ESSAY REVIEW: Bird Bones for Beginners

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R. J. SCARLETT. *Bones for the New Zealand Archaeologist.* 69 pp., 329 figs. Canterbury Museum Bulletin No. 4, Christchurch, 1972. $2.00.

Ever since the reviewer was at school (more than 25 years ago) and New Zealand prehistoric sites such as Wairau Bar and Pyramid Valley started to become part of a local natural historian's language, a growing band of archaeologists, spelaeologists and those interested in the subfossil history of New Zealand birds have been asking for a handbook to the identification of bird bones. What they wanted was a sort of osteological Peterson, Alexander or Falla, Sibson & Turbott that would take all the hard work out of identifications and free the worker from complete dependence on memory and a big comparative collection.

Well, here it is at last: Ron Scarlett's unique blend of osteological skill, know-how and perception presented to us in a book-sized manual (8 x 10 inches, soft-covered) on the identification of bones from New Zealand prehistoric sites. The book deals primarily with bird bones (294 of the 329 figures) but dog, rat, seal and tuatara bones are also covered. Though designed for the identification of archaeological material, it is intended that it should be equally useful for the determination of non-archaeological or " subfossil " bird bones.

Coverage:

Ron Scarlett of the Canterbury Museum follows in the osteological footprints of former Directors Julius von Haast and Henry Forbes, and from long experience is very much " aware of the problems concerning bones that confront the field archaeologist " (preface). He has set out to provide archaeologists " and others who have occasion to identify bones" (p. 25) with a manual " directed specifically to their needs " (preface). As it is " impossible to illustrate every bone of every bird . . . . which may be found in New Zealand middens," he has " selected birds representing each group except the cuckoos (which have not yet been found in New Zealand archaeological sites)" and given illustrations and measurements of the main bones (usually femur, tibia, metatarsus, humerus, ulna, radius, coracoid, scapula and sternum). He gives the moa " scant treatment, as two standard works on this group are available " (preface). The " scant treatment " must refer to the number of illustrations only (one figure each of a *Pachyornis mappini* femur, tibia and metatarsus) as the text on this group (pp. 20 - 22 and caption to fig 5) contains some of the most important statements about moas published since the " two standard works " referred to by Scarlett, Archey's Auckland Museum Bulletin *The Moa* (1941) and Oliver's Dominion Museum Bulletin *The Moas of New Zealand and Australia* (1949).

In the Canterbury Museum manual there is a useful section (pp. 1 - 2) on the excavation, removal and repair of bones, which the

author justifiably regards as " elementary " but *very necessary* as " few things infuriate the laboratory worker more than to receive bones for identification, then to have the job made more difficult than necessary, because they have not been handled with care . . . When I see bones or artifacts carelessly packed, I suspect the standard of archaeological work is generally low." Page 2 has a very important section on measuring bird bones, explaining precisely the method followed by Scarlett. In this branch of applied osteology where bone dimensions are so widely given and quoted, it is important to know how such figures are obtained. Archey (1941: 13) gives the details of the measurements he used, but Oliver (1949) unfortunately does not. To quote Scarlett again " it does not matter which method is followed, *provided that one states where the measurement is taken* " (author's italics). After reading this section your reviewer now knows how others measure the " width of the shaft " the " M " of a bird limb bone ! Measurements throughout the text of Scarlett's manual are given in centimetres where most workers would expect to find millimetres used. The same figures are involved naturally, but a decimal point is used in every dimension (69 times on page 15 for example). This involves more typesetting, is not easy to follow with the eye and introduces the possibility in future work of the misplacement of points by human error in manuscript, printer's proof or published page. My strong advice to users of this manual, and to scientists in general, is to use millimetres wherever possible (at least for dimensions under 1000 mm, i.e. 100.0 cm).

