A PELICAN IN NEW ZEALAND

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ABSTRACT

The discovery of sub-fossil Pelicans in New Zealand is reviewed, and the conclusion reached that, owing to their larger size, the New Zealand birds were a distinct sub-species, which is here named *Pelecanus conspicillatus novaezealandiae.*

DISCUSSION

In November 1930 Dr. Gilbert Archey and others found a part skeleton of a Pelican in a cave in the Waikaremoana district. This was in "a steep earth slope formed by material fallen from the end wall of the cave." The Pelican bones "were about 18 inches below the surface, just above the Moa bones" also found there, "and slightly scattered through the downward movements of later accretion to the slope." The next finds occurred at Marfell Beach, Lake Grassmere, Marlborough, on the eastern side of the ponded lake of the saltwroks.

On the 23rd February 1947 Mr. P. Lovell-Smith found a weathered right coracoid in the sandhills, and in the following March Mr. J. R. Eyles picked up a worn right humerus, possibly of the same skeleton, also in the sandhills.

In March 1953 Mr. and Mrs. J. Britton found a left femur in the same area, and later in the same year the proximal end of a right humerus. This piece of humerus does not belong to the one found in 1947, and, from its colouration, the femur seems to come from the water-logged layer immediately above the old beach gravels. In this layer all the bones have a brown staining. Thus from Lake Grassmere we have representatives of two, probably three, individuals.

Ten years later, in the course of his archaeological excavations at Poukawa, Hawkes Bay, Mr. Russell Price found a large part of a single skeleton on the 2nd and 16th February 1963. These bones were in squares 18 and 19 of his layer 5, resting on the bottom of an old stream bed. The pelvis of this bird was surrounded by a considerable amount of greasy stain, still visible on the matrix. This stain shows clearly on the colour slides taken while the bones were in situ. A few fragments of another Pelican were found in 1954 by Mr. Price at the same site. I am indebted to Mr. Price for permission to examine and publish his material. I have had for comparison an almost complete skeleton of *Pelecanus conspicillatus* Temminck (Australian Museum No. S.728), now in the collection of the Auckland Institute and Museum (I am deeply indebted to Mr. Graham Turbott, Director of the Museum, for the opportunity to examine this skeleton), and some bones of *Pelecanus onocrotalus* Linne, cleaned from an old mounted skin. I have also utilized the measurements published by Dr. Archey (See Tables). In a few instances, in the dimensions of S.728, my measurements differ slightly from those given by Archey, and these I have indicated, but in one case of considerable discrepancy, I suspect an error in transcription. I have checked and re-checked my measurement.

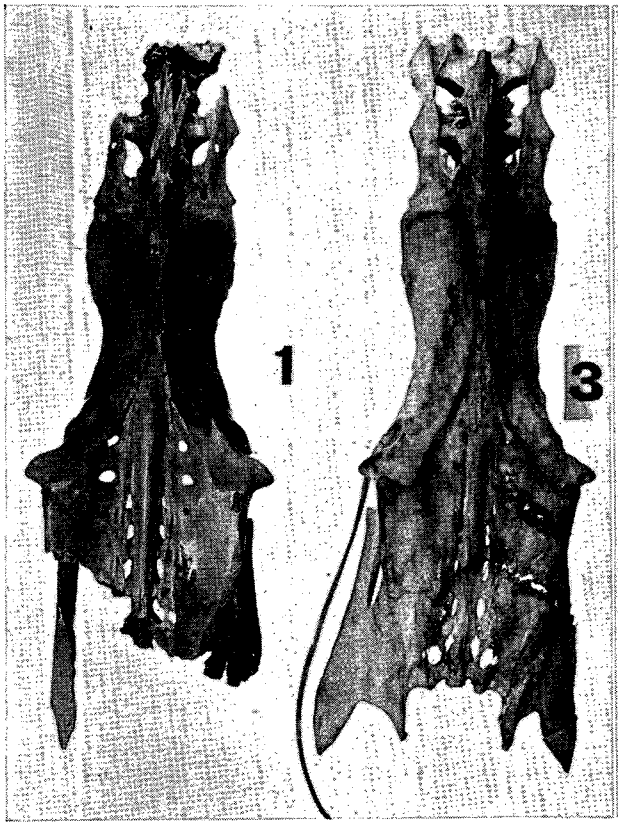


Fig. 1 — Pelvis, Dorsal View. 1 Holotype. 3 S.728.

