Birds

1. The vertebrate fossil record, By Johannes Muller
The use of this date, however, has not been free of controversy, which recently culminated in an open **debate** involving both paleontologists and molecular biologists. Page 1069

However, from a strictly paleontological perspective, the mammal–bird split is problematic because: (a) there are not enough fossil localities from the early Late Carboniferous that predate the earliest known evidence of the split, (b) the same is true for the number of fossil localities immediately after the first appearance of amniotes and (c) there are still several long ghost lineages in the phylogeny of early amniotes and their sister taxa. Page 1074

2. Early origins of modern birds, By Michael J. Benton
Two major current phylogenetic questions are hotly **debate**d, however: the origins of Metazoa (multi celled animals), and the origins of modern bird and mammal groups. In both cases, molecular evidence suggests that the point of origin is twice as old as the oldest known fossils. This implies either that half the fossil record of animals, and of modern birds and mammals, is cryptic, or that the molecular conclusions are flawed. Either way, there is a strong challenge to the integrity of molecular phylogenetic analytical techniques, or to claims by palaeontologists that the history of life can be divined from the fossil record. The question of metazoan origins has been **debate**d already in BioEssays. Page 1043

These dramatic claims are one of many challenges to ‘‘traditional’’ morphology-based views. Past experience does not indicate which way the **debate** will go, whether the molecular challenge, or the status quo, will be upheld. Nonetheless, **debate**s such as these have often been heated, and it is worth reviewing the current position. Page 1044

In cases of conflict and error, molecular trees suffer many of the same methodological problems as morphological, for example the choice of taxa in the in group, the choice of out group taxa, the choice and definition of characters, and the choice of algorithm. Results obtained using either technique may be confused by problems of convergence, long branch attraction, and rapid splitting of lineages (star phylogenies). In addition, special features of molecular phylogeny reconstruction cause problems: variable rates of substitution at different sites, differential rates of transitions and transversions, and multiple substitutions at sites. Page 1044

The postulation of rare or cryptic ancestors does not really resolve anything, and is just a restatement of the problem; there is no independent evidence for the proposal that ancestors were cryptic other than the assumption that such ancestors were there and yet have not been found. The proposal fails absolutely on a probability argument: why should some 20–30 lineages, the modern bird and mammal orders reputed to have existed undetected through most of the Cretaceous, all uniformly have remained cryptic until they blossomed forth in abundance and with autapomorphies in place and fully displayed between 70 and 55 million years ago? Page 1047

There are numerous other substantial problems to be considered before accepting date estimates founded on molecular data. As Bromham and colleagues point out, current estimates of specific dates of divergence between various clades of mammals vary enormously, and sometimes by as much as 100%. Page 1049

However, from a strictly paleontological perspective, the mammal–bird split is problematic because: (a) there are not enough fossil localities from the early Late Carboniferous that predate the earliest known evidence of the split, (b) the same is true for the number of fossil localities immediately after the first appearance of amniotes and (c) there are still several long ghost lineages in the phylogeny of early amniotes and their sister taxa. Page 1074

3. Molecular phylogeny of songbirds, By Greg S. Spicer
Relationships among the families of passerine birds have been the subject of many **debate**s over the years (Sibley and Ahlquist, 1990). With the development of new molecular systematic techniques, the **debate** over relationships within the passerines has become even more heated. Page 325

However, despite the attention to this phylogenetic problem, many familial relationships within the Passeriformes remain unresolved. Page 325

Molecular phylogenetic results have been fraught with a lack of resolution, as well, due to the lack of phylogenetic signal in the genes chosen for the studies. Page 326

4. Phylogeny of the avian genus, By John P. Dumbacher
For the phylogenetic analyses, gaps were simply coded as missing data. Although gaps certainly contain additional information, exactly how to code and model the evolution of insertions and deletions is less straight forward and subject to some **debate**. Page 777

5. Multi-locus phylogeny, By Silke Fregin
The relationships among the genera in Acrocephalidae sensu Johansson et al. (2008) and their relationships to other taxa have long been **debate**d based on morphology and zoology. Page 866

6. Mitochondrial marker sequences, By Martin J. Riesing
So far, classification is based on osteological and other morphological traits, but the phylogenetic information of those characters may be blurred by convergence. Page 328

Phylogenetic relationships between Buteo and related genera are also not well understood. Page 328, 329

