Supporting Information

Jablonski and Finarelli 10.1073/pnas.0902973106

SI Text

Hypothesis Testing of Monophyly and Polyphyly. We calculated the proportions of monophyly, paraphyly, and polyphyly, and we calculated confidence intervals around these proportions as 2 standard errors of the estimate, using Wilson's method (1):

$$\mathrm{SE} = \sqrt{\frac{p^*(1-p^*)}{n+4}},$$

with

$$p^* = \frac{a+2}{n+4}.$$

In this equation, a is the number of "positive" counts (that is, for monophyly, a is the number of monophyletic morphogenera), and n is the total count of sampled morphogenera. We performed these calculations on the total set of surveyed morphogenera and for Mollusca and Mammalia separately. We also considered the molluscan clades Gastropoda and Bivalvia individually and further partitioned Mollusca, Gastropoda, and Bivalvia into marine and nonmarine groups, because the principal nonmarine taxa of both gastropods (Pulmonata) and bivalves (Unionoida) have been notoriously difficult to resolve morphologically.

We then quantitatively assessed the rate of monophyly for morphogenera in each data partition to determine if the observed rate significantly exceeds what would be expected by chance. Such a determination requires a model of taxonomic accuracy to set the proportion of monophyletic morphogenera that one would expect to observe by chance assuming that there is no association between taxonomic assignment to a genus and true phylogenetic relatedness. Unfortunately, what constitutes an appropriate model is not straightforward. Here, we present 3 potential models, and we obtained consistent results in applying all 3.

Model 1: Random Permutation Model. The simplest approach is a permutation model, assessing the frequency of monophyletic genera that would occur from a random draw of cladograms. Here, the expected rate is the ratio of the number of cladograms consistent with a monophyletic morphogenus to the total number of potential cladograms. This model effectively postulates that there is no phylogenetic information in generic assignment according to morphology-based taxonomy, and any congruence between genera and phylogeny is happenstance. The probability in this model varies as a function of both the total number of species in the analysis and the number of species in the morphogenus. Given the rules we followed for selection of phylogenetic analyses (see *Methods*), the maximum chance probability under this model is realized at the minimum requirement for inclusion in our analysis: a morphogenus of 3 species and a total of 5 species in the phylogenetic analysis. For this case, there are 105 potential cladogram topologies for the 5 species, of which 9 recover the morphogenus as a monophyletic clade ($P = 8.6\%$). If the analysis instead includes a total of 6 species, then the total number of potential cladograms is 945, 45 of which are consistent with monophyly for the same 3-species genus ($P = 4.7\%$). Given the observed distribution of species in the surveyed phylogenetic analyses (Table S1), the median probability of observing monophyly by a random selection of cladogram topologies is 9.5 E-05, ranging from 3.0 E-33 to 4.7%. These values are similar in mammals (range: 3.0 E-33 to 4.7%, median: 1.8 E-04) and mollusks (range: 1.4 E-32 to 3.0%, median: 1.5 E-05). Thus, under model 1, the expected probability of morphogenus monophyly ranges from low to minuscule. Moreover, the observed frequency of monophyly significantly exceeds the highest probability under this model (4.7%) for every examined data partition.

Model 2: Unbiased Genus Assignment. It is not certain that the above "balls in an urn"-type model is appropriate for testing whether the observed rate of monophyly is greater than expected by chance. An alternative could assume that there is an equal probability for correct or incorrect assignment of a genus name to a given species. This model treats correct generic assignment by the taxonomist as an unbiased coin flip, with a 50–50 probability, such that the joint probability of correctly assigning the same name to n species forming a monophyletic clade with respect to a molecular phylogeny would be $(\frac{1}{2})^n$. With our minimum requirement for inclusion being 3 species in a morphogenus, the maximum probability under this model is therefore 12.5%, and diminishes as the number of taxa in the genus increases. Given the observed number of species in surveyed morphogenera (Table S1), the median probability of monophyly is 6.25%, with a range of 6.9E-18 to 12.5%. Again, the ranges and medians are similar for mammals (range: 7.9 E-12 to 12.5% median: 6.25%) and mollusks (range: 6.9 E-18 to12.5%, median: 3.13%). Here, too, the observed frequencies of monophyly for our compilation are significantly greater than even the highest probability under this model for all data partitions.

Model 3: Equiprobable Phyletic States. One could also assign equal probabilities to each of the 4 phyletic states illustrated in Fig. 1 (monophyly, uniparaphyly, multiparaphyly, and polyphyly). This model treats a named morphogenus as an arbitrary collection of taxa, and this set of taxa could exhibit any of the potential phyletic states when actually subjected to a phylogenetic analysis. This is certainly not a realistic scenario; however, this assumption gives an expected proportion 25% that is always greater than the probability of monophyly based on either the "random draw" or "coin-flip" models. As there is no definitively correct model, we treat this value of 25% as a highly conservative overestimate of the true expected rate of monophyly. By transitivity, if an observed rate of monophyly is significantly >25%, then morphogenera are significantly more congruent with the results of molecular analyses than would be expected by chance if there is no phylogenetic information contained in morphological taxonomies.