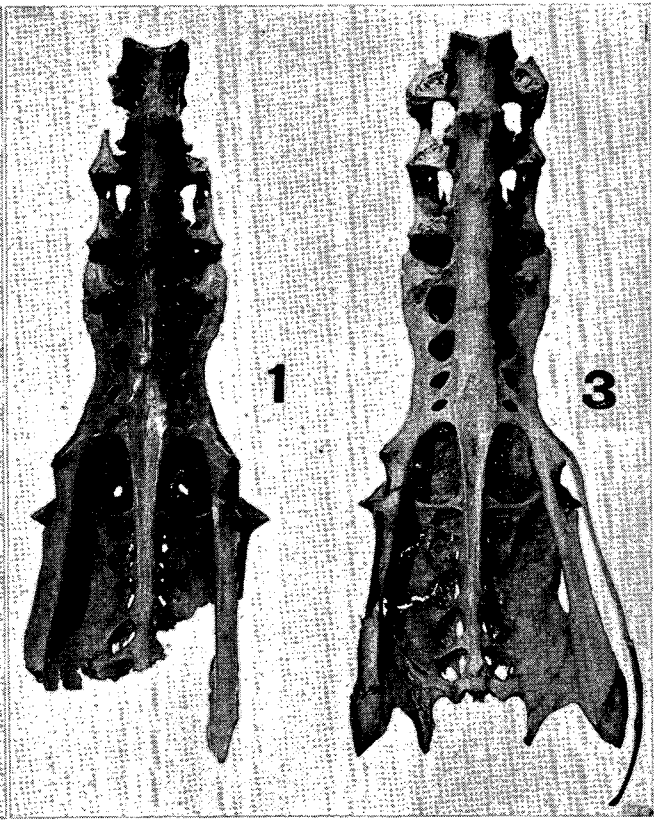


Fig. 2 — Pelvis, Ventral view. 1 Holotype. 3 S.728.

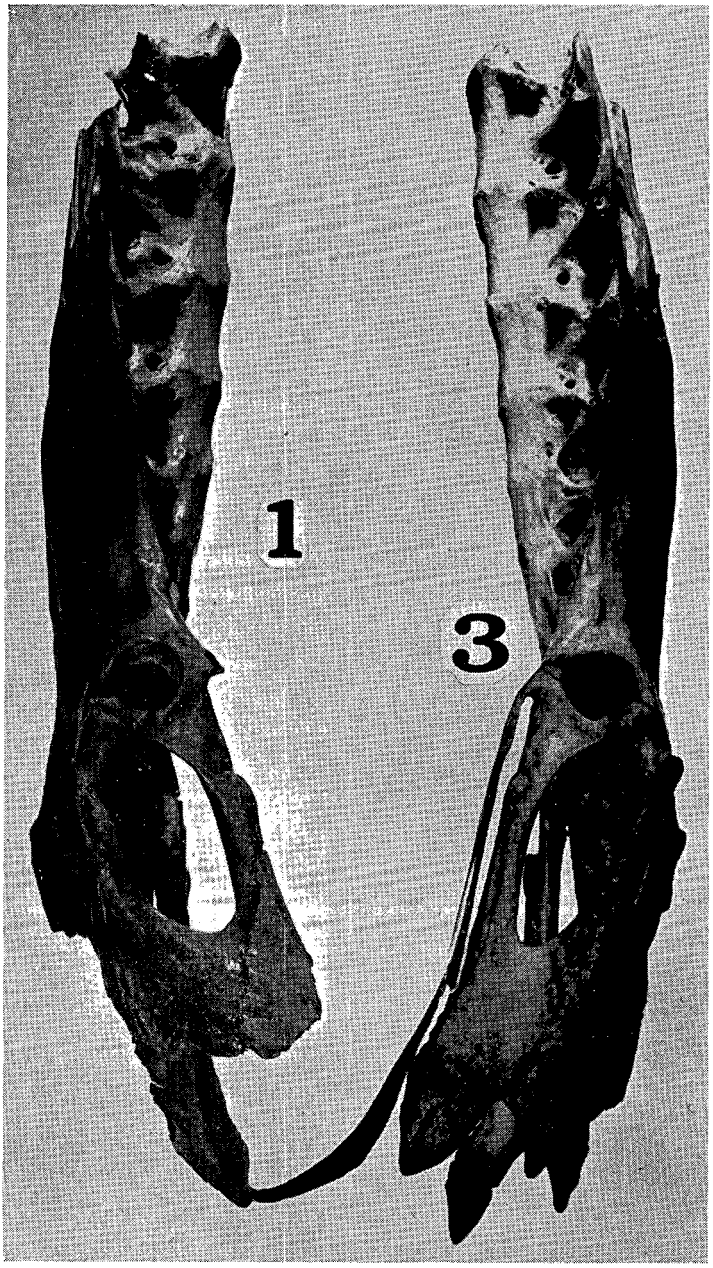


Fig. 3 — Pelvis. 1 Holotype. R. sid. 3 S.728. L. side.

