Remains of the Apteryx.

In the fluvial deposits and in the cavern at the base of Tongariro, in the North Island of New Zealand, bones of the *Apteryx* have been discovered so associated with those of *Dinornis*, *Palapteryx*, *Aptornis* and *Notornis*, as to lead to the conclusion that they had been buried at the same period and were of equal antiquity. Most of these remains, of which a femur (fig. 6), and a tarso-metatarse (figs. 7 & 8) are figured in Pl. LI., agree in size and other characters with the corresponding parts of the existing species (*Apteryx australis*): but amongst the specimens transmitted by Governor Grey from the cavern at Tongariro there is a femur, which agrees in size with that of the smaller species of *Apteryx* figured and described by my friend Mr. Gould under the name of *Apteryx Owenii*.

The shaft of the femur of the *Apteryx* is characterized by the convexity of the fore part of the shaft in the direction of its axis, which is due, not only to a slight bending of the whole shaft forwards, but to an enlargement in that direction of the middle of the fore part of the shaft: the trochanter does not rise much above the neck and head of the bone: its anterior border, which is thick and rounded, is produced: the broad outer and back part of the condyle is impressed by coarse irregular grooves and pits. Two intermuscular ridges diverge from the middle of the back part of the bone to each condyle. The fore part of the outer condyle is slightly inclined inwards. There is no 'foramen pneumaticum.'

The tarso-metatarse (figs. 7 & 8) presents the general characters of that compound bone in the *Palapteryx*: but the intercondyloid tubercle is relatively higher, and the inner border of the entocondyloid fossa is more convex: the ectocalcaneal process is also better developed and more distinct from the mesocalcaneal one: the chief tendinous groove lies, however, between this and the entocalcaneal process. The back part of the mesometatarse projects and supports, as a buttress, the mesocalcaneal process: on each side of this are the interosseous foramina which converge as they extend forwards, but open separately into the anterior fossa below the proximal end of the bone. This fossa is relatively larger and deeper than in *Palapteryx* or *Dinornis*, but is not extended so far down the bone as in *Notornis*. The rough articular depression (i, fig. 7) for the syndosmosis of the hallux is well-marked. The meso-metatarse advancing forwards at its lower half, makes a median prominence at that part of the common shaft: the groove between it and the ectometatarse is well-marked, and just before its termination it shows a small perforation from before backwards: this is the most distinctive mark between the tarso-metatarse of the *Apteryx* and that of the *Palapteryx*. The inner condyle is the least produced, the middle one the most, and in a somewhat greater degree than in the *Palapteryx*. The trochlear groove deeply impresses the whole extent of the middle condyle: it is more feebly marked on the lateral condyles, except posteriorly where the lateral border of each is produced backwards.

1 Zool. Trans. vol. iii. p. 379. pl. 57.
When the general results of the restoration of extinct species and their relations to existing species of the different continents and islands of the globe are first received, they commonly suggest the idea that the races of animals have deteriorated in respect of size. The more striking phenomena first and most strongly impress the mind, which contrasts, for example, the great Cave-Bears of Europe with the actual Brown Bear, the Megatherioids of South America with the small existing Sloths, and the gigantic Glyptodons with the Armadillos. The huge Diprotodon and Nototherium suggest a similar contrast with the Kangaroos of Australia; and the towering Dinornis and Palapteryx with the humble Apteryx of New Zealand. But the comparatively diminutive animals of South America, Australia and New Zealand, that form the nearest allies of the gigantic extinct species respectively characteristic of such tracts of dry land, are yet specifically if not generically distinct from them, nor have such small species been more recently introduced. In England, for example, our Moles, Water-voles, Hares, Weasels, Stoats, Badgers and Foxes are of the same species as those that existed when the Hippopotamus swam the rivers, the Hyæna, Bear and Lion lurked in the caves, and the Rhinoceros and Elephant trod the land. So likewise the remains of small Sloths and Armadillos are found associated with the Megatherium and Glyptodon in South America; and the fossil remains of species as diminutive as the present Kangaroos and Dasyures occur abundantly in Australia with those of herbivorous Marsupials as large as Tapis and Rhinoceroses, and of carnivorous Marsupials as large as the Lion or Tiger. So likewise in New Zealand we find that the small Apteryx and Notornis have co-existed with the great Dinornis and Palapteryx.

