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THE MOA IN AUSTRALIA.[1]

RECENT discovery in Lord Howe's Island has proved that post-tertiary Australia extended far to the east of its present shores. Still it remains true that if among the results of inquiry into the past phases of Australian life there be one suggestive of the possible inter-relation of faunas apparently as distinct in history as in location, it is the discovery of a bird identical with the moas of New Zealand, and of others so near akin to them as to have been pardonably mistaken for them by acute observers. Fossils so like moa bones as the latter must necessarily have been, clearly show that the evolution of these grand birds was not initiated in their recent island home, but that it had already made considerable progress in that portion of a far-reaching continent which we now name Australia, when a period was put to the Nototherian age by desolating outflows of lava over the greater part of the land. Having regard to the improbability of birds so organized effecting a passage over sea under any ordinary circumstances, we can hardly escape the further conclusion that New Zealand's entire separation from the continental area was brought about in time not more remote than that era of intense volcanic activity. One is even tempted to surmise, and it appears very possible to do so without absurdity, that it was one among the consequences of that very manifestation of energy. But this is an instance of speaking without book on a question which should be rigorously, as it may be confidently, left for decision in the hands of New Zealand geologists. Cumulative evidence to the same effect, but still more explicit in kind, is yielded by a relic of a true dinornis. From it we gather that the process of evolution had, in the self-same place and time, accomplished more than we could have justly anticipated without such warrant — the production of that more complete departure from the rest of the *Struthionidæ* which we recognize in the moa type. And again, as the "wolves" and "devils" of Tasmania, the "crowned pigeons" of New Guinea, and the "wallabies" of those and other Pacific islands, have been cut off from the common ancestral seat of their genera, so also have the moas.

It is indeed somewhat strange that the notion of the same genus of birds existing at one time in Australia and at a later period in New Zealand should ever have been thought inadmissible, yet it is difficult to see what other conception of the case should have been in the mind of Sir Richard Owen when he spoke of the advent of an Australian moa as "an exceptional extension of a New Zealand genus to Australia." At the same time it is by no means to be regretted that Owen did take this view, and that in consequence he regarded with suspicion any Australian claim to moa rank, however well accredited. It is to the stimulation of his critical faculty by incredulity that we owe the full assurance that there has existed a bird which, though not dinornis, had much in it pertaining to dinornis, a degree of affinity which under the circumstances could not have been overstated, but, as stated, is quite sufficient to show that Australia was the nursery of the sept.

But let us quit generalities for the more immediate object in hand, viz., a brief review of the recorded occurrences of the moa stock in Australian deposits. As if to excite a hope that such occurrences would be frequent, the first of all the extinct birds of Australia to be drawn from those deposits and made known to science was a struthious bird dwarfing in size not only existing cassowaries and emus, but the emu which was contemporary with it. A thigh-bone of this bird was discovered in the year 1836 by Sir Thomas Mitchell in a brecchia cave in Wellington Valley, New South Wales. It was examined by Sir Richard Owen, and figured by him in an appendix to Mitchell's "Three Expeditions into the Interior of Eastern Australia," 1838. At that time, as we are subsequently informed, Owen determined the bone "to belong to a large bird, probably from its size struthious or brevipennate, but not presenting in its femur characters which justified him in suggesting closer affinities." The study of moa bones in after years enable him, he says, to perceive that in some features of importance the cave femur "resembles that bone in the emu rather than in dinornis." We learn further that "the length of this fossil was 13 inches, the breadth of the middle of the shaft not quite 3 inches," — measurements which are noteworthy, as they render it apparent that in its dilated proportions the bone was much more like the dinornis femur than that of the emu, which has a breadth of only $1\frac{1}{4}$ inches to a length of $8\frac{3}{4}$ inches.

Thirty-three years elapsed before any further light was thrown upon a problem which was sufficiently obscure. It then issued from the Peak Downs, near the centre of Queensland, where in 1869 a well was being sunk. The workmen passed through thirty feet of the residuum of basaltic decomposition, the "black soil" characteristic of "downs" country, then through 150 feet of drift pebbles and bowlders. Lying on one of the bowlders, at 180 feet from the surface, they met with a short thick femur, which was happily preserved from the usual fate experienced by such finds, and, more happily, passed into the hands of the well-known geologist, the Rev. W. B. Clarke. In concert with Mr. G. Krefft, then curator of the Australian Museum, Mr. Clarke compared it with the moa bones, with the result that he felt himself justified in announcing the discovery in the *Geological Magazine* of that year in a letter entitled, "Dinornis an Australian Genus." At Sir R. Owen's solicitation a cast of this bone was sent to him by the trustees of the Australian Museum, and this, in 1872, formed the subject of a communication from Owen to the Geographical Society. After pointing out at length the characters in which this femur resembles dinornis and dromæus (emu) respectively, the examiner decides "that in its essential characters it resembles more that bone in the emu than in the moa, and that the characters in which it more resembles dinornis are concomitant with and related to the more general strength and robustness of the bone, from which we may infer that the species manifested dinornithic strength and proportions of the hind limbs combined with characters of closer affinity to the existing more slender limbed and swifter wingless bird peculiar to the Australian continent." To the bird represented by the fossil Owen gave the name "dromornis," a name significant of his conception of the paramount affinity displayed by its femur. If with that judgment a succeeding observer finds it impossible to completely harmonize his own conclusion, and says so, it is because in this case compulsion rides rough-shod over peril. That the dromornis bone has important features which relate it to the emu rather than to the moa is a position which is unassailable, but that these alone are its "essential" characters is a postulate, and one that has no right to command assent. Essential they are among the dromæan features of the bone; but of the compound dromornis bone as a whole they form but a part of the essentials. The absence of the air-duct communicating with the interior of the bone, a characteristic dinornithic feature, seems quite as important as a structural index to habit as the dromæan set of the head of the bone; and, being strictly dinorthic, it is not "related to the general strength

[1] By C. W. De Vis, M.A., in the New Zealand Journal of Science for May, 1891.