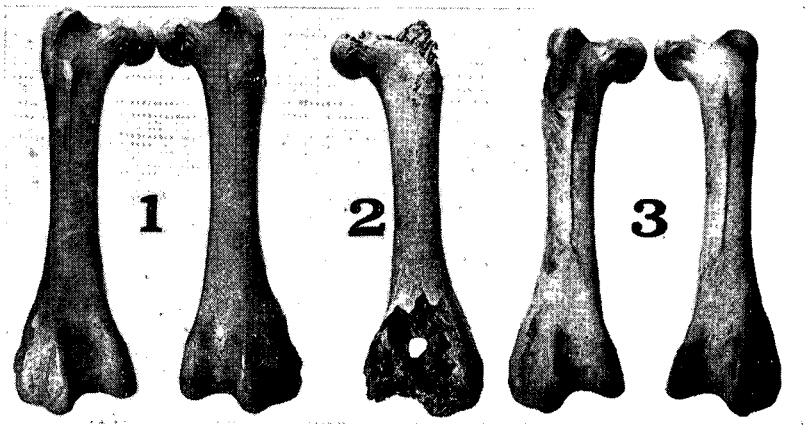


Fig. 4 — Femora. 1 Holotype. 2 AV. 12,482. 3 S.728.

Many kinds of birds very considerably in size within the species, and when *one* individual is found which is larger than those previously recorded, it is unwise to assume that it is a new form. Thus Dr. Archey was justified in assuming that his Waikaremoana skeleton was an exceptionally large form of the Australian Pelican. If, however, *several* specimens are found, all consistently larger than and geographically distinct from the known birds, it becomes clear that one is dealing with something new. I consider the New Zealand Pelican as a distinct subspecies, formerly indigenous to the country, of the Australian species.

The material from Poukawa consists of the following bones of an individual skeleton:

Mandible: Found in many fragments. I have largely reconstructed this, but some pieces are missing, so that it is not possible to obtain all the measurements which might be desired.

L. quadrate.

Pelvis: This lacks both pubes, the posterior extremity of the right ischium, ditto of the left ilium and the final fused caudal vertebra of the sacrum, but is otherwise complete. The first three thoracic vertebra (Nos. 21, 20 and 19) are fused to the sacrum, and partly covered by extensions of the ilia; as this is also the case with S.728 I assume that this condition is general in Pelicans.