1. Wilson EB (1927) Probable inference, the law of succession, and statistical inference. *J Am Stat Assoc* 22:209–212.
2. Alexander LF, Riddle BR (2005) Phylogenetics of the new world rodent family heteromyidae. *J Mamm* 86:366–379.
3. Anderson FE (2000) Phylogeny and historical biogeography of the loliginid squids (Mollusca: Cephalopoda) based on mitochondrial DNA sequence data. *Mol Phyl Evol* 15:191–214.
4. Armbruster GFJ, Bohme M, Bernhard D, Schlegel M (2005) The H3/H4 histone gene cluster of land snails (Gastropoda: Stylommatophora): TS/TV ratio, GC3 drive, and signals in stylommatophoran phylogeny. *J Moll Stud* 71:339–348.
5. Arnason U, Gullberg A Janke G, Kullberg M (2007) Mitogenomic analyses of caniform relationships. *Mol Phyl Evol* 45:863–874.

6. Baker AM, Sheldon F, Somerville J, Walker KF, Hughes JM (2004) Mitochondrial DNA phylogenetic structuring suggests similarity between two morphologically plastic genera of Australian freshwater mussels (Unionoida: Hyriidae). *Mol Phyl Evol* 32:902–912.
7. Bardeleben C, Moore RL, Wayne RK (2005) A molecular phylogeny of the Canidae based on six nuclear loci. *Mol Phyl Evol* 37:815–831.
8. Barros MC, Sampaio I, Schneider H (2003) Phylogenetic analysis of 16S mitochondrial DNA data in sloths and anteaters. *Gene Mol Biol* 26:5–11.
9. Barroso CML, et al. (1997) Update on the phylogenetic systematics of new world monkeys: Further DNA evidence for placing the pygmy marmoset (*Cebuella*) within the genus *Callithrix*. *Int J Primatol* 18:651–674.
10. Birungi J, Arctander P (2001) Molecular systematics and phylogeny of the Reduncini (Artiodactyla: Bovidae) inferred from the analysis mitochondrial cytochrome *b* gene sequences. *J Mamm Evol* 8:125–147.
11. Blacket MJ, et al. (1999) Systematic relationships within the dasyurid marsupial tribe Sminthopsini: A multigene approach. *Mol Phyl Evol* 12:140–155.
12. Bradley RD, Edwards CW, Carroll DS, Kilpatrick CW (2004) Phylogenetic relationships of neotomineperomyscine rodents: Based on DNA sequences from the mitochondrial cytochrome *b* gene. *J Mamm* 85:389–395.
13. Campbell DC, et al. (2005) Phylogeny of North American amblemines (Bivalvia, Unionoida): Prodigious polyphyly proves pervasive across genera. *Invert Biol* 124:131–164.
14. Canapa A, Barucca M, Marinelli A, Olmo E (2001) A molecular phylogeny of Heterodonta (Bivalvia) based on small ribosomal subunit RNA sequences. *Mol Phyl Evol* 21:156–161.
15. Canavez FC, Moreira MAM, Simon F, Parham P, Seuanez HN (1999) Phylogenetic relationships of the callitrichinae (Platyrrhini, primates) based on β^2-microglobulin DNA sequences. *Am J Primatol* 48:225–236.
16. Carlini DB, Young RE, Vecchione M (2001) A molecular phylogeny of the octopoda (Mollusca: Cephalopoda) evaluated in light of morphological evidence. *Mol Phyl Evol* 21:388–397.
17. Chaves R, et al. (1999) The place of *Callimico goeldii* in the callitrichine phylogenetic tree: Evidence from von Willebrand factor gene intron II sequences. *Mol Phyl Evol* 13:392–404.
18. Chevret P, Dobigny G (2005) Systematics and evolution of the subfamily Gerbillinae (Mammalia, Rodentia, Muridae). *Mol Phyl Evol* 35:674–688.
19. Chevret P, Veyrunes F, Britton-Davidian J (2005) Molecular phylogeny of the genus Mus (Rodentia: Murinae) based on mitochondrial and nuclear data. *Biol J Linn Soc* 84:417–427.
20. Collin R (2005) Development, phylogeny, and taxonomy of *Bostrycapulus* (Caenogastropoda: Calyptraeidae), an ancient cryptic radiation. *Zool J Linn Soc* 144:75–101.
21. Collins AC (2004) Atelinae phylogenetic relationships: The trichotomy revived? *Am J Phys Anthropol* 124:285–296.
22. Cook JA, Runck AM, Conroy CJ (2004) Historical biogeography at the crossroads of the northern continents: Molecular phylogenetics of red-backed voles (Rodentia: Arvicolinae). *Mol Phyl Evol* 30:767–777.
23. Cronin MA, Stuart R, Pierson BJ, Patton JC (1996) K-casein gene phylogeny of higher ruminants (Pecora, Artiodactyla). *Mol Phyl Evol* 6:295–311.
24. Davenport TRB, et al. (2006) A new genus of African monkey, *Rungwecebus*: Morphology, ecology, and molecular phylogenetics *Science* 312:1378–1381.
