THE WRYBILL: A FEEDING ADAPTATION

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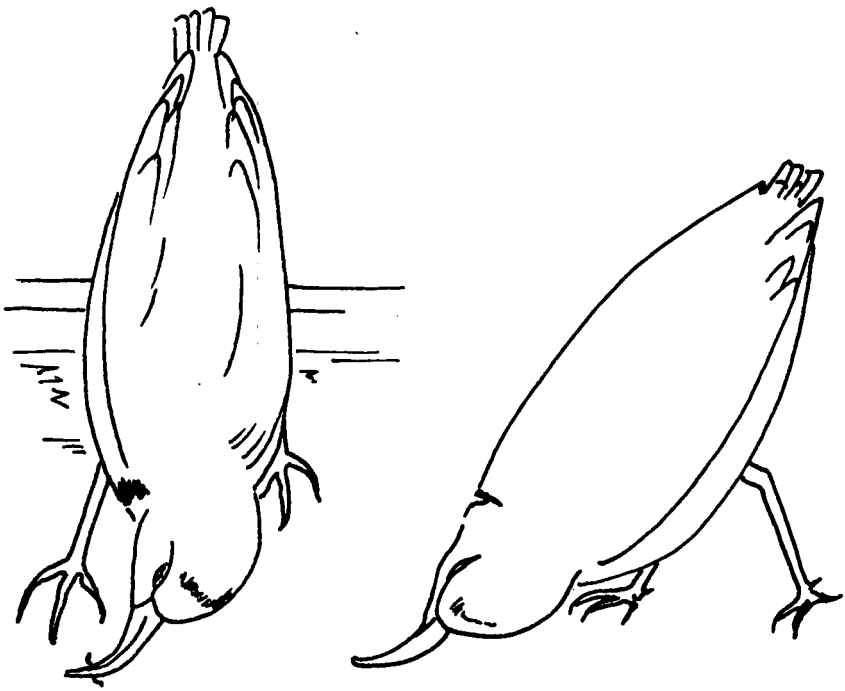
The Wrybill *Anarhynchus frontalis* has received much attention from field workers, with respect both to numbers and to its clear-cut north-south migration within New Zealand. Further, its standing as the only known bird with sideways-bent bill was noted and documented early in the history of New Zealand ornithology.

The present brief note merely draws attention to observations on feeding behaviour made by the writer — and by very many other observers ! — on the northern New Zealand tidal harbours forming the species' wintering grounds (see Sibson 1943 (3) and 1963 (4)). Observers will readily note the feeding method used, particularly since the Wrybill does not flush readily and may often be seen at remarkably close quarters: the birds as they feed over the soft mud predominantly sweep the head sideways, the action being from right to left i.e. *against* the "righthanded" curve of the bill; such an action means that the whole side of the front (distal) portion of the bill from angle to tip becomes functional as a grasping and gathering mechanism, and it seems justifiable to suppose that the bill possesses a relatively high efficiency for mudflat feeding when used in this way.

The feeding action of a flock of Wrybills, especially if moving towards the observer, is quite marked — it may be described as



Wrybills at Karaka, Manukau Harbour (drawn by Jeanne Goulding)

"mechanical" — the birds striking repeatedly against the curve of the bill as they see and capture food items. The action has been well shown in films of waders taken by G. J. H. Moon and others. The bill, it should be noted, is not invariably used in this way — although the action described is the usual one — items sometimes being picked up with the tip in dotterel fashion; but in this case the stroke is also down *and to the left.*

Few records of the food taken are available for this species — as with most of our waders — the only sight records being of worms which are, of course, clearly visible.

The most obvious conclusion when this action is seen is that there can be no doubt concerning the adaptive significance of the shape of the bill. Other waders — notably the Pied Stilt *Himantopus leucocephalus* — will in mudflat feeding turn the bill "along the flat" to pick up food items, but with a straight bill such an action means that it is used with some effort and the bird's face may in extreme cases go down until almost touching the mud; in comparison, the Wrybill's action against the side of the bill is both deft and effective. Stilts, it should be noted, sometimes use a "scything" action, moving the bill alternatively to left and right, evidently finding the side of the bill, when used in this way, more efficient under certain circumstances than grasping or probing with the tip, possibly when larger items such as worms are abundant.

