THE TONGUES OF KIWIS (APTERYX SPP.)

By CHARLES McCANN

ABSTRACT

Kiwis fall into two distinct groups, *striated* (including the North Island, the South Island and the Stewart Island Kiwis) and *spotted* (including the Little Spotted and the Great Spotted Kiwis). Variation, both geographically and longitudinally, is evident. One major character, the tongue with its closely associated sensory tracts, is described and contrasted in three species of kiwi, the North Island Kiwi *(Apteryx australis mantelli)*, the Great Spotted Kiwi *(A. haasti)* and the Little Spotted Kiwi *(A. oweni)*. It is concluded that the shape of the tongue has an important bearing on the type of food eaten and the terrain occupied by each of the species. The differences in the anatomy of the tongues indicate that the spotted kiwis are distinct from the striated kiwis and a different origin or a divergence of development resulting from early separation in the type of habitat occupied is suggested. The marked difference in the kind of plumage supports this hypothesis according to the contrasting habitats now occupied by the two groups of kiwis.

INTRODUCTION

Kiwis are well-known and need no description. Broadly, they are divided into well-defined groups: the *Striated Kiwis,* distributed in suitable localities throughout the North Island, across Cook Strait, down the eastern side of the South Island and thence on to Stewart Island. Included are the North Island, the South Island and the Stewart Island Kiwis. A certain amount of variation, according to locality, is acknowledged which is to be expected owing to the ecological and biological changes through such a long latitudinal range. The largest form appears in Stewart Island. Individual variation is frequent. The *Spotted Kiwis* on the other hand are represented by two marked species ranging along the back bone of mountains and the western coast of the South Island. The smaller of the two *(Apteryx oweni)* is more restricted in its range, being more or less confined to Nelson and Marlborough Districts. Like the size variation observed in the Striated Kiwis, the larger of the two spotted Kiwis *(A. haasti)* exhibits a similar increase in size the further south one travels.

There are, of course, other fundamental differences beyond the scope of this short paper which is restricted to the variation in the structure of the tongue and its associated tissues.

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Material and methods:

The drawings are based on fresh material as it came to hand from carcasses received by the taxidermy department of the National Museum, Wellington. The tongues were first sketched in pencil and final sketches made shortly afterwards with the aid of the pencil sketches and the preserved specimens. The fresh specimens were pinned out on a board before fixation.

Unlike most other birds, the openings of the nostrils are situated at the extremity of the long Whimbrel like bill, they are connected by the long nostril tubes with the large and capacious sinuses and olfactory lobes above the glottis. The tongue, itself, is short in all species and does not extend far into the beak. The beak is well adapted for deep probing into soft substrata in search of food.

The tongues of three species of Kiwis are described and contrasted:

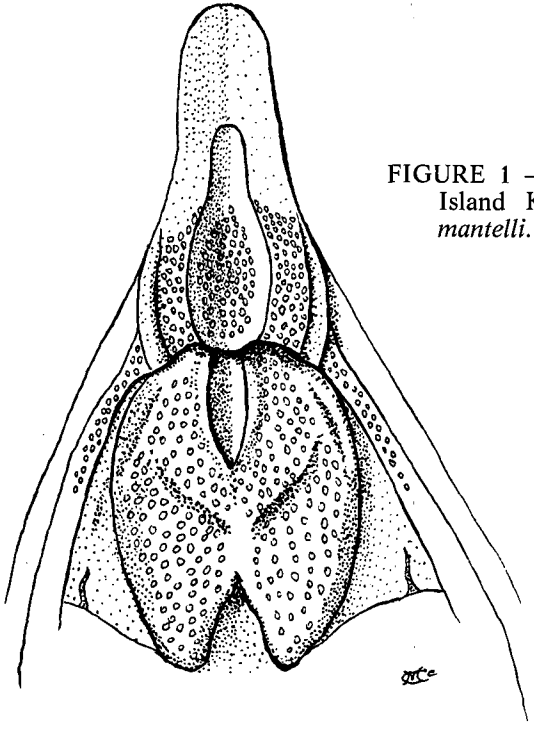

FIGURE 1 — Tongue of the North Island Kiwi, *Apteryx australis mantelli.*

North Island Kiwi, *Apteryx australis mantelli* (Fig. 1)

The tongue is somewhat long-pyriform with half to three quarters of its anterior length free and less fleshy; tip obtuse, retuse or truncate; the posterior margin somewhat fleshy for about 2 to 3 fifths of its length from its base; mesially there is a shorter pyriform depression conforming to the outline of tongue. The lower half of the tongue is closely pitted with largish taste pits. Immediately behind the tongue is the somewhat narrow glottis surrounded by a large laryngeal pad (which, incidentally, is very similar in outline to the swim-bladder of the porcupine-fish !) deeply divided posteriorly for about a quarter of its length and copiously beset with large taste pits arranged roughly in longitudinal rows with a base area just above the angle of the lobed area; a row of small pits stretch for a short distance, at an angle of about 45° from the median line of the pad; other such rows of small pits appear, one on each of the shoulders of the pad. Rows of pits extend along the hyoids to a distance about half way down the pad.