25. de Weerd DRU, Gittenberger E (2004) Re-evaluating Carinigera: Molecular data overturn the current classification within the clausiliid subfamily Alopiinae (Gastropoda, Pulmonata). *J Moll Stud* 70:305–318.
26. Delisle I, Strobeck C (2005) A phylogeny of the Caniformia (order Carnivora) based on 12 complete protein-coding mitochondrial genes. *Mol Phyl Evol* 37:192–201.
27. DelPero M, et al. (2001) Phylogenetic relationships among the Malagasy lemuriforms (Primates: Strepsirrhini) as indicated by mitochondrial sequence data from the 12S rRNA gene. *Zool J Linn Soc* 133:83–103.
28. DelPero M, Pozzi L, Masters JC (2006) A composite molecular phylogeny of living lemuroid primates. *Folia Primatol* 77:434–445.
29. Distel DL (2000) Phylogenetic relationships among Mytilidae (Bivalvia): 18S rRNA data suggest convergence in mytilid body plans. *Mol Phyl Evol* 15:25–33.
30. Donald KM, Kennedy M, Spencer HG (2005) The phylogeny and taxonomy of austral monodontine topshells (Mollusca: Gastropoda: Trochidae), inferred from DNA sequences. *Mol Phyl Evol* 37:474–483.
31. Dragoo JW, Honeycutt RL (1997) Systematics of mustelid-like carnivores. *J Mamm* 78:426–443.
32. Dubey S, Salamin N, Ohdachi SD, Barriere P, Vogel P (2007) Molecular phylogenetics of shrews (Mammalia: Soricidae) reveal timing of transcontinental colonizations. *Mol Phyl Evol* 44:126–137.
33. Dufour SC, Steiner G, Beninger PG (2006) Phylogenetic analysis of the perihydrothermal vent bivalve *Bathypecten vulcani* based on 18s rRNA. *Malacologia* 48:35–42.
34. Dutra-Clarke AVC, Williams C, Dickstein R, Kaufer N, Spotila JR (2001) Inferences on the phylogenetic relationships of Succineidae (Mollusca, Pulmonata) based on 18S rRNA gene. *Malacologia* 43:223–236.
35. Emerson GL, Kilpatrick CW, McNiff BE, Ottenwalder J, Allard MW (1999) Phylogenetic relationships of the order insectivora based on complete 12S rRNA sequences from mitochondria. *Cladistics* 15:221–230.
36. Engel SR, Hogan KM, Taylor JF, Davis SK (1998) Molecular systematics and paleobiogeography of the South American sigmodontine rodents. *Mol Biol Evol* 15:35–49.
37. Faulkes CG, VerheyenE, Verheyen W, Jarvis JUM, Bennett NC (2004) Phylogeographical patterns of genetic divergence and speciation in African mole-rats (Family: Bathyergidae). *Mol Ecol* 13:613–629.
38. Flynn JJ, Finarelli JA, Zehr S, Hsu J, Nedbal MA (2005) Molecular phylogeny of the Carnivora (Mammalia): Assessing the impact of increased sampling on resolving enigmatic relationships. *Syst Biol* 54:317–337.
39. Fulton TL, Strobeck C (2006) Molecular phylogeny of the Arctoidea (Carnivora): Effect of missing data on supertree and supermatrix analyses of multiple gene datasets. *Mol Phyl Evol* 41:165–181.
40. Galewski T, Mauffrey JF, Leite YLR, Patton JL, Douzery EJP (2005) Ecomorphological diversification among South American spiny rats (Rodentia: Echimyidae): A phylogenetic and chronological approach. *Mol Phyl Evol* 34:601–615.
41. Gallardo MH, et al. (2004) Whole-genome duplications in South American desert rodents (Octodontidae). *Biol J Linn Soc* 82:443–451.
42. Gatesy J, Yelon D, Desalle R, Vrba ES (1992) Phylogeny of the Bovidae (Artiodactyla, Mammalia) based on mitochondrial ribosomal DNA sequences. *Mol Biol Evol* 9:433–446.
43. Gaubert P, Veron G (2003) Exhaustive sample set among Viverridae reveals the sister-group of felids: The linsangs as a case of extreme morphological convergence within Feliformia. *Proc R Soc London Ser B* 270:2523–2530.
44. Gaubert P, Cordeiro-Estrela P (2006) Phylogenetic systematics and tempo of evolution of the Viverrinae (Mammalia, Carnivora, Viverridae) within feliformians: Implications for faunal exchanges between Asia and Africa. *Mol Phyl Evol* 41:266–278.
45. Gilbert C, Ropiquet A, Hassanin A (2006) Mitochondrial and nuclear phylogenies of Cervidae (Mammalia, Ruminantia): Systematics, morphology, and biogeography. *Mol Phyl Evol* 40:101–117.
46. Glaubrecht M, von Rintelen T (2003) Systematics, molecular genetics, and historical zoogeography of the viviparous freshwater gastropod *Pseudopotamis* (Cerithioidea, Pachychilidae): A relic on the Torres Strait Islands, Australia. *Zool Scr* 32:415–435.