R. humerus: Nearly complete.

L. humerus: With part of shaft missing.

R. ulna, R. and L. radii: (The latter had been broken and incorrectly restored.)

R. and L. carpo-metacorpi: (The latter lacks about 4.2 c.m. of the 3rd metacarpal, distally).

L. scapula: (Broken distally).

R. and L. coracoids.

R. and L. femora.

R. tibio-tarsus.

R. and L. fibulae: (Both with fragments missing distally).

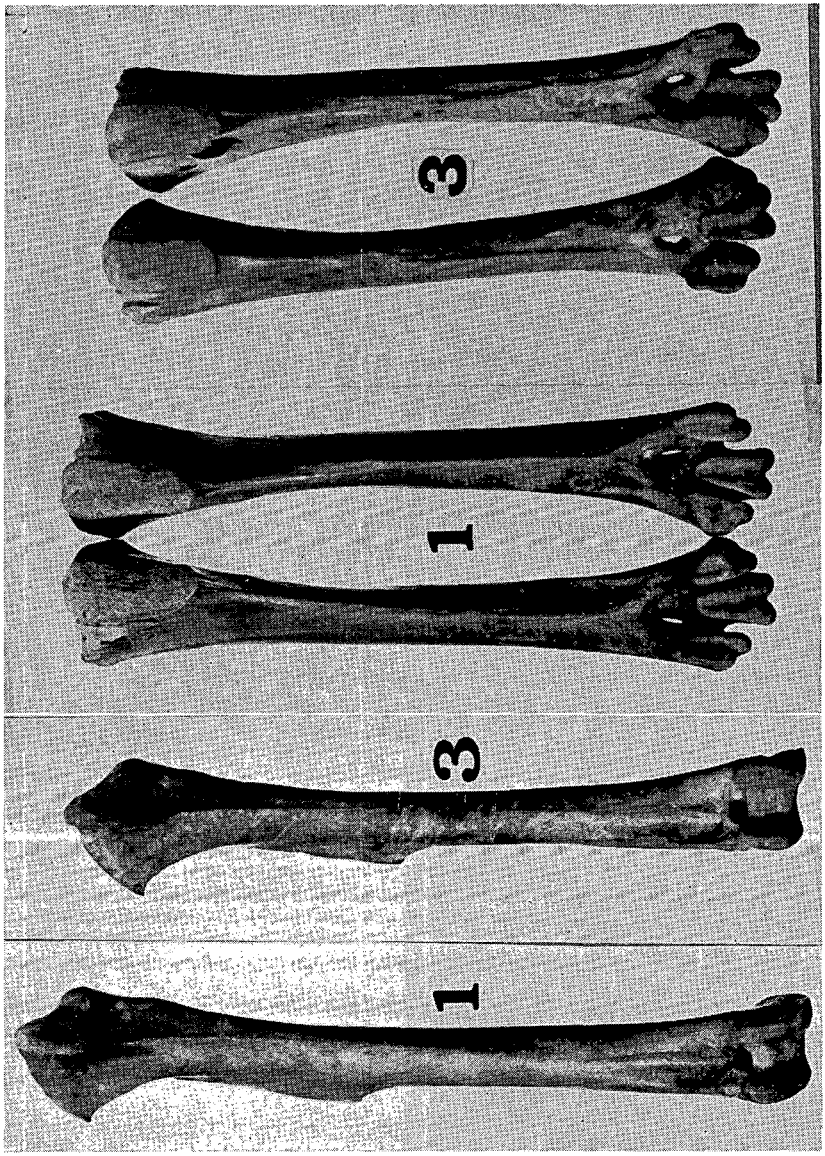


Fig. 5 — R. Tibio-tarsus.

Fig. 6 — Tarso-metatarsi. 1 Holotype. 3 S.728.
1 Holotype. 3 S.728

R. and L. tarso-metatarsi.

2 *phalanges.*

Fragments of a minimum of 7 *ribs.*

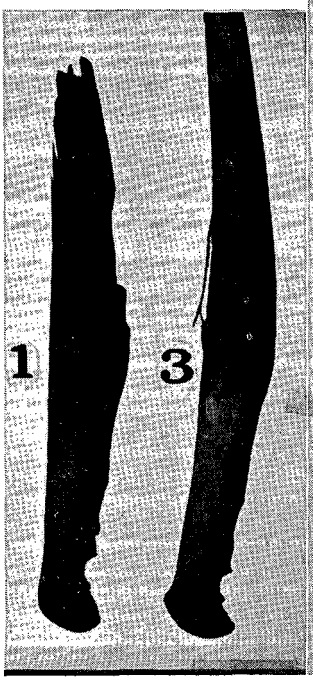
9 unfused *vertebrae:* (Numbered from the atlas downwards, they are Nos. 5, 6, 7, 11, 12, 13, 14, 16, 18).

1 *caudal vertebra,* and the *pygostyle.*

In general, these bones are in very good condition.

I nominate this skeleton as the Holotype of *Pelecanus conspicillatus novaezealandiae.* The Waikaremoana skeleton in the Auckland Museum, and the following bones from Marfell Beach, Lake Grassmere, Marlborough, in the Canterbury Museum: AV. 12,264, incomplete R. humerus, AV. 12,482, L. femur, AV. 13,095, proximal fragment of R. humerus, and AV. 15,089, R. coracoid, are Paratypes.

Fig. 7 — L. Posterior ramus of mandible.
1 Holotype. 3 S.728.



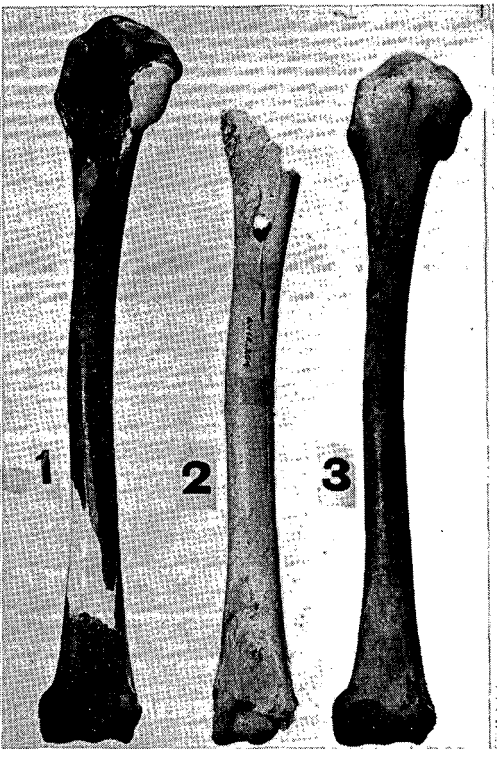


Fig. 8 — R. Humerus. 1 Holotype (joined accurately). 2 A.V. 12,264. 3 S.728.