A straightforward section on the skeleton (pp. 3 - 4) explains clearly and precisely all the technical bone names used in the text and indeed covers " about all the osteology which a field worker need master." For more detailed information the user is referred to a useful bibliography (pp. 26 - 28). Unlike many contemporary osteologists Ron Scarlett has always used the full technical terms *tibio-tarsus, tarso-metatarsus* and *carpo-metacarpus* (all strictly correct in birds) where Archey, Oliver and others would use the deliberately shortened, more familiar forms *tibia, metatarsus* and *carpus*. Echoing Scarlett's words on measurements, one could say that it does not matter which series of terms is used, provided that one realizes that the full terms are strictly correct and then uses either the full terms (as Scarlett does) or the shortened forms (as your reviewer does), but does not mix the two.

The main body of the text follows (pp. 4 - 22) where " typical birds of each group " are discussed from an osteological point of view, the size ranges of their limb bones are given and the bone illustrations for each selected species are listed. There are usually at least 9 figures for each illustrated species, but some such as the Yellow-eyed Penguin and the etxinct Eagle *Harpagornis* have as many as 14 figures. The 22 main New Zealand orders and families represented in local archaeological and subfossil sites are dealt with. These range from kiwis to wattle-birds, and include among others

petrels, ducks, rails, parrots, crows and moas, but exclude groups of small birds such as swifts, wrens, warblers, flycatchers, etc. Apart from the section on moas, where all recognized species are listed but not dealt with in detail, 68 species, subspecies or geographical forms of New Zealand birds are discussed and their measurements tabulated, 31 of these being illustrated as representatives of their systematic groups. This is a truly magnificent and representative coverage and quite unlike any other practical manual on the identification of bones (bird, mammal or fish) known to the reviewer.

Finally, we have what must be regarded as the most important part of the manual, the 33 full page plates with their 319 individual drawings and 15 photographic figures accompanied by 8 pages of detailed explicit captions. The first two plates show a variety of bird bones with labelled parts and standard measurement positions indicated; plates 3 - 4 show humeri; plates 5 - 6 other wing bones; plates 7 - 10 coracoids, scapulae and some crania and mandibles; plates 11 - 19 sterna (pls 11 and 12 are bound in reverse order in my copy); plates 20 - 26 leg bones, mostly in associated species sets of femur, tibia and metatarsus; plate 27 pelves, and plates 28 - 33 assorted tuatara and mammal bones. The drawings throughout appear adequate and are relatively clear, but differ greatly in quality. Plate 1 for example contains 7 superb figures and stands out in comparison with other plates, while plate 9 (note plate numbers appear only in the caption lists) is coarse and shows rough penmanship.

Scales for drawings:

The one great criticism of this book, however, must be levelled against the lack of direct information on the scales at which the illustrations have been reproduced. The only mention of scale in the entire text that I can see is on page 25 " ever-increasing costs have limited the illustrations that could be included. Some have had to be reduced in size, although as many as possible are reproduced in the actual size." This is tantalizing of course as using actual-sized drawings to identify individual bones directly would be absolutely ideal for the user. Scales are *not* given with the captions to the figures where *they should always appear in any scientific work* if not on the plates themselves. The three photographic plates (27, 32 and 33) have scales included, but the other 30 plates do not. The only way to check the scales at which bird bones have been drawn is to check the dimension range for the particular bone involved as given in the text against the actual size of the figure on the plate and see if the figure has been reproduced " actual size " or has been reduced ! For example the White-capped Mollymawk has a humerus ranging from 310 to 317 mm in length (p. 6); the drawing of this humerus in fig. 1 is about 170 mm long, therefore the figure has been reduced to a little more than half size. On the other hand the range for the Yellow-eyed Penguin humerus (p. 5) is given as 65 to 79 mm and the drawing of the humerus (fig. 18) is about 78 mm long, so figure 18 has been reproduced actual size (as has the whole of plate 3

presumably?). No dimensions are given for moa, mammal and tuatara bones in the text so there is no way of checking from information available in this book the scales at which bones of these groups have been drawn.

Does it work ?

