Chapter 1
Introduction

Institutional Abbreviations

AMNH	American Museum of Natural History, New York, New York, EEUU
BAR	Museo Asociación Paleontológica Bariloche, Río Negro, Argentina
BMNH	Natural History Museum, London, UK
FM	Field Museum of Natural History, Chicago, Illinois, EEUU
MACN	Museo Argentino de Ciencias Naturales Bernardino Rivadavia, Ciudad Autónoma de Buenos Aires, Buenos Aires, Argentina
MLP	Museo de La Plata, Buenos Aires, Argentina
MPEF-PV	Museo Paleontológico "Egidio Feruglio", Trelew, Chubut, Argentina
MPM-PV	Museo Padre Molina, Río Gallegos, Santa Cruz, Argentina
YPM-PU	Peabody Museum of Natural History, New Haven, Connecticut, EEUU

Modern birds are represented by two big lineages, the Palaeognathae (Tinamiformes + Ratitae) and the Neognathae (Galloanserae + Neoaves) (Mindell and Brown 2005). Fowl and waterfowl (Galloanserae) represent the earliest divergence among neognaths (Fain and Houde 2004) (Fig. 1.1). Both clades sum approximately 10,000 species of which 60 % are Passeriformes (the most diverse clade of terrestrial vertebrates). A comparison between the past and the present reveals a complex and hallmarked evolutionary and biogeographic history which would have begun over 65 million years ago (Tambussi 2011).

The origin of living bird lineages has long been the subject of some controversy. Did living bird lineages originate after the extinction of nonavian dinosaurs at the Cretaceous–Paleogene limit (K-Pg, better known as Cretaceous-Tertiary or K/T boundary)? Or did members of these lineages coexisted with nonavian dinosaurs and survived this great mass extinction event? Whereas the data from biogeography and molecular sequencing argue in favor of the coexistence option, the fossil evidence refutes it, placing the "Big Bang" of avian radiation after the

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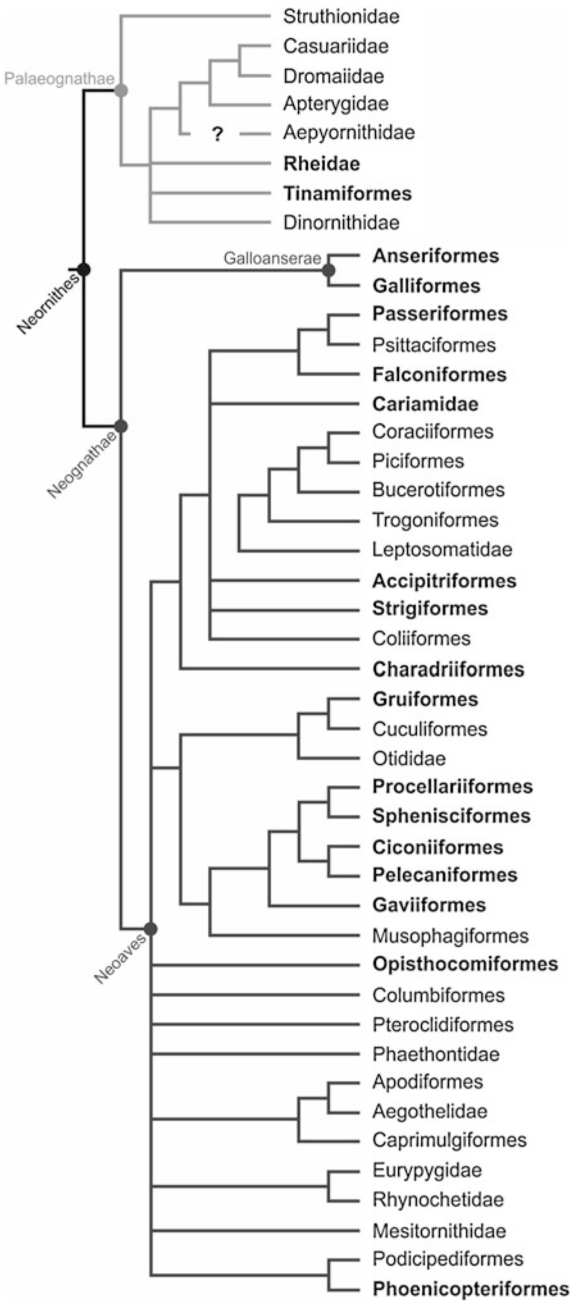