47. Goodacre SL, Wade CM (2001) Molecular evolutionary relationships between partulid land snails of the Pacific. *Proc R Soc London Ser B* 268:1–7.
48. Haase M (2005) Rapid and convergent evolution of parental care in hydrobiid gastropods from New Zealand. *J Evol Biol* 18:1076–1086.
49. Halanych KM, Robinson TJ (1999) Multiple substitutions affect the phylogenetic utility of cytochrome b and 12S rDNA data: Examining a rapid radiation in Leporid (Lagomorpha) evolution. *J Mol Evol* 48:369–379.
50. Harper EM, Dreyer H, Steiner G (2006) Reconstructing the Anomalodesmata (Mollusca: Bivalvia): Morphology and molecules. *Zool J Linn Soc* 148:395–420.
51. Hassanin A, Ropiquet A (2004) Molecular phylogeny of the tribe Bovini (Bovidae, Bovinae) and the taxonomic status of the Kouprey, Bos sauveli Urbain 1937. *Mol Phyl Evol* 33:896–907.
52. Hassanin A, Douzery EJP (1999) Evolutionary affinities of the enigmatic saola (*Pseudoryx nghetinhensis*) in the context of the molecular phylogeny of Bovidae. *Proc R Soc London Ser B* 266:893–900.
53. Hassanin A, Douzery EJP (1999) The tribal radiation of the family Bovidae (Artiodactyla) and the evolution of the mitochondrial cytochrome *b* gene. *Mol Phyl Evol* 13:227–243.
54. Hassanin A, Pasquet E, Vigne JD (1998) Molecular systematics of the subfamily caprinae (Artiodactyla, Bovidae) as determined from cytochrome *b* sequences. *J Mamm Evol* 5:217–236.
55. Heralde FM, et al. (2007) Molecular phylogeny of some Indo-Pacific genera in the subfamily Turrinae H. Adams and A. Adams, 1853 (1838) (Gastropoda: Neogastropoda). *Nautilus* 121:131–138.
56. Herron MD, Castoe TA, Parkinson CL (2004) Sciurid phylogeny and the paraphyly of Holarctic ground squirrels (*Spermophilus*). *Mol Phyl Evol* 31:1015–1030.
57. Holland BS, Hadfield MG (2004) Origin and diversification of the endemic Hawaiian tree snails (Achatinellidae: Achatinellinae) based on molecular evidence. *Mol Phyl Evol* 32:588–600.
58. Holznagel WE, Lydeard C (2000) A molecular phylogeny of North American Pleuroceridae (Gastropoda: Cerithioidea) based on mitochondrial 16S rDNA sequences. *J Moll Stud* 66:233–257.
59. Honeycutt RL, Rowe DL, Gallardo MH (2003) Molecular systematics of the South American caviomorph rodents: Relationships among species and genera in the family Octodontidae. *Mol Phyl Evol* 26:476–489.
60. Horvath JE, et al. (2008) Development and application of a phylogenomic toolkit: Resolving the evolutionary history of Madagascar's lemurs. *Gen Res* 18:489–499.
61. Huff SW, et al. (2004) Investigations into the phylogenetic relationships of freshwater pearl mussels (Bivalvia : Margaritiferidae) based on molecular data: Implications for their taxonomy and biogeography. *J Moll Stud* 70:379–388.
62. Janecek LL, Honeycutt RL, Adkins RM, Davis SK (1996) Mitochondrial gene sequences and the molecular systematics of the Artiodactyl subfamily Bovinae. *Mol Phyl Evol* 6:107–119.
63. Jansa SA, Voss R (2005) Phylogenetic relationships of the marsupial genus *Hyladelphys* based on nuclear gene sequences and morphology. *J Mamm* 86:853–865.
64. Jansa SA, Barker FK, Heaney LR (2006) The pattern and timing of diversification of Philippine endemic rodents: Evidence from mitochondrial and nuclear gene sequences. *Syst Biol* 55:73–88.
65. Jansa SA, Goodman SM, Tucker PK (1999) Molecular phylogeny and biogeography of the native rodents of Madagascar (Muridae: Nesomyinae): A test of the single-origin hypothesis. *Cladistics* 15:253–270.
66. Jones WJ, et al. (2006) Evolution of habitat use by deep-sea mussels. *Mar Biol* 148:841–851.
67. Kallersjo M, von Proschwitz T, Lundberg S, Eldenas P, Erseus C (2005) Evaluation of ITS rDNA as a complement to mitochondrial gene sequences for phylogenetic studies in freshwater mussels: An example using Unionidae from northwestern Europe. *Zool Scr* 34:415–424.
68. Kappner I, Bieler R (2006) Phylogeny of venus clams (Bivalvia: Venerinae) as inferred from nuclear and mitochondrial gene sequences. *Mol Phyl Evol* 40:317–331.