As this book sets out to be a manual on the identification of bones from New Zealand archaeological sites it is only fair to see if it can be used in the way it was intended. At first sight it appears as if all those distinctively " New Zealand " bones, or characteristic local traps depending on which side of the identification one is, giving or receiving, are figured on the plates and in many cases discussed in the text. For example we have the shield-like *kakapo sternum* (figs 150, 151) with its " distinctive . . . rounded oblong shape, and very shallow keel "; the M-shaped *kiwi sternum* (figs 184 - 186) with " keel . . . represented by slight bulge only "; the *penguin metatarsus* (fig. 238) " this squat, almost oblong bone could not be mistaken for the bone of any other bird "; the elongate and parallel-sided *Aptornis* (extinct large rail) *coracoid* (fig. 89) which fooled the reviewer utterly when first found in a Wairarapa cave deposit; the splayed *parrot metatarsus* (figs 228, 229, 232) once seen, never forgotten; the *shearwater tibia* (fig. 268) with its extraordinarily elongated cnemial crest; the serrate *tuatara jawbone* or *mandible* (fig. 303) where " the teeth arise directly from the bone . . . without sockets," and the narrow-shafted *dog femur* (figs 315, 316) superficially resembling, in the bird-orientated New Zealand scene, the femur of a slender-legged " bird " about the size of an extinct Eagle or an *Aptornis*. But this is not enough, can the book be used for the determination of ordinary run-of-the-mill bird bones, those without obvious distinctive features that stand out immediately on preliminary examination ?

To attempt to answer this question of use your reviewer tried to identify from scratch an assorted series of 18 different, known but randomly selected bird bones, some freshly prepared, some archaeological and some subfossil. *All except one were identified readily,* though several minor misprints, textual errors and extensions to size ranges were found during this exercise. Thus the weka humerus and metatarsus; the Paradise Duck humerus; the Grey Duck coracoid; the extinct Swan femur, tibia and humerus; the shag tibia; the kiwi femur, and the extinct Crow humerus were straight forward identifications from the illustrations and fitted within quoted sizes ranges. On the other hand the following bones could be identified from the illustrations, but in each case some value judgement had to be made or some problem arose when using textual information: the Red-billed humerus was 75mm long and a perfect miniature of the Black-backed Gull humerus in fig. 22 and within the size range quoted for the former of 70 - 75mm; the extinct Crow metatarsus from the South Island was 74mm long and very slightly above the quoted range of 65 - 73mm for mainland bones (but within the range of 72 - 77mm for

Chatham Island bones); the extinct Eagle humerus was 208mm long and below the quoted range of 216 - 238mm; the extinct Coot humerus is illustrated in fig. 24 not " fig. 25 " as quoted in the text; the size range for the *Gallirallus australis 'hector'* metatarsus given as 6.525 to 6.10cm is either reversed or in error; in the White-capped Mollymawk the size range of the femur quoted as 17.6 to 18.5cm should surely read 7.6 to 8.5cm, while the tibia size range quoted as 31.0 to 31.7cm is completely wrong (the drawing of the tibia in fig. 215 is about 179mm long and is presumably actual size as the associated femur and metatarsus drawings in figs 214 and 216 are within the corrected and quoted size ranges respectively); the Muttonbird *(Puffinus griseus)* humerus was 104mm long and closely matched the illustration for this species in fig. 20 which is about 105mm long, the range quoted, however, is 110 - 112mm yet the other figures on this plate are drawn actual size; finally the Blue Penguin *(Eudyptula minor)* femur at a length of 53mm appeared reasonably close to being a small version of the Yellow-eyed Penguin femur in fig. 236 with a stated range of 77 - 87mm, but no measurements are given for the small *Eudyptula* penguins.

The one failure in this identification exercise was a Blue Penguin tibia 81mm long. It did not appear to match anything on the plates but came close (especially in the distal end) to being a miniature form of fig. 201 which is the extinct Swan tibia with a size range of 183 - 202mm (note swan figs 200 - 202 are wrongly listed in text as 230 - 232). It did not appear as a smaller edition of the Yellow-eyed Penguin tibia of fig. 237 (the only penguin tibia illustrated) with a range of 109 - 134mm, as it differed strongly in the distal end (though similar at the proximal end). Unfortunately for the uninformed user Blue Penguin bones are common in many coastal archaeological sites.