7. Phylogeny of ''core Gruiformes'', By Matthew G. Fain
Opinions on the systematic relationships of birds in the avian order Gruiformes have been as diverse as the families included within it. Despite ongoing **debate** over monophyly of the order and relationships among its various members, recent opinion has converged on the monophyly of a ''core'' group of five families classified as the suborder Grues. Page 515

For well over a century, avian systematists have **debate**d their phylogenetic relationships and even whether they constitute a monophyletic assemblage. Page 515

8. Phylogeny of Paroaria, By Liliana M. Dávalos
The phylogenetic position of the genus has been controversial, and Paroaria has been assigned to various tribes within the family Fringillidae. Page 234

9. Phylogeny of long-tailed tits, By Martin Päckert
To date there is a lively **debate** on the species status of some narrowly distributed SE Asian taxa as well as on their phylogenetic relationships to other congeners. Page 953

10. A phylogeny of the megapodes, By Sharon M. Birks
Here, we use maximum-likelihood analyses of RDP1 and ND2 to construct our primary hypotheses for megapode phylogeny, but we also take advantage of having two independent estimates of phylogeny to further explore differences in evolutionary dynamics between nuclear and mitochondrial sequences as well as the effects of weighting in parsimony analyses—a topic of ongoing **debate**. Page 409

11. Phylogeny of swiftlets, By Henri A. Thomassen
Due to a lack of distinctive morphological characters, swift taxonomy and phylogeny has always been an area of disagreement. Page 86

12. Specific chicken repeat, By Simone Treplin
While the monophyly of the order Passeriformes as well as its suborders suboscines (Tyranni) and oscines (Passeri) is well established, both on morphological and molecular grounds, lower phylogenetic relationships have been a continuous matter of **debate**, especially within oscines. This is particularly true for the rock fowls (genus Picathartes), which phylogenetic classification has been an ongoing puzzle. Sequence-based molecular studies failed in deriving unambiguously resolved and supported hypotheses. Page 328

However, as most of the evolutionary lineages originated through a rapid radiation during the early Tertiary, phylogenetic relationships within the group have been a continuous matter of **debate**. Page 328

Due to their unique suit of morphological traits, the phylogenetic position of these species within Passeriformes has been the object of extensive **debate** and still remains a puzzle. Page 328

13. Phylogeny of the snubnose darters, By Tamra C. Mendelson

Phylogenetic relationships among snubnose species have been a challenge to resolve at all levels of divergence, from the monophyly of species to deeper relationships among subgenera. Page 1253

At deeper levels, relationships among Ulocentra and closely related subgenera also have generated **debate**. In particular, relationships among Ulocentra and its two closest relatives, subgenera Etheostoma and Nanostoma, have been difficult to resolve. Page 1253

Relationships among species within Ulocentra, however, were not fully resolved in the mtDNA analysis, with multiple cases of species-level paraphyly. Therefore, the monophyly of species, relationships among species, and relationships among subgenera remain an open question. Page 1253

14. Phylogeny of the NewWorld Orioles, By Kevin E. Omland
Unfortunately, phylogenetic relationships within the genus are poorly known, with only a few previous studies providing testable phylogenetic hypotheses. Beecher (1950) studied skull characteristics and nest shape and concluded that there were two distinct lineages of orioles, each of which had evolved independently from different *Agelaius*-like ancestors. Page 224

15. Molecular systematics, By Leo Joseph
Debate concerning their circumscription has most recently centerd on the position of four genera, Neophema, Neopsephotus, Pezoporus and Psittacella, the last two having never been adequately included in sequence-based analyses. Page 675

While recognizing current **debate** over the calibration of rates of molecular evolution (e.g., Lovette, 2004; Ho, 2007), we note that the conventional calibration for mtDNA evolution of 2% per million years (Tarr and Fleischer, 1993) would suggest that the split between Pe. Occidentalis and Pe. wallicus/Pe. flaviventris likely occurred about 3.3 mya, certainly before the Pleistocene. Page 681

16. Phylogenetic relationships, By J. M. Pons
The relationships among gulls are still the focus of controversial **debate**s. Page 686

The skuasalcids clade is sister to a clade including larids, terns, and skimmers, but relationships between these three latter groups remain uncertain. Page 686

Nevertheless, the main source of uncertainty over the timing of gull evolution is the calibration of the tree. Page 696