69. Karanth KP, Delefosse T, Rakotosamimanana B, Parsons TJ, Yoder AD (2005) Ancient DNA from giant extinct lemurs confirms single origin of Malagasy primates. *Proc Natl Acad Sci USA* 102:5090–5095.
70. Kirkendale L, Lee T, Baker P, Foighil DO (2004) Oysters of the Conch Republic (Florida Keys): A molecular phylogenetic study of *Parahyotissa mcgintyi*, *Teskeyostrea weberi*, and *Ostreola equestris. Malacologia* 46:309–326.
71. Koepfli KP, Wayne RK (2003) Type ISTS markers are more informative than cytochrome *b* in phylogenetic reconstruction of the Mustelidae (Mammalia: Carnivora). *Syst Biol* 52:571–593.
72. Kohler F, von Rintelen T, Meyer A, Glaubrecht M (2004) Multiple origin of viviparity in Southeast Asian gastropods (Cerithioidea: Pachychilidae) and its evolutionary implications. *Evolution* 58:2215–2226.
73. Kojima S, Fujikura K, Okutani T (2004) Multiple trans-Pacific migrations of deep-sea vent/seep-endemic bivalves in the family Vesicomyidae. *Mol Phyl Evol* 32:396–406.
74. Koufopanou V, Reid DG, Ridgway SA, Thomas RH (1999) A molecular phylogeny of the patellid limpets (Gastropoda: Patellidae) and its implications for the origins of their antitropical distribution. *Mol Phyl Evol* 11:138–156.
75. Krajewski C, Moyer GR, Sipiorski JT, Fain MG, Westerman M (2004) Molecular systematics of the enigmatic ''phascolosoricine'' marsupials of New Guinea. *Austral J Zool* 52:389–415.
76. Krajewski C, Wroe S, Westerman M (2000) Molecular evidence for the pattern and timing of cladogenesis in dasyurid marsupials. *Zool J Linn Soc* 130:375–404.
77. Krebs RA, Vlasceanu RN, Tevesz MJS (2003) An analysis of diversity in freshwater mussels (Bivalvia: Unionidae) of the Cuyahoga and Rocky river watersheds (Ohio, USA) based on the 16S rRNA gene. *J Great Lakes Res* 29:307–316.
78. Kuznetsova MV, Kholodova MV, Luschekina AA (2002) Phylogenetic analysis of sequences of the 12S and 16S rRNA mitochondrial genes in the family Bovidae: New evidence. *Russ J Genet* 38:942–950.
79. Lalueza-Fox C, Shapiro B, Bover P, Alcover JA, Bertranpetit J (2002) Molecular phylogeny and evolution of the extinct bovid *Myotragus balearicus. Mol Phyl Evol* 25:501–510.
80. Latiolais JM, Taylor MS, Roy K, Hellberg ME (2006) A molecular phylogenetic analysis of strombid gastropod morphological diversity. *Mol Phyl Evol* 41:436–444.
81. Lecompte F, Denys C, Granjon L (2005) Confrontation of morphological and molecular data: The *Praomys* group (Rodentia, Murinae) as a case of adaptive convergences and morphological stasis. *Mol Phyl Evol* 37:899–919.
82. Ledje C, Arnason U (1996) Phylogenetic relationships within caniform carnivores based on analyses of the mitochondrial 12S rRNA gene. *J Mol Evol* 43:641–649.
83. Lee T, Foighil DO (2003) Phylogenetic structure of the Sphaeriinae, a global clade of freshwater bivalve molluscs, inferred from nuclear (ITS-1) and mitochondrial (16S) ribosomal gene sequences. *Zool J Linn Soc* 137:245–260.
84. Lei RH, Jiang ZG, Hu Z, Yang WL (2003) Phylogenetic relationships of Chinese antelopes (subfamily Antilopinae) based on mitochondrial ribosomal RNA gene sequences. *J Zool* 261:227–237.
85. Lindgren AR, Katugin ON, Amezquita E, Nishiguchi MK (2005) Evolutionary relationships among squids of the family Gonatidae (Mollusca: Cephalopoda) inferred from three mitochondrial loci. *Mol Phyl Evol* 36:101–111.
86. Liu HP, Hershler R (2005) Molecular systematics and radiation of western North American nymphophiline gastropods. *Mol Phyl Evol* 34:284–298.
87. Liu HP, Hershler R, Thompson FG (2001) Phylogenetic relationships of the Cochliopinae (Rissooidea: Hydrobiidae): An enigmatic group of aquatic gastropods. *Mol Phyl Evol* 21:17–25.
88. Manganelli G, Salomone N, Giusti F (2005) A molecular approach to the phylogenetic relationships of the western palaearctic Helicoidea (Gastropoda: Stylommatophora). *Biol J Linn Soc* 85:501–512.