It appears then that for identification purposes the illustrations are indeed very good *if used with care, common sense and thought,* but the user must be on the constant lookout for misprints and textual errors. I think this manual could be *dangerous* if used superficially by an archaeologist or ornithologist who was uninitiated into the basic problems and methods of bone identification. On the other hand it is obviously an important working tool for those actually working on and interested in the identification of bird bones in the New Zealand area.

Scarlett the osteologist:

One of the important and delightful aspects of this book is the light it throws on the osteological knowledge, methods and philosophy of Ron Scarlett himself. His succinct comments on bone measurements (p. 2) have already been discussed in this review while his remarks on the classification of birds (p. 4) could be echoed by many. The difficult to describe kiwi femur is skilfully characterized on page 5 as " curved, and ' twisted ' throughout the shaft " while the

matching tibia is usefully described as being " straight, with little or no ' bridge ' over the foramen at the distal end." It is well known that the bones of the different genera and species of New Zealand shags are very similar and show a wide variation in sibe range within each species but rather surprisingly Scarlett now adds that " individuals with the longest wings are not necessarily those with the longest legs " (p. 9). Scarlett's statements on the variability, wide range in size and the synonymy of the extinct Rail *Aptornis otidiformis* (p. 12) summarize the results of his long-term unpublished study of this distinctive bird. The characteristic ' ralline curve ' of a rail femur is discussed on page 14 as is the differences between the rather similar rail and duck metatarsi (figs 209, 210). On the same page he mentions " a great proliferation of ralline forms in New Zealand . . . a few thousand years ago " and knows of undescribed species from scattered bones; in fact he finds that " the rails are a fascinating group, to the osteologist, but not an easy one with which to work." Pages 20 - 22 on the classification of moas are very important and should be read by anyone with an interest in the systematics of this group. Ron Scarlett's classification is " based on a very extensive acquaintance with Moa, and on [his] present knowledge of their bones and distribution. It is also the simplest " when compared to those of Archey and Oliver " (p. 22). When trying to identify individual moa leg bones Scarlett has found that measurements alone are unreliable " as the legs of different species can be of similar size " and with " broken bones the task is even more difficult," but he has " found that the blood vessel markings on tibio-tarsi are a considerable help, when visible, in distinguishing fragmentary material, as although they vary somewhat between individuals, there is a constant pattern for each genus " (p. 20). He has more to say on this new use for blood vessels on page 22 and in the caption to fig. 5.

One minor but theoretically important concept used by the author three times in this work would find little or no support from other workers in his chosen field. This is the idea of being able to make specific or subspecific separations of bones on geographical distribution alone. It appears on page 14 for the weka " the subspecies can only be distinguished as bones by their geographic distribution," on page 4 for the kiwi "the bones of the large Kiwi are not easily separated to species, except by geographic distribution " and on page 19 for the kokako ' the New Zealand [should read North Island] and South Island subspecies cannot be separated as skeletons, except by their geographic location." If one follows this through one is making the assumptions that the geographic ranges of the forms under discussion were the same in the past and that the named forms (differences presumably based on plumage or external colours, certainly not on size as this would be reflected in the skeleton) actually existed in the past at the time the bones under consideration were deposited (probably safe assumptions in the case of most archaeological material but unsafe when dealing with subfossil bones). In other

words the systematic labels have been put forward to indicate some present-day external differences which can be linked with present-day geographical distribution and one cannot work backwards to the systematic label from the geographic distribution alone.

After commenting on the ingenuity of the Maori in the utilization of bone for artifacts Ron Scarlett has this to say about fieldwork in his own beloved discipline " one of the joys of archaeology is that the next stroke of the trowel may reveal something rare and beautiful. It is that thought, I think, that keeps many of us patiently working under a blazing sun or in freezing cold, and the New Zealand archaeologist experiences plenty of both " (p. 25).