This situation of multiple incongruence between morphological characters and phylogeny in gulls contrast with the good agreement between plumage patterns and phylogeny in terns. Page 696

17. The evolutionary history of cockatoos, By Nicole E. White
Waterhouse (2006) stated the need for additional Cretaceous fossils before any certainty can be brought to the **debate**. Page 617

However, dating Cacatuidae using 40 mtDNA genomes and well-accepted fossil calibrations also provided insights into the broader **debate** regarding evolution of the Psittaciformes. Page 618

18. Calibration of a molecular clock, By Martin Packert
The ongoing **debate** on the reliability of avian molecular clocks is actually based on only a small number of calibrations carried out under different assumptions with respect to the choice and constraints of calibration points or to the use of substitution model. Page 1

However, the fossil record is poor in many, especially younger avian lineages, and thus fossil dating is almost limited to avian orders and families but fails for clock calibration at the genus, species, or subspecies level. Page 2

19. Phylogeography of giant petrels Macronectes, By N. M. S. M. Techow
There has been much **debate** recently on the suitability of mitochondrial DNA (mtDNA) phylogenies for discerning avian taxonomy, as there is no theoretical basis for associating gene trees with population lineages (Avise, 2000). Page 472

20. The continuum of pigeon evolution, By Gillian C. Gibb
Even the large avian study (169 taxa, 32 kb of nuclear sequence) of Hackett et al. (2008) has not resolved the relationship of pigeons. Page 699

Among the Neoaves just what is the closest relative of pigeons has been an unresolved **debate** for decades. Page 699

21. Phylogeny of the Charadriiform birds, By Tara A. Paton
Because of the difficulties of constructing a robust phylogeny for Charadriiform birds using morphological characters, recent studies have turned to DNA sequences to resolve the systematic uncertainties of family-level relationships in this group. However, trees constructed using nuclear genes or the mitochondrial Cytochrome b gene suggest deep-level relationships of shorebirds that differ from previous studies based on morphology or DNA–DNA hybridization distances. Page 657

The phylogenetic relationships within shorebirds (Aves: Charadriiformes) continue to be a fascinating problem to systematists because hypotheses generated by morphological and biochemical methods are vastly different. Page 657

22. Divergence among neognath birds, By Alison L. Chubb
To date, there is little consensus concerning the phylogenetic relationships among neognath orders, which include all extant birds except ratites and tinamous. Different data sets, both molecular and morphologic, have yielded radically different and often unresolved ordinal topologies, especially within the neoaves clade. This lack of resolution and ongoing conflict indicates a need for additional phylogenetic characters to be applied to the question of higher-level avian phylogeny. Page 140

Higher-level phylogenies of modern birds (subclass Neornithes) have been plagued by lack of resolution and disagreement among different data sets, both morphologic and molecular (reviewed in Cracraft and Clarke, 2001). Page 140

The ZENK tree provides another data set to fuel this unresolved **debate**. Despite growing clarity about relationships at the base of the avian tree (Paleognathae vs. Neognathae and Galloanserae vs. Neoaves) and the potential for an alliance between flamingos and grebes, relationships among most other major lineages of modern birds remain largely uncertain. Page 148

23. New World suboscine birds, By R. Terry Chesser
Species composition of families in the Furnarii (sensu Ames, 1971 and Raikow, 1987), in contrast, has with few exceptions been well defined, but the monophyly and relationships of specific families have been a matter of **debate**. Page 12

24. Molecular evolution in space, By Rauri C.K. Bowie
This split remains controversial and is exemplified by the **debate** over the taxonomic assignment of Olive Sunbirds on Zanzibar Island off the east coast of Africa. Page 70

25. The Five-lined skink, By Briar J. Howes
The hypothesis that Pleistocene refugial dynamics have played a disproportionate role in generating current diversity in North America has proven controversial (Arbogast and Slowinski, 1998; Avise et al., 1998; Klicka and Zink, 1997; Zink and Slowinski, 1995). For example, dates of divergence of many species of birds appear to predate the latter half of the Pleistocene (Klicka and Zink, 1997), a period during which glacial expansion and recession was proposed to have fragmented the range of many ancestral species (Mengel, 1964). Recent evidence suggests that this **debate** over the importance of Pleistocene dynamics is somewhat misdirected. Page 183