89. Marko PB (2002) Fossil calibration of molecular clocks and the divergence times of geminate species pairs separated by the Isthmus of Panama. *Mol Biol Evol* 19:2005–2021.
90. Marko PB, Vermeij GJ (1999) Molecular phylogenetics and the evolution of labral spines among eastern Pacific Ocenebrine gastropods. *Mol Phyl Evol* 13:275–288.
91. Marmi J, Lopez-Giraldez JF, Domingo-Roura X (2004) Phylogeny, evolutionary history, and taxonomy of the Mustelidae based on sequences of the cytochrome *b* gene and a complex repetitive flanking region. *Zool Scripta* 33:481–499.
92. Martin Y, Gerlach G, Schlotterer C, Meyer A (2000) Molecular phylogeny of European muroid rodents based on complete cytochrome *b* sequences. *Mol Phyl Evol* 16:37–47.
93. Matsumoto M, Hayami I (2000) Phylogenetic analysis of the family Pectinidae (Bivalvia) based on mitochondrial cytochrome *C* oxidase subunit I. *J Moll Stud* 66:477–488.
94. Matthee CA, Davis SK (2001) Molecular insights into the evolution of the family Bovidae: A nuclear DNA perspective. *Mol Biol Evol* 18:1220–1230.
95. Matthee CA, Robinson TJ (1999) Cytochrome *b* phylogeny of the family Bovidae: Resolution within the Alcelaphini, Antilopini, Neotragini, and Tragelaphini. *Mol Phyl Evol* 12:31–46.
96. Matthee CA, van Vuuren BJ, Bell D, Robinson TJ (2004) A molecular supermatrix of the rabbits and hares (Leporidae) allows for the identification of five intercontinental exchanges during the Miocene. *Syst Biol* 53:433–447.
97. Matthee CA, et al. (2007) Indel evolution of mammalian introns and the utility of non-coding nuclear markers in eutherian phylogenetics. *Mol Phyl Evol* 42:827–837.
98. May-Collado L, Agnarsson I (2006) Cytochrome *b* and Bayesian inference of whale phylogeny. *Mol Phyl Evol* 38:344–354.
99. Meireles CM, et al. (1999) Molecular phylogeny of Ateline new world monkeys (Platyrrhini, Atelinae) based on γ-globin gene sequences: Evidence that *Brachyteles* is the sister group of *Lagothrix. Mol Phyl Evol* 12:10–30.
100. Meyer CP (2004) Toward comprehensiveness: Increased molecular sampling within Cypraeidae and its phylogenetic implications. *Malacologia* 46:127–156.
101. Michel E (2004) *Vinundu*, a new genus of gastropod (Cerithioidea: 'Thiaridae') with two species from Lake Tanganyika, East Africa, and its molecular phylogenetic relationships. *J Moll Stud* 70:1–19.
102. Mikkelsen PM, Bieler R, Kappner I, Rawlings TA (2006) Phylogeny of Veneroidea (Mollusca: Bivalvia) based on morphology and molecules. *Zool J Linn Soc* 148:439–521.
103. Minton RL, Lydeard C (2003) Phylogeny, taxonomy, genetics, and global heritage ranks of an imperilled, freshwater snail genus *Lithasia* (Pleuroceridae). *Mol Ecol* 12:75–87.
104. Montgelard C, Matthee CA, Robinson TJ (2003) Molecular systematics of dormice (Rodentia: Gliridae) and the radiation of *Graphiurus* in Africa. *Proc R Soc London Ser B* 270:1947–1955.
105. Morgan JAT, et al. (2002) A phylogeny of planorbid snails, with implications for the evolution of Schistosoma parasites. *Mol Phyl Evol* 25:477–488.
106. Mouchaty S, Cook JA, Shields GF (1995) Phylogenetic analysis of northern hair seals based on nucleotide sequences of the mitochondrial cytochrome *b* gene. *J Mamm* 76:1178–1185.
107. Nakano T, Ozawa T (2007) Worldwide phylogeography of limpets of the order Patellogastropoda: Molecular, morphological, and palaeontological evidence. *J Moll Stud* 73:79–99.
108. Neumann K, et al. (2006) Molecular phylogeny of the Cricetinae subfamily based on the mitochondrial cytochrome *b* and 12S rRNA genes and the nuclear vWF gene. *Mol Phyl Evol* 39:135–148.
109. Nieves M, Ascunce MS, Rahn MI, Mudry MD (2005) Phylogenetic relationships among some Ateles species: The use of chromosomic and molecular characters. *Primates* 46:155–164.