Errors, ommissions and comments:

There is an unusually large number of misprints and examples of bad editorial work in this bulletin; in fact it is clear that the proofs could never have been seen by the author. Apart from those mentioned already in this review one finds " *Pteredroma* " for *Pterodroma* on page 7, " *Pelecanoider urinatric* " for *Pelecanoides urinatrix* on page 8, " *novae hollandiae* " as two words on page 8 but correctly written as one word on page 15, " secual " for sexual on page 14, " *lönnbergi* " on page 15 when the Rules of Zoological Nomenclature state that a diaeresis must not be used in a scientific name, capitalization of specific names twice on page 15, " *Staigops* " for *Strigops* on page 17, " agreemtn " and " Swam " for agreement and Swamp on page 20, " *forstoi* " for *forsteri* on page 23, " Soothy " for Sooty in caption to fig. 46, and " ulna " and " femur" transposed in the captions to figs 311 and 312. Figs 306 and 310 are not illustrations of the Southern Fur Seal despite their listing on page 23.

The spacing between paragraphs, headings and within tables of measurements differs radically in various parts of the text (compare page 17 where the table at the top is double-spaced, that in the middle partly double-spaced and that at the bottom single-spaced with page 15 where the spacing is even and good) and sometimes becomes confusing to the eye (there is a larger gap between " Radius " and " Coracoid " in the table at the top of page 17 than between the section on the Kakapo and that on the South Island Kaka on the same page; the first paragraph of text on page 10 is dealing with *Cnemiornis* in the first line, yet the table which follows without a break gives measurements of *Chenopis*). On most pages paragraphs start with an indented line (as on page 11 for example) but on some they do not (page 20 for example). The method of indicating the number of individual bones measured to give the size range quoted for a skeletal element changes midway through the text (compare page 13 with page 19) and the only key to the method used in the later tables is given in the lower table on page 16. There is no contents page.

As the book will primarily be used for the identification of individual unassociated bones the user will find those plates devoted to one skeletal element only (e.g. pls 3 - 4, humeri) easier to use than

those with several different elements illustrated, especially plates 20 to 24 with associated sets of leg bones. The association of the femur, tibia and metatarsus of each species together on the one plate would be a help if part or whole skeletons were being identified but is frustrating and confusing to the eye when attempting to make direct comparisons while holding a single unassociated leg bone in the hand. Annotation of the plates in this manual is recommended. Your reviewer found that the addition of generic names alongside drawings, adding straight lines linking the three leg elements of each species on plates 20 to 24, putting scales or reminder marks on plates with drawings reproduced less than actual size, as well as adding the occasional Peterson-type arrow to indicate some morphological feature found useful or distinctive greatly increased the usefulness of these plates. May I say that it helped bring the bare bones of this osteologcal atlas into systematic and more useful " life " ? The Starbrite-type, dimple-surfaced paper used throughout the book is of high quality but not easy to write on with ink or soft pencil.

With the qualifications listed above I would have no hesitation in recommending this book for those *seriously* interested in the identification and study of prehistoric bird bones in the New Zealand area.

Postscript:

By coincidence a book along very much the same lines as Ron Scarlett's manual, but dealing with European Mammal bones, was recently reviewed in *Nature* (Vol. 238, August 25, 1972, p. 474) and has been drawn to my attention by the Editor of *Notornis.* It is a bilingual (English/German) *Atlas of Animal Bones for Prehistorians, Archeologists* [sic] *and Quaternary Geologists* drawn by Otto Garraux and published by Elsevier, Amsterdam, London and New York, 1972. The reviewer, I. W. Cornwall (himself the author of a book *Bones for the Archaeologist* referred to by Scarlett in his text and bibliography), had this to say about the new atlas, " the illustrations do not pretend to be complete, but are confined to the principal bones . . . [of] domestic species and those usually hunted for food or fur, as well as . . . representative members of their orders . . . they should enable some opinion to be formed, even by non-osteologists " as to whether the remains belong to illustrated species or members of the same group. Cornwall considers that " within its chosen limits, this book fills a decided gap in the literature available to workers in the field, and may confidently be recommended to them."

By one of those unexplained quirks the study of animal bones has become distinctly better documented and more straightforward in both hemisphers at almost exactly the same time.

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