26. Analysis of the ‘‘true thrushes’’, By John Klicka
Although the ‘‘true thrushes’’ (Turdinae, sensu Sibley and Monroe, 1990) are one of the most widespread and well-known ‘‘families’’ of birds in the world, their taxonomic affiliations with other lineages, and relationships among constituent genera have long confounded taxonomists. Page 486

27. East Asian Erithacus robin, By Shin-Ichi Seki
The phylogenetic relationship among the Erithacus robins, however, is still a question under **debate** (Kajita, 1999; Ornithological Society of Japan, 2000). Page 899

28. Genetic homogeneity in rosy-finches, By Sergei V. Drovetski
The southern part of the range is inhabited by the three currently recognized species, which have fueled past taxonomic **debate**s. Page 442

29. Diversification of the blue tits, By L. Kvist
The definition of taxonomic units is problematic and has been under strong **debate** for decades. Page 509

30. The Greenside Darter, By Amanda E. Haponski
The question of whether or not to elevate taxa and which species concept to use has been **debate**d and reviewed extensively in the literature (see Zink and McKitrick, 1995; Mayden, 1997; Coyne and Orr, 2004). Page 80

31. Phylogenetic relationships of Finches, By M. A. A. Van der Meij
The fringillids can be divided into two groups, the Fringilla species and the cardueline Wnches (Sibley and Ahlquist, 1990; Stempel, 1987), but there have been many **debate**s about the relationship of the genus Fringilla. Page 97

32. White-chinned and Spectacled Petrels, By N. M. S. Mareile Techow
There has been much **debate** about the definition of a species (e.g. Helbig et al., 2002; Avise, 2004). Page 30

33. Relationships between Clerodendrum, By Dorothy A. Steane
The position of Kalaharia relative to Clerodendrum has long been a source of **debate**. Page 44

34. Evolution of Modern Birds, By M. Andreına Pacheco
This places mitogenomic studies in birds at the core of intense **debate**s in avian evolutionary biology. Page 1927

Debates about the origin of the parrots and cockatoos reflect those of the Neornithes in general, with some studies suggesting that they originated in Gondwana during the Cretaceous. Page 1939

35. Molecular Phylogeny of the Parrots, By Timothy F. Wright
The question of when modern birds (Neornithes) first diversified has generated much **debate** among avian systematists. Page 2141

The timing of the diversification of modern birds (Neornithes) is one of the most contentious issues in avian systematics. At the heart of the **debate** is a mismatch between the fossil record, which includes few modern forms prior to the Cretaceous/Tertiary (K/T) boundary. Page 2141

Debates about the origin of the parrots and cockatoos (Order Psittaciformes, hereafter ‘‘parrots’’ or ‘‘psittaciforms’’) mirror those of the Neornithes in general, with some workers suggesting that they originated in Gondwana during the Cretaceous (Cracraft 1973; Forshaw 1989), whereas others, citing fossil evidence of stem group parrots from Tertiary deposits in Europe. Page 2141

36. Resolving Deep Neoaves Phylogeny, By Renae C. Pratt
Clearly, the root of Neoaves is still under **debate**; however, we now have a number of possibilities to be tested by future analyses. Page 322

References

1. The vertebrate fossil record, By Johannes Muller, Bio Essays, 2005, Volume 27, Pages 1069–1075

2. Early origins of modern birds, By Michael J. Benton, Bio Essays, 1999, Volume 21, Pages 1043–1051

3. Molecular phylogeny of songbirds, By Greg S. Spicer, Molecular Phylogenetics and Evolution, 2004, Volume 30, Pages 325–335

4. Phylogeny of the avian genus, By John P. Dumbacher, Molecular Phylogenetics and Evolution, 2008, Volume 49, Pages 774–781

5. Multi-locus phylogeny, By Silke Fregin, Molecular Phylogenetics and Evolution, 2009, Volume 52, Pages 866–878

6. Mitochondrial marker sequences, By Martin J. Riesing, Molecular Phylogenetics and Evolution, 2003, Volume 27, Pages 328–342

7. Phylogeny of ''core Gruiformes'', By Matthew G. Fain, Molecular Phylogenetics and Evolution, 2007, Volume 43, Pages 515–529

8. Phylogeny of Paroaria, By Liliana M. Dávalos, Molecular Phylogenetics and Evolution, 2009, Volume 53, Pages 234–248

9. Phylogeny of long-tailed tits, By Martin Päckert, Molecular Phylogenetics and Evolution, 2010, Volume 55, Pages 952–967