110. Norris RW, et al. (2004) The phylogenetic position of the zokors (Myospalacinae) and comments on the families of muroids (Rodentia). *Mol Phyl Evol* 31:972–978.
111. Ohdachi SD, et al. (2006) Molecular phylogenetics of soricid shrews (Mammalia) based on mitochondrial cytochrome *b* gene sequences: With special reference to the Soricinae. *J Zool* 270:177–191.
112. Okusu A, Schwabe E, Eernisse DJ, Giribet G (2003) Towards a phylogeny of chitons (Mollusca, Polyplacophora) based on combined analysis of five molecular loci. *Org Divers Evol* 3:281–302.
113. Oliverio M, Cervelli M, Mariottini P (2002) ITS2 rRNA evolution and its congruence with the phylogeny of muricid neogastropods (Caenogastropoda, Muricoidea). *Mol Phyl Evol* 25:63–69.
114. Oshida T, et al. (2004) Phylogenetic position of the small Kashmir flying squirrel, *Hylopetes fimbriatus* (*Eoglaucomys fimbriatus*), in the subfamily Pteromyinae. *Can J Zool* 82:1336–1342.
115. Owada M (2007) Functional morphology and phylogeny of the rock-boring bivalves *Leiosolenus* and *Lithophaga* (Bivalvia: Mytilidae): A third functional clade. *Mar Biol* 150:853–860.
116. Page SL, Chiu CH, Goodman M (1999) Molecular phylogeny of Old World monkeys (Cercopithecidae) as inferred from γ-globin DNA sequences. *Mol Phyl Evol* 13:348–359.
117. Pastorini J, Thalmann U, Martin RD (2003) A molecular approach to comparative phylogeography of extant Malagasy lemurs. *Proc Natl Acad Sci USA* 100:5879–5884.
118. Perez KE, Ponder WF, Colgan DJ, Clark SA, Lydeard C (2005) Molecular phylogeny and biogeography of spring-associated hydrobild snails of the Great Artesian Basin, Australia. *Mol Phyl Evol* 34:545–556.
119. Piaggio AJ, Spicer GS (2001) Molecular phylogeny of the chipmunks inferred from mitochondrial cytochrome *b* and cytochrome oxidase II gene sequences. *Mol Phyl Evol* 20:335–350.
120. Pitra C, Veits J (2000) Use of mitochondrial DNA sequences to test the Ceratomorpha (Perissodactyla: Mammalia) hypothesis. *J Zool Syst Evol Res* 38:65–72.
121. Pitra C, Fickel J, Meijaard E Groves PC (2004) Evolution and phylogeny of Old World deer. *Mol Phyl Evol* 33:880–895.
122. Querouil S, et al. (2001) Phylogeny and evolution of African shrews (Mammalia: Soricidae) inferred from 16s rRNA sequences. *Mol Phyl Evol* 20:185–195.
123. Raterman D, Meredith RW, Ruedas LA, Springer MS (2006) Phylogenetic relationships of the cuscuses and brushtail possums (Marsupialia: Phalangeridae) using the nuclear gene BRCA1. *Austral J Zool* 54:353–361.
124. Reece KS, Cordes JF, Stubbs JB, Hudson KL, Francis EA, (2008) Molecular phylogenies help resolve taxonomic confusion with Asian *Crassostrea* oyster species. *Mar Biol* 153:709–721.
125. Reeder SA, Bradley RD (2004) Molecular systematics of neotomine-peromyscine rodents based on the dentin matrix protein 1 gene. *J Mamm* 85:1194–1200.
126. Reeder SA, Carroll DS, Edwards CW, Kilpatrick CW, Bradley RD (2006) Neotomine-peromyscine rodent systematics based on combined analyses of nuclear and mitochondrial DNA sequences. *Mol Phyl Evol* 40:251–258.
127. Reid DG, Dyal P, Lozouet P, Glaubrecht M, Williams ST (2008) Mudwhelks and mangroves: The evolutionary history of an ecological association (Gastropoda: Potamididae). *Mol Phyl Evol* 47:680–699.
128. Remigio EA, Hebert PDN (2003) Testing the utility of partial COI sequences for phylogenetic estimates of gastropod relationships. *Mol Phyl Evol* 29:641–647.
129. Roe KJ, Lydeard C (1998) Species delineation and the identification of evolutionarily significant units: Lessons from the freshwater mussel genus *Potamilus* (Bivalvia: Unionidae). *J Shell Res* 17:1359–1363.
130. Roos C, Schmitz J, Zischler H (2004) Primate jumping genes elucidate strepsirrhine phylogeny. *Proc Natl Acad Sci USA* 101:10650–10654.
131. Ropiquet A, Hassanin A (2005) Molecular evidence for the polyphyly of the genus *Hemitragus* (Mammalia, Bovidae). *Mol Phyl Evol* 36:154–168.