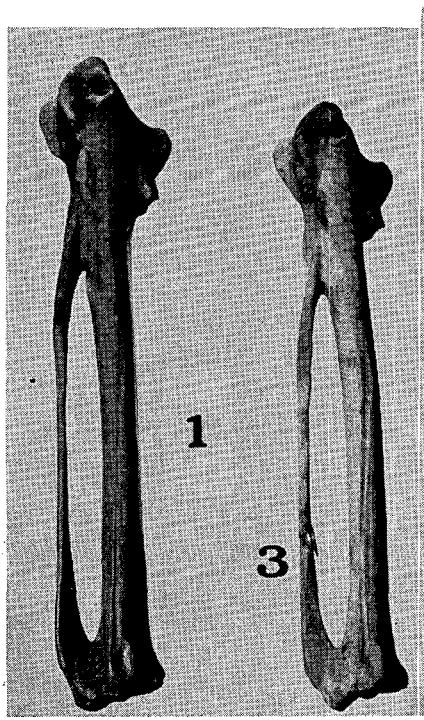


Fig. 9 — R. carpo-metacarpus.
1 Holotype. 3 S.728.

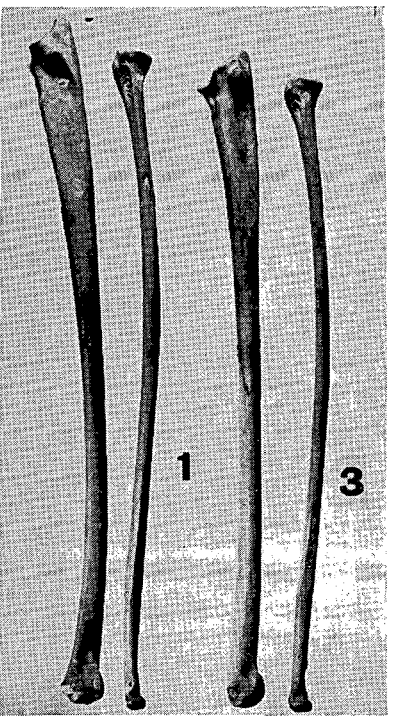


Fig. 10 — R. ulna and radius.
1 Holotype. 3 S.728.

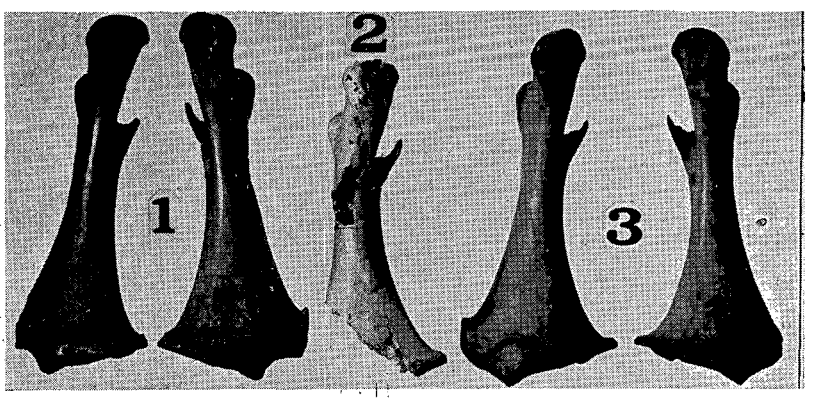


Fig. 11 — Coracoids. 1 Holotype. 2 AV. 15,039. 3 S. 728.

