STILTS NESTING AT ARDMORE, 1950-51 SEASON.

By A. F. Stokes, Ardmore, Papakura.

One pair of stilts nested on my farm this season (1950-51). The first nest met with misfortune. The female had been incubating for 24 days, when, on September 29, 1950, a cow ran over the nest and broke all the eggs. The birds were not to be deterred, however, for on the ninth day after the loss of the first clutch, a new nest had been made and an egg laid.

The four eggs were laid on October 8, 9, 10 and 11. The first three eggs were marked on the days they were laid, the fourth it was not necessary to mark. Incubation commenced early on October 10.

Hatching.—November 3, at 7.30 a.m., two chicks, Nos. 2 and 3, had hatched and left the nest, while No. 1 had just broken open the egg, the marked shell still adhering to the chick. The fourth egg was not then chipped, but it hatched on November 4 at noon.

Flying.—November 29, young birds stretching wings. December 1, one flew five yards. December 2, one flew about four chains, one three yards and the other two ran. December 3, three flying. December 4, three flying strongly, the other missing. (It was not seen again.) December 6, now flying freely. December 7, the family departed.

The incubation period, including October 10, was 25 days for each chick; No. 4, of course, one day behind the others as to beginning of incubation and hatching.

The hatching to flying period was 29, 30 and 30 days, taking December 2 for one and December 3 for the other two as their first days of flight. It is, of course, not known which bird was lost. If No. 4 survived, then one day would have to be deducted from one of the tallies.

Both incubation and hatching to flying periods are normal according to the records shown in "N.Z. Bird Notes," Vol. 3, No. 4, p. 108.

This was a very fine brood, even in size, active and healthy. As small chicks they behaved in a manner I had not previously witnessed. When feeding they were seldom more than one yard apart and often kept so closely together as to touch each other. Usually chicks scatter widely, only coming together to be brooded by a parent when cold or needing rest.

REVIEW.

The Moas of New Zealand and Australia, by W. R. B. Oliver. Dominion Museum Bulletin, No. 15, Wellington, 1949.

This book marks an important advance in the study of the Dinornithiformes. Until it appeared, the standard work was Dr. Gilbert Archey's "The Moa," (Auckland, 1944). Dr. Oliver's conclusions differ in many particulars from those of Dr. Archey.

The book under review begins with a summary of the history of the discovery of moa remains and a survey of the chief deposits. It goes on to consider the moa's structure and classification, follows this with a description of the genera and species, and ends with a discussion of their habits, origin, evolution and geological history, and a very useful bibliography, arranged according to subject. Incidentally, since no one is omniscient, neither the bibliographies of Archey nor Oliver, although very extensive, are complete, e.g., the second edition of Hutton's "The Lesson of Evolution" contains several pages of discussion and measurements of **Syornis casuarinus–Emeus crassus**, which they do not mention.

Dr. Oliver proposes several new species, sub-genera and genera and restores some species which Archey had suppressed, while rearranging others which had been founded on mixed bones. The new sub-genera for **Pachyornis** are **Mauiornis** and **Pounamua.** Two species formerly classified as **Eurapteryx,** the very broad-billed **exilis** and **haasti,** have been placed in a new genus, **Zelornis.** This new genus may not really be necessary, as **haasti** cannot be separated from **gravis** except by mandibulary and pre-maxillary characters, but I consider Archey was wrong in suppressing **haasti,** which he regarded as synonymous with **gravis.** The Canterbury Museum collection contains, as well as the type of

haasti, a number of crania, premaxillae, and mandibles which leave no doubt as to the necessity of recognising the specific distinction, and one very old, massive skeleton from Central Otago (A.V. 8427) lacking only the mandible, tarso-metarsi and one set of phalanges. This skeleton has the tracheal rings largely fused, with a very pronounced loop, and confirms the 3-4-4 phalangeal formation suspected, but not hitherto known for this species.

Oliver regards **Pachyornis pygmaeus**, which Archey accepts, as synonymous with **Euryapteryx geranoides**. In **Pachyornis** the new species are **septentrionalis**, **murihiku**, and **australis**, and in this genus Oliver places the part femur from the Queensland Post-Tertiary, described in 1884 by De Vris as **Dinornis queenslandiae**. Dr. Oliver examined this bone and publishes five clear photographs of it.

In **Euryapteryx** there is one new species, **tane**, and as mentioned above, **exilis** and **haasti** are transferred to **Zelornis**. Because the leg sizes of **Anomalopteryx didiformis** and **A. parvus** were connected by intermediate measurements, Archey placed them both under **A. didiformis** and transferred **oweni** to **Pachyornis**. Oliver restores **oweni** to **Anomalopteryx** and recognises both **parvus** and **didiformis**, while acknowledging the overlapping in size between the two latter, mainly because the typical **parvus** is small and slender, while **didiformis** is stoutly built. In the Canterbury Museum material I have noticed differences in the crania and pelves as well as the legs, which incline me to believe that Oliver may be right.

On the other hand, Oliver also separates **Megalapteryx didinus** from **M. hectori**, which Archey had united, but on examining a series of leg-bones of this genus from Notornis Valley, Te Anau, I found a continuous range from below the smallest **hectori** measurements given by Archey or Oliver, up to the **didinus** size. The smallest and largest of the tarso-metatarsi, for example, when contrasted looked very different, but no significant break in size could be seen in the intermediate bones.

In **Dinornis**, **gazella** and **hercules**, are new species, **hercules** being founded on a tibia and a few other bones. Reviewing the history of the classification of the moa and having recently untangled in Canterbury Museum the confusion of the past which had resulted in specimens of the same species being labelled under three or four names and the same name being applied to more than one species, I am suspicious of new species founded on size differences alone. Dr. Oliver removes **Pachyornis** from the sub-family **Anomalopteryginae**, mainly because of the character of the pre-orbital plates, and transfers it to **Emeinae**. With this I can hardly agree. The general character and proportions of the skull, particularly those of the temporal fossae and ridges, pre-orbitals, squamosals and the structure of the pre-maxilla and mandible of **Pachyornis** are much closer to **Anomalopteryx** than to **Emeus** or **Euryapteryx**; also, although this point may not be so important, **Pachyornis** has the usual 3-4-5 phalangeal formula, whereas **Emeus**, **Euryapteryx** and **Zelornis** are distinguished by the 3-4-4 formula.

Another point of disagreement is fig. 22, a photograph of the first egg found at the Wairau Bar moa-hunter burial ground and now in the Dominion Museum. The caption reads "Egg of **Pachyornis elephantopus (?)**. . ." and it is listed as such in the text. As, however, nearly all the moa remains from Wairau Bar are of **Euryapteryx gravis** and as so far no **Pachyornis** has been found there, the egg is very probably that of **Euryapteryx gravis**, as are the other Wairau Bar eggs. It has the characteristic longitudinal pitting of **gravis**.

The book is remarkable for the numerous photographs and line-drawings which illustrate it, and which add greatly to its usefulness. The generic and specific descriptions are carefully worked out—a great deal of work has been devoted to the skull—the lists of measurements are in the main adequate, and it is indispensable for anyone working on the moa. It is also of considerable interest to ornithologists in general.—R. J. Scarlett.

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