-355.
- CHISHOLM, A. H. 1954. The use by birds of "tools" or "instruments." Ibis 96:380-383.
- ELY, C. A., AND R. B. CLAPP. 1973. The natural history of Laysan Island, Northwestern Hawaiian Islands. Atoll Res. Bull. 171.
- GAYOU, D. C. 1982. Tool use by Green Jays. Wilson Bull. 94:593-594.
- LACK, D. 1947. Darwin's finches. Cambridge Univ. Press, Cambridge, England.
- MORSE, D. H. 1968. The use of tools by Brown-headed Nuthatches. Wilson Bull. 80:220-224.
- VAN LAWICK-GOODALL, J. 1970. Tool-using in primates and other vertebrates. Adv. Study Behav. 3:195-249.
- VAN LAWICK-GOODALL, J., AND H. VAN LAWICK-GOODALL. 1966. Use of tools by the Egyptian Vulture, *Neophron percnopterus*. Nature 212: 1468-1469.