[All Photographs by Frank McGregor

Pelvis	*Holotype*	*S.728*
Length of body (without fused vertebrae and minus pubes)	20.6	20.7 c.m.
Length with 3 fused vertebrae	28.5	28.4
Anterior width	5.85+	5.85
Posterior width	9.0 ± (estimated)	10.3 ±
Sacral length	16.2+ estimated 5	17.4
Width of body across supratrochanteric processes	9.75	8.85
Width at acetabulum	6.1	5.65
Depth of acetabulum	1.8	1.8
Width of acetabulum	1.8	1.9
Narrowest width at "waist"	4.35	4.6
Greatest width of ilio-ischiac foramen	2.35	2.1
Length of ilio-ischiac foramen anterior to fused vertebrae	4.75	5.0
Length to posterior sacrum	25+ estimated 5	25.6

As will be apparent from the above figures, the two pelves are very similar in size in most respects. There are, however, five notable variations. Lacking a greater range of material, I do not know whether they are significant subspecifically. The Holotype is much wider (0.9 c.m.) across the supra-trochanteric processes than S.728, and narrower (0.25 c.m.) at the waist. Over all, from the anterior end of the three fused vertebrae to the posterior end of the sacrum (in the Poukawa pelvis I have estimated a length of 0.5 c.m. for the missing piece) there is no significant difference, but in the sacral length the Holotype is about 0.7 c.m. shorter than S.728. In S.728 the ilio-ischiac foramen is proportionately longer in relation to width, than in the Poukawa specimen. The latter has a much more oval appearance in this opening: that this is indeed a striking difference is best shown by comparing the width/length quotients, a ratio of 118 (Holotype) to 100 (S.728).

S.728 was shot (it was collected by W. D. Campbell in 1900) and some bones were broken, apparently by shot-gun pellets. The right ischium is cracked posteriorally, and there is room for about 1 m.m. error either way in the measurement.

The same bone in the Holotype has a piece missing and my estimated width there is obtained by measuring from the centre of the sacrum to the left ischium, and doubling the result. From this, the Holotype is at least 1 c.m. narrower than S.728, in this part of the body. It is very apparent, from comparing the two pelves, that the ischia in the Poukawa specimen diverge at a much lesser angle than they do in S.728, i.e. they are more nearly parallel.

Mandible: The only part which is measurable in the Holotype is the left posterior ramus: where the other fragments can be compared with S.728 they are stouter.

	Holotype	S.728	A.V. 16,045 *P. onocrotalus*
Width of posterior ramus	3.6	3.6	3.95
Height of posterior ramus	2.8	2.7	2.9
Greatest height of ramus	2.5	2.1	2.3

Tibio-tarsus	Length	Proximal	Mean	Distal
Waikaremoana*:	20.3	3.77	....	2.62
Holotype Poukawa:	R.20.7	3.9 (2.8) (6)	1.5	2.5
A.M. 1014*:	17.8	3.1	....	2.6
S.728:	R.19.2	3.9 (2.7) (6)	11.4	2.45 (7)
	L.19.3	3.9 (2.65)	1.35	2.45
A.M. 1207*:	17.8	3.1	....	2.2
S.A. individual*:	17.6	3.06	....	2.14
AV.16,045 onocrotalus:	R.21.8	3.95 (2.9) (6)	1.45	2.8
	L.21.8	3.95 (2.9)	1.4	2.8
Tarso-metatarsus				
Waikaremoana*:	....	2.5	....	2.69
Holotype Poukawa:	R.13.8	2.5	1.05	2.6
	L.13.8	2.6	1.1	2.6
A.M. 1014*:	....	2.5	....	2.7
S.728:	R.12.95	2.4	1.05	2.45
	L.12.9	2.4	1.055	2.55
A.M. 1207*:	....	2.4	....	2.7
Q.M. individual*:	....	....	....	2.15
Q.M. maximum*:	....	....	....	2.4
S.A. individual*:	....	2.24	....	2.18
AV. 16,045 onocrotalus:	R.14.4	2.9	....	3.0
	L.14.4	2.8+	1.4	3.0
Fibula				
Holotype Poukawa:	R.....	1.3	....	....
	L.8.1+ (tip absent)	1.3	....	....
S.728:	R warped	1.3	....	....
	L.11.5	1.3	....	....
AV. 16,045 onocrotalus:	R. 8.1	1.2	....	....
	L. 8.1	1.2	.....	....

Coracoid	Length	Proximal	Mean (1)	Distal
Waikaremoana*:	14.5	....	....	....
Holotype Poukawa:	R.14.7 L.14.6+	2.9 2.9	1.75 1.8	6.1+ ....
AV. 15,039 Lake Grassmere:	Too worn to measure.	2.7+	1.8	Too worn to measure.
A.M. 1014*:	13.0	....	....	....
S.728:	R.13.9 L.13.9	2.35 2.35	1.7 1.65	6.2 6.0+ (Missing Piece)
A.M. 1207*:	11.9	....	....	....
Q.M. individual*:	12.0	....	....	....
Q.M. maximum*:	14.3	....	....	....
S.A. individual:	11.7	....	....	....

