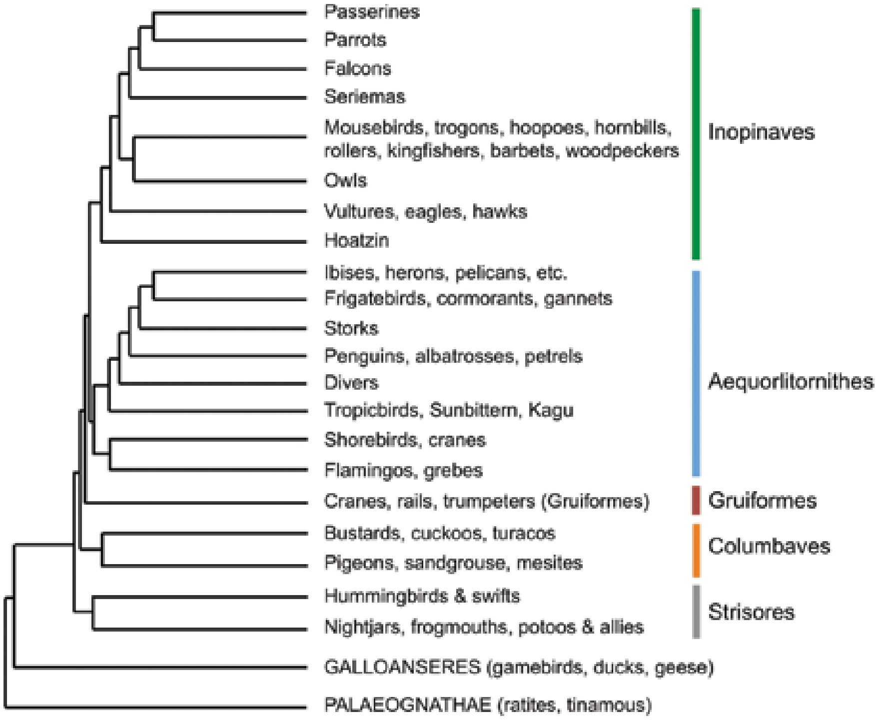
another year, another tree



In 2015 *African Birdlife* reported how genomics had brought new insights into the early radiation of modern birds (March/April 2015, pages 10–11). Erich Jarvis and his colleagues compared the entire genomes of 48 species from 36 bird orders. They founded their 'best' tree on 41.8-million base pairs – one thousand times more sequence data than was used by Shannon Hackett's team in 2008, in what until then had been the most comprehensive attempt to infer the evolutionary history of birds.

Now, less than a year later, a team led by Rick Prum has reported yet another tree, based on sequence data for 198 birds and two crocodiles (*Nature* 526: 569–573). They used a more selective approach, targeting 400 highly conserved nuclear gene regions. Although they didn't have as much sequence data per species, they argue that their much better coverage of avian lineages enables them to better surmise evolutionary relationships.

Once again, there were no big surprises at the largest scale. Birds are still divided into three main groups: the Palaeognathae (ratites and tinamous), Galloanseres (gamebirds and ducks) and Neoaves (all other birds). However, whereas Jarvis et al. split the Neoaves into two groups (Columbea, comprising the pigeons, sandgrouse, mesites, flamingos and grebes, and Passerea, comprising all the other Neoaves), Prum et al. found five groups.

They divided them into the Strisores, comprising the nightjars and allies, swifts and hummingbirds; the Columbaves, with two sub-groups, the pigeons, mesites and sandgrouse (Columbimorphae), and cuckoos, bustards and turacos (Otidimorphae); the Gruiformes: cranes, rails, finfoots and trumpeters; and the Aequorlitornithes, comprising all sea- and waterbirds, again with two sub-groups: flamingos/grebes being basal to the shorebirds, gulls/terns and alcids, and Sunbittern/tropicbirds being basal to all other seabirds and storks, herons, ibises, etc. The fifth group, the Inopinaves, encompasses all remaining land birds, with the Hoatzin being sister to three major sub-groups: diurnal birds of prey (Accipitriformes), owls and the Coraciimorphae, which includes all the 'near passerines' (mousebirds, cuckoo-roller, trogons, hoopoes, hornbills, bee-eaters, rollers, kingfishers, motmots, honeyguides, woodpeckers and barbets) and the Australaves, including the seriemas, falcons, parrots and passerines.

The new arrangement makes sense intuitively. The major radiation among the Neoaves apparently occurred soon after the last mass extinction event some 66 million years ago, when there were lots of vacant niches for birds to exploit. Prum's team suggests that different groups specialised at this time: the Strisores adapted to a nocturnal lifestyle (with swifts and hummingbirds secondarily reverting to being active by day), the Aequorlitornithes exploited aquatic habitats, and so on. The new tree is likely to find favour with birders as many traditional groupings are retained (Gruiformes, Accipitriformes, the 'near passerines', etc.). The more extensive coverage also confirms some relationships that remain debated, such as the diving petrels being placed among the petrels, not as a distinct family.

Is this the last word on the evolution of birds? Probably not; I recently supplied a large consortium with blood samples from sugarbirds and sheathbills; its goal is to generate entire genome sequences for every family of birds. But with each iteration, the differences among trees become smaller. For example, like Hackett et al., Prum's team found that the pelicans were once again the closest relatives to the Shoebill and Hamerkop, but that the Hamerkop was the basal species, not the pelicans. Within a few years I expect there will be little debate as to the broad relationships among extant birds and bird books will increasingly switch to the 'correct' sequence.

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