

A New Flightless Gallinule (Aves: Rallidae: *Gallinula*) from the Oligo-Miocene of Riversleigh, Northwestern Queensland, Australia

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ABSTRACT. Flightlessness in birds occurs in a taxonomically diverse array of families, but is best exemplified in the rails (Rallidae). Most flightless species of rails live on islands, where the absence of native mammalian predators may make flight superfluous. Fossil rails from Oligo-Miocene sites at Riversleigh, northwestern Queensland, Australia, are considered to represent a single species of gallinule *Gallinula*, described here as new. Compared with four Quaternary species of *Gallinula* from Australasia (two volant, two non-volant), it shows similarities with the flightless species in the development of the fore- and hindlimb elements and in other characteristics of limb bone morphology associated with flightlessness. These indicate that the Riversleigh species was non-volant. Its relationships with the Quaternary species, including the flightless *Gallinula mortierii*, now restricted to Tasmania, but known from Plio-Pleistocene deposits in eastern mainland Australia, are considered.

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Flightlessness in birds occurs in a taxonomically diverse array of families. Flightlessness per se probably conveys no adaptive value; instead, it is a consequence of morphological changes that convey other selective advantages to the bird (Livezey & Humphrey, 1986). The general consensus is that the loss of volancy results as the flight muscles and pectoral assemblage become reduced as energy-saving processes during ontogeny (Olson, 1973a). Such modifications are advantageous when they do not render the birds more susceptible to predation. The presence of flightless birds on islands is strongly correlated with the absence of predators, particularly mammalian ones. Other factors can moderate this relationship, such as the availability of sufficient cover to avoid or reduce predation,

allowing birds to exist in the presence of predators, and the stability of resources, removing the need for far-ranging mobility (dispersal) (Worthy, 1988).

The developmental mechanisms involved in the loss of flight have been explored in greatest depth in the rails (Rallidae) (Olson, 1973a), the family that best exemplifies the phenomenon. About a fourth of the world's 125 or so living or recently extinct species have lost the power of flight. Most, but not all, of these are populations on islands, where the absence of native mammalian predators has reduced the benefit of the ability to fly. Those species that have become extinct usually did so at least in part from the inability to cope with the introduction of exotic predators. Prominent among the few instances of flightlessness in rails