10. A phylogeny of the megapodes, By Sharon M. Birks, Molecular Phylogenetics and Evolution, 2002, Volume 23, Pages 408–421

11. Phylogeny of swiftlets, By Henri A. Thomassen, Molecular Phylogenetics and Evolution, 2003, Volume 29, Pages 86–93

12. Specific chicken repeat, By Simone Treplin, Molecular Phylogenetics and Evolution, 2007, Volume 43, Pages 328–337

13. Phylogeny of the snub nose darters, By Tamra C. Mendelson, Molecular Phylogenetics and Evolution, 2010, Volume 57, Pages 1253–1259

14. Phylogeny of the New World Orioles, By Kevin E. Omland, Molecular Phylogenetics and Evolution, 1999, Volume 12, Number 2, Pages 224–239

15. Molecular systematics, By Leo Joseph, Molecular Phylogenetics and Evolution, 2011, Volume 59, Pages 675–684

16. Phylogenetic relationships, By J. M. Pons, Molecular Phylogenetics and Evolution, 2005, Volume 37, Pages 686–699 Page 87

17. The evolutionary history of cockatoos, By Nicole E. White, Molecular Phylogenetics and Evolution, 2011, Volume 59, Pages 615–622

18. Calibration of a molecular clock, By Martin Packert, Molecular Phylogenetics and Evolution, 2007, Volume 44, Pages 1 To 14

19. Phylogeography of giant petrels, By N. M. S. M. Techow, Molecular Phylogenetics and Evolution, 2010, Volume 54, Pages 472–487

20. The continuum of pigeon evolution, By Gillian C. Gibb, Molecular Phylogenetics and Evolution, 2010, Volume 56, Pages 698–706

21. Phylogeny of the Charadriiform birds, By Tara A. Paton, Molecular Phylogenetics and Evolution, 2006, Volume 39, Pages 657–667

22. Divergence among neognath birds, By Alison L. Chubb, Molecular Phylogenetics and Evolution, 2004, Volume 30, Pages 140–151

23. New World suboscine birds, By R. Terry Chesser, Molecular Phylogenetics and Evolution, 2004, Volume 32, Pages 11–24

24. Molecular evolution in space, By Rauri C.K. Bowie, Molecular Phylogenetics and Evolution, 2004, Volume 33, Pages 56–74

25. The Five-lined skink, By Briar J. Howes, Molecular Phylogenetics and Evolution, 2006, Volume 40, Pages 183–194

26. Analysis of the ‘‘true thrushes’’, By John Klicka, Molecular Phylogenetics and Evolution, 2005, Volume 34, Pages 486–500

27. East Asian Erithacus robin, By Shin-Ichi Seki, Molecular Phylogenetics and Evolution, 2006, Volume 39, Pages 899–905 Page 95

28. Genetic homogeneity in rosy-finches, By Sergei V. Drovetski, Molecular Phylogenetics and Evolution, 2009, Volume 50, Pages 437–445

29. Diversification of the blue tits, By L. Kvist, Molecular Phylogenetics and Evolution, 2005, Volume 34, Number, Pages 501–511

30. The Greenside Darter, By Amanda E. Haponski, Molecular Phylogenetics and Evolution, 2008, Volume 49, Number, Pages 69–83

31. Phylogenetic relationships of Finches, By M. A. A. Van der Meij, Molecular Phylogenetics and Evolution, 2005, Volume 34, Number, Pages 97–105

32. White-chinned and Spectacled Petrels, By N. M. S. Mareile Techow, Molecular Phylogenetics and Evolution, 2009, Volume 52, Number, Pages 25–33

33. Relationships between Clerodendrum, By Dorothy A. Steane, Molecular Phylogenetics and Evolution, 2004, Volume 32, Number, Pages 39–45

34. Evolution of Modern Birds, By M. Andreına Pacheco, Molecular Biology And Evolution, 2011, Volume 28, Number 6, Pages 1927–1942

35. Molecular Phylogeny of the Parrots, By Timothy F. Wright, Molecular Biology And Evolution, 2008, Volume 25, Number 10, Pages 2141–2156

36. Resolving Deep Neoaves Phylogeny, By Renae C. Pratt, Molecular Biology And Evolution, 2009, Volume 26, Number 2, Pages 313–326

www.creation.com