use molecular techniques to infer an age for ants and from their data estimated a Late Jurassic (ca. 185 mya +/− 36 my) origin. The fossil used in the calibration was *Cariridris bipetiolata* (8), at the time considered a myrmeciine. However, subsequently *C. bipetiolata* was found not to be an ant (and was placed in the Ampulicidae), rendering the calibration incorrect. Two large molecular studies undertook the task of estimating the age of ants (9, 76). These two studies, however, came to different age estimates. Moreau et al. (76) inferred an age of 140–168 myo, and Brady et al. (9) inferred an age of 115–135 myo. Brady et al. (9) further inferred an age of 137–143 myo for crown-group ants plus sphecomyrmines. How do we reconcile this range of dates? Differences in how fossil deposits were calibrated, as well as what fossils were utilized in the analysis, may explain the discrepancy. For instance, Brady et al. (9) utilized a much more complete range of aculeate fossils to calibrate a series of multiple outgroup nodes.

Gondwana: supercontinent that existed in the Mesozoic consisting of Africa, Antarctica, Arabia, Australia, India, Madagascar, New Zealand, and South America

The age estimates of both Moreau et al. (76) and Brady et al. (9) are older than what the fossil record reveals, but given the rarity of Mesozoic ants (**Figure 1**) this is perhaps not surprising. What we do know is that since the discovery of *Sphecomyrma freyi*, myriad fossil discoveries have shown that there was a rather diverse sphecomyrmine fauna in the Cretaceous and that definitive crown-group ants (*Kyromyrma neffi* and the Ethiopian dolichoderine) existed concurrently with them. The apparent absence of ants from Early Cretaceous insect-rich deposits such as the Spanish and Lebanese ambers (110 to 125 mya), the Santana Formation of Brazil (120 mya), and the Chinese Yixian Formation (140–145 mya) suggests ants did not originate before 110–120 mya. The question of the age of ants, however, does demonstrate the necessity of combining fossil ants with molecular divergence dating techniques because fossils provide the critical minimum age estimates for the lineages in question. As divergence dating becomes ever more popular, the need for accurately identified and classified fossil specimens will only increase. Investigations for additional Cretaceous fossils, particularly from ancient Gondwanan localities, will help elucidate the timing of the origin and radiation of these highly successful insects.

SUMMARY POINTS

1. Ants have existed on Earth for at least 100 million years and, based on the fossil record, probably evolved somewhere between 110 and 120 mya.
2. The taxonomic placement of the extinct, ant-like Armaniidae, which are likely the closest relatives of the Formicidae, has been controversial, but there are compelling arguments for why they should not be considered formicids.
3. Although the first Mesozoic ant was discovered in 1967, it was not until the past two decades that a number of important Mesozoic ant discoveries have been made, including, most recently, the discovery of a 93–95 myo crown-group ant assignable to the Dolichoderinae from the Cretaceous of Africa.
4. Recent discoveries have shown that the Cretaceous stem group, Sphecomyrminae, although rare as fossils, was surprisingly diverse morphologically, which implies a diverse array of ancient sphecomyrmine behaviors as well.
5. Despite their appearance in the Cretaceous, it was not until the Eocene that ants became common as fossils, and presumably this increase in fossilized remains is correlated with an increase in the general abundance and ecological dominance of ants.
6. Molecular divergence dating techniques are growing in popularity, and the need for accurate fossil ant identification will only become more acute as more studies rely on fossils for calibration of datasets.