Scapula		
Holotype Poukawa:	L. distal end absent	3.2
S.728:	R.12.9 (cartilage not fused)	3.2
	L.13.2	3.3

Pygostyle	Length	Height	Width
Holotype Poukawa:	5.6	2.55+	1.15
S.728:	4.6+ (tip missing)	2.8	1.0

It will be seen that the difference in maximum height of the ramus between the Holotype and S.728 is 0.4 c.m. larger when the total measurement is considered, and 0.2 c.m. higher than the generally much larger *Pelecanus onocrotalus*.

The figures speak for themselves. Although some of the measurements of the larger Australian skeletons approach those of the New Zealand specimens, over-all the latter are much bigger. This is particularly shown in the length of the limb bones.

Because of their weathered nature, not all measurements are possible on the Lake Grassmere bones, but comparison with the Poukawa skeleton and S.728 shows that they also belong to the larger group. Measured from the distal end to the beginning of the scar for the acrocoraco-humeral ligament on the medial crest of the humerus, the results are: Holotype, 24.5, AV.12,264, Lake Grassmere, 24.0, S.728: 23.2 c.m.

Dr. Archey's paper discusses in detail the intraspecific variation in various species of Pelicans, which is indeed considerable, and concludes: "If the Pliocene and Pleistocene species (recorded by De Vis) are to be regarded as ancestral to the modern *P. conspicillatus* the New Zealand form might be regarded as indicating the general diminution in size reached by sub-Recent times."

Dr. Archey was supplied with the maximum and minimum measurements of skeletons in the Queensland and South Australian Museums, but it would, of course, be helpful if more material were available from both Australia and New Zealand.

RANGE OF VARIATION IN NEW ZEALAND AND AUSTRALIAN FORMS

	New Zealand	Australia
Femur:		
Length	12.2-12.8	9.8-11.8
Proximal	3.55-3.6	2.71.3.2
Mid-diameter	1.5-1.6	1.2-1.5
Distal	3.7-3.8	2.9-3.34
Tibio-tarsus:		
Length	20.3-2.07	17.6-19.3
Proximal	3.77-3.9	3.06-3.91
Mid-diameter	1.5(one individual)	1.35-1.4(one individual)
Distal	2.5-2.62	2.14-2.6
Tarso-metatarsus:		
Length	13.8-13.9(one individual)	12.9-12.95(one individual)
Proximal	2.5-2.6	2.24-2.5
Mid-diameter	1.05-1.1(one individual)	1.055(one individual)
Distal	2.6-2.69	2.15-2.7
Humerus:		
Length	35.5-35.7	29.2-34.0
Proximal	5.9-6.1	4.9-5.73
Mid-diameter	2.15-2.3	1.68-1.95
Distal	4.75-4.8	3.9-4.65
Ulna:		
Length	38.0(one individual)	36.4±(one individual)
Proximal	3.3(one individual)	3.25(one individual)
Mid-diameter	1.5(one individual)	1.4(one individual)
Distal	2.4-2.5	2.1-2.35
Radius:		
Length	37.0-3.71	31.7-35.4
Proximal	2.25-2.3	1.4(?)-2.25
Mid-diameter	1.0(one individual)	0.75(One individual)
Distal	1.5-1.55	1.4-2.0(?)
Coracoid:		
Length		117-143
Carpo-metacarpus:		
Length	16.7(one individual)	15.3(one individual)

Humerus	Length	Proximal	Mean (1)	Distal
Waikaremoana:	35.7	5.9	2.3	4.8
Holotype Poukawa:	R.35.5 L.....	6.1 6.1	2.15 2.15	4.7 4.75
AV. 12,264 L. Grassmere:	.....	....	2.2	....
A.M. 1014*:	33.5	5.4	1.7	4.4
S.728:	R.33.3 (*33.4) L.32.05	5.7 (*5.73) 5.7	1.9 (*mean1.95) 1.9	4.6 4.62
A.M. 1207*:	30.9	5.1	1.8	3.9
Q.M. individual*:	29.2	5.1	....	4.0
Q.M. maximum*:	34.0	6.0	....	....
S.A. individual*:	30.3	4.9	1.68	4.05
AV. 16,045 India onocrotalus:	....	....	2.2	5.2
Ulna				
Waikaremoana*:	....	....	....	2.5
Holotype Poukawa:	R.38.0	3.3	1.5	2.4
A.M. 1014*:	....	....	....	2.2
S.728:	R.36.4± (2)	3.25	1.4	2.35
A.M. 1207*:	....	....	....	2.1
S.A. individual*:	....	....	.....	2.16
AV. 16,045 onocrotalus:	R.42.0 L..... (3)	3.7 3.65	1.4 1.4	2.7 2.7

The Waikaremoana skeleton, judging from its situation, is probably some thousands of years old. The Poukawa specimen was found in association with man (we are awaiting C.14 dates for this site), and three of the four bones from Lake Grassmere are from the sand above the Moa-hunter deposits there, although probably derived by wind action from them. The fourth, the femur, almost certainly ante-dates the human occupation at the site. As all the New Zealand bones so far discovered are considerably larger than the Australian form, although excepting the pelvis there is little difference otherwise between those from the two countries, as stated above, I conclude that the New Zealand bird is of sub-specific status.