Fig. 1.1 Summary of relationships among main avian lineages following Mindell and Brown (2005)

K-Pg boundary (Fig. 1.2). This latter hypothesis is based on two facts: firstly, most lineages of living birds appear in strata from about 11 to 20 million years ago following the great extinction event at the end of the Mesozoic, and second there

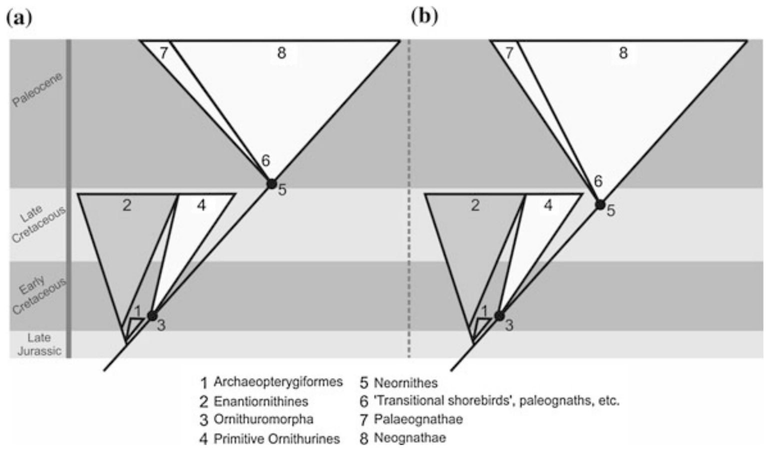

Fig. 1.2 Two modern avian radiation hypotheses. **a** Tertiary radiation hypothesis of Alan Feduccia (1995, 1999). **b** Origin of nearly all modern avian in the Cretaceous, as proposed by Joel Cracraft (1974)

are no Cretaceous fossils remains that can be assigned with certainty to the Neornithes. This scenario was greatly modified some years ago by the finding of a partial skeleton belonging to a new species of Anseriformes named *Vegavis iaai,* about 71 million years old (late Cretaceous, Maastrichtian), from Antarctica, that could be analyzed in a phylogenetic context (Clarke et al. 2005, 2006). From that moment, at least the lineages that include the living screamers, some very primitive geese and the true ducks (Anseriformes), and the close relatives of pheasants and hens (Galliformes) are said to have coexisted with nonavian dinosaurs. This was the first fossil evidence that definitely placed the radiation of modern birds in the Cretaceous. After the K-Pg, the Cenozoic was undoubtedly dominated by mammals and Neornithes birds. Be enough it to say that by the early Oligocene ($\sim$35 million years ago), most of the orders of birds that we recognize today had appeared. During recent decades, a great increase in paleornithological information, especially from Miocene through Pleistocene deposits, has become available but knowledge about South American Paleogene birds is almost stagnant. No small bird remains have been recorded so far.

It is quite complicated characterize the effect of environmental changes on bird communities during the South American Cenozoic. In a recent paper, Tambussi (2011) interpreted the paleoenvironmental, paleoecological, and faunal conditions of the Cenozoic using the four most complete bird assemblages recovered from Neogene sediments of Patagonia and the Pampean region. In this work, we summarized the record of land-bird, the paleoenvironmental changes of South America and Antarctica through Cenozoic, emphasizing the relationships between biomes and the geological forces that, through different climatic-environmental factors, have driven its evolution. We increase the area of interest to South

America and Antarctica. The focal point of this analysis is on terrestrial or arboreal birds but some considerations on aquatic (continental or marine) birds are made.

The temporal focus is on Paleocene–Pliocene fossils but Paleogene avifaunas are poorly known, whereas Neogene (at least Miocene to Pliocene) avifauna has an essentially modern higher level composition. The information came from both our own examination of fossils and the literature review. The data, however, are not homogeneous, since some temporal gaps without, or with only very scanty, information occurs.

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