We have not a particle of evidence that any species of bird or beast that lived during the pliocene period has had its characters modified in any respect by the influence of time or of change of external influences. In proportion to its bulk is the difficulty of the contest which, as a living organized whole, the individual of such species has to maintain against the surrounding agencies that are ever tending to dissolve the vital bond, and subjugate the living matter to the ordinary chemical and physical forces. Any changes, therefore, in such external conditions as a species may have been originally adapted to exist in, will militate against that existence in a degree proportionate, perhaps in a geometrical ratio, to the bulk of the species. If a dry season be gradually prolonged, the large Mammal will suffer from the drought sooner than the small one: if any alteration of climate affect the quantity of vegetable food, the bulky Herbivore will first feel the effects of stinted nourishment: if new enemies are introduced, the large and conspicuous quadruped or bird will fall a prey, whilst the smaller species conceal themselves and escape. Smaller animals, also, are usually more prolific than larger ones.

The actual presence, therefore, of small species of animals in countries where larger species of the same natural families formerly existed, is not the consequence of any gradual diminution of the size of such species, but is the result of circumstances, which may be illustrated by the fable of the ' oak and the reed ': the smaller and feeble
animals have bent, as it were, and accommodated themselves to changes which have destroyed the larger species. We find, nevertheless, that the same peculiar forms or families of animals exist, and characterize particular portions of dry land, e. g. South America, Australia, and New Zealand, at the present day, as at a period long antecedent to Human history or existence; and although many species have perished, there has been no general sweeping away of the peculiar aboriginal land animals of those continents or islands. But just as the smaller Sloths and Armadillos still linger in South America, so the smaller Kangaroos, Wombats, Dasyures, and other Marsupials have continued to exist in Australia, and a few species of the comparatively diminutive wingless birds of the genera Apteryx and Brachypteryx still dwell in the island where, when probably its extent was far greater, their peculiar families were once much more richly represented and by species on a far larger scale.

DESCRIPTION OF THE PLATES.

PLATE XLVIII.

Fig. 1. Outer or under view of the sternum of a species of Palapteryx.
   2. Inner or upper view of ditto.
   3. Lateral border of ditto.
   4. Anterior border of ditto.
   5. Outer view of the sternum of Notornis Mantelli.
   6. Inner view of ditto.
   7. Lateral border of ditto.
   8. Anterior border of ditto.

All the figures are of the natural size.

PLATE XLIX.

Restoration of the foot of Palapteryx robustus.

Fig. 1. Front view of the bones.
   i. Detached metatarsal of the rudimental hallux.
   ii. Distal trochlea of entometatarsal, or that of the second toe: its three phalanges are numbered 1, 2, 3.
   iii. Distal trochlea of mesometatarsal, or that of the third toe: its four phalanges are numbered 1, 2, 3 and 4: a side view of the last is added in outline.
   iv. Distal trochlea of ectometatarsal, or that of the fourth toe: its five phalanges are numbered 1, 2, 3, 4, 5.

Fig. 2. Outline of the proximal end of the compound tarso-metatarsal bone.
   3. Distal ends of the trochleæ of the three metatarsal elements, numbered as in fig. 1: below these are the proximal articulations of their respective proximal phalanges.
Fig. 4. A side view of the metatarsal of the hallux, showing its characteristic twist.
5. Back view of the metatarsal of the hallux.
6. Distal ends of the trochleæ of the three metatarsal elements of the compound bone of the Cassowary (Casuarius indicus): below these are the proximal articulations of their respective proximal phalanges.
7. Outline of the bones of the foot, front view, of an Ostrich (Struthio camelus): the homologous phalanges with those of the Palapteryx are indicated by the same symbols.

All the figures are of the natural size.

PLATE L.

Restoration of the foot of Dinornis rheides.

Fig. 1. Front view of the bones. Only the distal ends of the coalesced metatarsals are figured. The bones of the toes are indicated by the same symbols as in Plate XLIX.
2. A side view of the ungual phalanx of the middle toe.
4. Front view of distal end of ditto, with part of the medullary cavity and its compact walls exposed.
6. Proximal end of ditto.
7. Side view of ditto.
8. Distal end of ditto.

All the figures are of the natural size.

PLATE LI.

Restoration of the foot of Palapteryx dromioides.

Fig. 1. Front view of the bones. Only the distal ends of the coalesced metatarsals are figured. The bones of the toes are indicated by the same symbols as in Plate XLIX.
2. A side view of the ungual phalanx of the third toe.
4. Front view of the tibia of ditto.
5. Back view of the tarso-metatarsale of ditto.
8. Front view of ditto of ditto.

All the figures are of the natural size.