In view of the probable adaptation of the bill of the Wrybill for mudflat feeding as shown above, it may be suggested that an investigation of the head and neck musculature and associated anatomy would be of much interest, and it is likely that a trend towards general asymmetry is involved.

The only hypothesis previously advanced to explain the bent bill is that of Potts 1871 (2) (quoted and extended by Buller, in his first edition: Buller 1873 (1)): "(p. 96) A consideration of the natural features of its favourite haunts permits us to indulge in surmises as to the convenience and adaptability of its remarkable form of beak for obtaining its food. Where we have seen it has never been far from water, and if, as we presume, this bird is peculiar to this country, we can point to our larger river beds as affording it admirable feeding grounds. These rapid shallow streams are perpetually wandering and shifting in their course, cutting new channels after every freshet, whether occasioned by heavy rainfalls or by the melting of snow from the alpine crests of the 'back country.' Anyone acquainted with our 'plains' must have observed, here and there, how certain parts (termed by geologists, 'fans'), are thickly covered with stones — as, for instance, some miles below the Gorges of the Rakaia or Rangitata; — however unpromising or useless they may appear to the inexperienced, the practical grazier is aware that those stones assist in keeping the ground cool, and in retaining beneath them a certain amount of moisture which, during the drier portion of the year (when the parching north-west winds prevail), thus invigorates the thirsty rootlets of many valuable grasses, and the result is the maintenance of a fair number of sheep on this rather barren-looking stretch of country. When any of these stones are disturbed from their bed, who can have failed to notice the commotion pro-

duced amongst the insect community thus suddenly disclosed to view; what scuttling ensues to gain fresh concealment from the garish light of day. In a somewhat similar manner, after a stream has deserted its temporary bed, in all probability numerous forms of aquatic insect life, attracted by the moisture, are to be found in the sand in which the shingle lies half imbedded. The horny point of the bill of this bird, from its peculiar form, is sufficiently strong to be used for thrusting between and under stones and pebbles.

"The flexibility of the upper mandible derived from the long grooves and flattened form (extending to nearly half its length), tends materially to assist the bird in fitting its curved bill close to a stone, and thus aids it in searching or fossicking around or beneath the shingle for its food, while at the same time the closed mandibles would form a tube through which water and insects could be drawn up, as water is sucked up by a syringe. As the flexure of the bill is lateral, the bird is enabled to follow up retreating insects, by making the circuit of a waterworn stone with far greater ease than if it had been furnished with the straight beak of the plover, or the long flexible scoop of the avocet.

"The inspection of [the specimens demonstrated] must clear away any little cloud of doubt that might remain on the minds of persons unfamiliar with the bird, and convince them that this singular form of bill, so far from being an accidental deformity, is a beautiful provision of Nature, which confers on a plover-like bird the advantage of being able to secure a share of its food from sources whence it would be otherwise unattainable."

Not only has the explanation appeared to many subsequent observers far-fetched (see comments by Stead 1932 (6) and Soper 1963 (5)), but observations to date in the breeding range — the broad shingle river beds of the eastern South Island — suggest that food taken during this portion of the year is derived mainly from the soft muddy drifts in the river beds and softer interstices between shingle, and is comparatively rarely sought under the stones themselves.*

ACKNOWLEDGEMENT

I am most grateful to Miss Jeanne Goulding for the accompanying field sketches showing feeding Wrybills.

REFERENCES

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2 POTTS, T. H., 1871: On the Birds of New Zealand, Pt. 2. **Trans. N.Z. Institute** 3, 59-109.

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4 SIBSON, R. B., 1963: A Population Study of the Wry-billed Plover **Anarhynchus frontalis. Notornis** 10, 146-153.

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* The writer observed Wrybills on the breeding grounds during several seasons (1957-63), and made the general observations on feeding given above; his observations are supported by more recent work by Mr. B. D. Bell (pers. comm.). Stead (1932) observed pecking under stones, but this was evidently under special circumstances where a stream was drying up and had left the larger type of shingle.