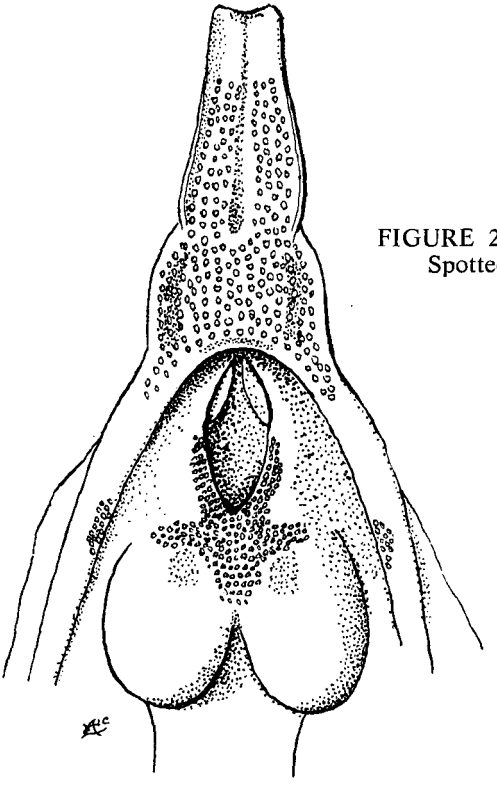

FIGURE 2 — Tongue of the Great Spotted Kiwi, *A. haasti,* female.

Great Spotted Kiwi, *Apteryx haasti* (Fig. 2)

The tongue is more or less oblong with a marked constriction just below the transverse midline. The area below the constriction corresponds to the area encompassed by the thickened margins in *A. mantelli.* A shallow median groove extends from the apex of the tongue to a transverse line drawn at the constriction; except for a short distance (about one fifth) the rest of the tongue is covered with largish taste pits, intermixed with small ones below the constriction towards the margins. The apex is truncate or retuse.

The laryngeal pad in *A. haasti* is not so well-defined as in *A. mantelli,* particularly in the area surrounding the glottis; its most marked feature is the two large ovoid lobes deeply divided from one another; they are devoid of large pits but smaller ones are scattered about. The glottis is large with two " glands " anteriorly; surrounding the lower half of the glottis are the arms of an otherwise cruciform area of large pits extending between the glottis and the division of the ovoid lobes of the laryngeal. On the hyoid arms some distance posteriorly, but almost opposite the transverse arms of the cruciform patch of pits, is a small group of pits, one on either side.

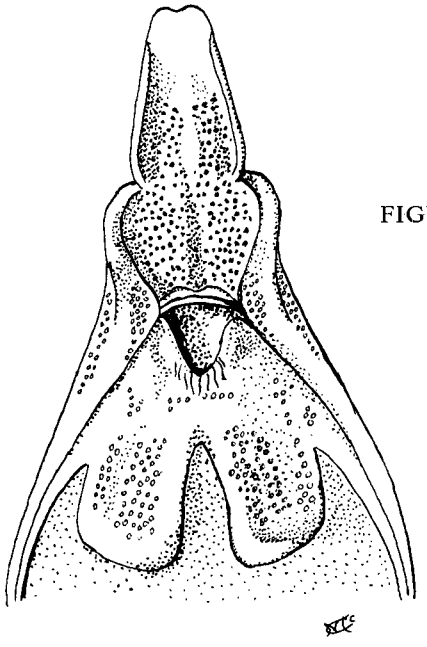

FIGURE 3 — Tongue of the Little Spotted Kiwi, *A. oweni,* male.

Little Spotted Kiwi, *Apteryx oweni* (Fig. 3)

The tongue of *A. oweni* is very similar to that of *A. haasti* in several respects which might be expected, but it is more strongly constricted about half way along its length; the apex is retuse or truncate; the margins are narrowly inflexed as far as the transverse constriction; there is a shallow, median depression. With the exception of approximately one third of the anterior portion, the remainder of the tongue is much pitted with taste pits, as in *A. haasti,* and an increased number of smaller marginal pits. The base of the tongue is margined with a fleshy fold which obscures a portion of the glottis.

The laryngeal pad is not so well-defined as in *A. mantelli* and *A. haasti;* it is formed of two fleshy lobes deeply divided from each other; the lobes are more oblong rather than ovoid as in *A. haasti;* the lobes have scattered large pits interspersed with small pits; a transverse line of a few pits exist below the glottis and a small group of pits at either end of the transverse set. Two series of pits exist on either side of the hyoids, to a level of the posterior end of the glottis.

CONCLUSIONS

After close examination of the one major character, the *tongue* and its closely associated sensory tracts, it is, perhaps, possible to reach some generalised conclusions: (a) The shape of the tongue, and (b) the distribution of the sensory pits in each of the species, both have an important bearing on the type of food consumed and the type of terrain in which it is captured — in short they are general ecological factors.

The marked differences in the structure of the tongues indicate that, although the spotted kiwis show a close similarity amongst themselves, they are distinct from the striated kiwis and suggest a different origin or divergence of development resulting from early separation in the type of habitat.

Again, the marked difference in the type of plumage between the spotted and striated kiwis appears, to some extent, to lend support to this hypothesis: one group, the spotted, inhabits the colder, often snow clad, terrain in open tussock (?) and the other occurs in the more dank or rain drenched areas of both islands (this is true when the birds are abroad, at night, when dew is heaviest).

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Charles McCann,
8 Kiwi Street,
Heretaunga,
Upper Hutt