Radius	Length	Proximal	Mean	Distal
Waikaremoana *:	37.1	2.25	....	1.55
Holotype	R.....	2.3	1.0	1.55
Poukawa	L.37.0	2.25	1.0	1.5
A.M. 1014*:	34.5	2.1	....	1.4
S.728:	R.35.4 (*35.5)	2.25	0.75	1.55 (*1.47)
	L.35.25	2.15	0.75	1.6
A.M. 1207*:	32.5	2.0	....	1.4
Q.M. individual*:	32.0	....	....	....
Q.M. maximum*:	35.2	....	....	....
S.A. individual*:	31.7	1.4(?)	....	2.0(?)
AV. 16,045	R.40.7	2.6	1.0	1.65
onocrotalus:	L.....(4)	2.6	1.0	1.65

Carpo-metacarpus:	Length	Proximal	Mean width of index metacarpal	Mean height of index metacarpal	Distal
Holotype	R.16.7	3.5	1.125	0.925	2.75
Poukawa:	L.16.6	3.5	1.125	0.925	2.75
S.728:	R.15.3	3.2	1.075	0.9	2.6
	L.15.3	3.3	1.075	0.875	2.6
AV. 16,075	R.17.25	3.5	1.3	1.1	3.0
onocrotalus	L.17.2	3.6	1.3	1.1	3.0

Femur	Length	Proximal	Mean	Distal
Waikaremoana*:	12.8	3.6	1.6	3.8
Holotype	R.12.2	3.55	1.5	3.7
Poukawa:	L.12.2	3.55	1.425	3.7
AV. 12,482 L. Grassmere:	11.95+(5)	3.3+	1.4	3.55+
A.M. 1014*:	11.8	3.2	1.4	3.3
S.728	R.11.6	31.5	1.4	3.34
	L.11.6	31.5	1.4	3.35
A.M. 1207*:	10.8	3.1	1.3	3.0
Q.M. individual*:	9.8	....	1.2	3.0
Q.M. maximum*:	11.6	....	1.4	3.5
S.A. individual*:	10.3	2.71	1.2	2.9

FOOTNOTES

* Quoted from Dr. Archey.

(1) I measure the narrowest point of a shaft, which enables broken bones to be compared, but when the measurement is taken in the middle of a shaft, as by Dr. Archey, there is usually little, if any, significant difference.

(2) Shaft broken by shot-gun pellet, but joined.

(3) Shaft broken and healed before death of bird.

(4) Ditto.

(?) These figures were probably accidentally transposed in Dr. Archey's list. I have yet to see a radius in which the proximal end is smaller than the distal.

(5) The bone is very worn at the extremities.

(6) The bracketted measurements are taken across the anterior surface. Those given by Dr. Archey, and the first ones in my list, are taken diagonally across the head.

(7) Dr. Archey's measurement is 2.38 c.m. I cannot get this measurement.

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I have included in the Bibliography some references which I have consulted, but which are not cited in the text.

★

SHORT NOTE

TEREK SANDPIPER AT MANAWATU ESTUARY

To the considerable list of transequatorial migrants recorded at Manawatu estuary may now be added the Terek Sandpiper *(Xenus cinereus)*. An individual of this species was seen there on 29/1/66 and 27/2/66 during the only visits to the estuary which the writer made in the summer of 1965-66, and it was also seen, on the latter date, by a party of Wildlife Branch officers, including B. D. Bell. It was a very active bird, particularly on the first occasion, and associated primarily with Banded Dotterels, occasionally with Golden Plovers.

This record extends further southward the known range of this species.

— M. J. IMBER

[At least five Terek Sandpipers are known to have been in New Zealand during the summer of 1965-66. They were widely scattered and the dates overlap. Two spent that summer on the Karaka coast of Manukau Harbour and one on the Miranda coast of the Firth of Thames. On 12/2/66 one was watched by J. C. Davenport in the Ahuriri estuary, Napier. — Ed.]