132. Ropiquet A, Hassanin A (2005) Molecular phylogeny of caprines (Bovidae, Antilopinae): The question of their origin and diversification during the Miocene. *J Zool Syst Evol Res* 43:49–60.
133. Ruiz-Garcia M, Alvarez D (2003) RFLP analysis of mtDNA from six platyrrhine genera: Phylogenetic inferences. *Folia Primatol* 74:59–70.
134. Rundell RJ, Holland BS, Cowie RH (2004) Molecular phylogeny and biogeography of the endemic Hawaiian Succineidae (Gastropoda: Pulmonata). *Mol Phyl Evol* 31:246–255.
135. Sato JJ, et al. (2006) Evidence from nuclear DNA sequences sheds light on the phylogenetic relationships of Pinnipedia: single origin with affinity to Musteloidea. *Zool Sci* 23:125–146.
136. Sato JJ, et al. (2003) Phylogenetic relationships and divergence times among mustelids (Mammalia: Carnivora) based on nucleotide sequences of the nuclear interphotoreceptor retinoid binding protein and mitochondrial cytochrome *b* genes. *Zool Sci* 20:243–264.
137. Schander C, Halanych KM, Dahlgren T, Sundberg P (2003) Test of the monophyly of Odostomiinae and Turbonilliinae (Gastropoda, Heterobranchia, Pyramidellidae) based on 16S mtDNA sequences. *Zool Scr* 32:243–254.
138. Schneider JA, Foighil DO (1999) Phylogeny of giant clams (Cardiidae: Tridacninae) based on partial mitochondrial 16S rDNA gene sequences. *Mol Phyl Evol* 13:59–66.
139. Sena L, et al. (2002) Mitochondrial COII gene sequences provide new insights into the phylogeny of marmoset species groups (Callitrichidae, Primates). *Folia Primatol* 73:240–251.
140. Shilts MH, Pasqual MS, Foighil DO (2007) Systematic, taxonomic, and biogeographic relationships of Argentine flat oysters. *Mol Phyl Evol* 44:467–473.
141. Shinohara A, Campbell KL, Suzuki H (2003) Molecular phylogenetic relationships of moles, shrew moles, and desmans from the new and old worlds. *Mol Phyl Evol* 27:247–258.
142. Smith MF (1998) Phylogenetic relationships and geographic structure in pocket gophers in the genus *Thomomys*. *Mol Phyl Evol* 9:1–14.
143. Sousa Varela E, et al. (2007) Molecular phylogeny of mangrove oysters (Crassostrea) from Brazil. *J Moll Stud* 73:229–234.
144. Stanger-Hall K, Cunningham CW (1998) Support for a monophyletic Lemuriformes: Overcoming incongruence between data partitions. *Mol Biol Evol* 15:1572–1577.
145. Steiner C, Tilak M, Douzery EJP, Catzeflis FM (2005) New DNA data from a transthyretin nuclear intron suggest an Oligocene to Miocene diversification of living South America opossums (Marsupialia: Didelphidae). *Mol Phyl Evol* 35:363–379.
146. Steiner G, Dreyer H (2003) Molecular phylogeny of Scaphopoda (Mollusca) inferred from 18S rDNA sequences: Support for a Scaphopoda-Cephalopoda clade. *Zool Scr* 32:343–356.
147. Steiner G, Reynolds PD (2003) Molecular systematics of the Scaphopoda. *Molecular Systematics and Phylogeography of Mollusks*, eds Lydeard C, Lindberg DR (Smithsonian Books, Washington, DC), pp 123–139.
148. Steinke D, Albrecht C, Pfenninger M (2004) Molecular phylogeny and character evolution in the Western Palaearctic Helicidae s.l. (Gastropoda: Stylommatophora). *Mol Phyl Evol* 32:724–734.
149. Steppan SJ, Storz BL, Hoffmann RS (2004) Nuclear DNA phylogeny of the squirrels (Mammalia: Rodentia) and the evolution of arboreality from c-myc and RAG1. *Mol Phyl Evol* 30:703–719.
150. Steppan SJ, Adkins RM, Spinks PQ, Hale C (2005) Multigene phylogeny of the Old World mice, Murinae, reveals distinct geographic lineages and the declining utility of mitochondrial genes compared to nuclear genes. *Mol Phyl Evol* 37:370–388.
151. Takacs Z, Morales JC, Geissmann T, Melnick DJ (2005) A complete species-level phylogeny of the Hylobatidae based on mitochondrial ND3-ND4 gene sequences. *Mol Phyl Evol* 36:456–467.
152. Taylor JD, Williams ST, Glover EA (2007) Evolutionary relationships of the bivalve family Thyasiridae (Mollusca: Bivalvia), monophyly and superfamily status. *J Mar Biol Assoc UK* 87:565–574.
153. Tongkerd P, Lee T, Panha S, Burch JB, Foighil DO (2004) Molecular phylogeny of certain Thai gastrocoptine micro land snails (Stylommatophora: Pupillidae) inferred from mitochondrial and nuclear ribosomal DNA sequences. *J Moll Stud* 70:139–147.
154. Tosi AJ, Melnick DJ, Disotell TR (2004) Sex chromosome phylogenetics indicate a single transition to terrestriality in the guenons (tribe Cercopithecini). *J Hum Evol* 46:223–237.
155. Tosi AJ, Detwiler KM, Disotell TR (2005) X-chromosomal window into the evolutionary history of the guenons (Primates: Cercopithecini). *Mol Phyl Evol* 36:58–66.
156. Valdes A (2003) Preliminary molecular phylogeny of the radula-less dorids (Gastropoda: Opisthobranchia), based on 16S mtDNA sequence data. *J Moll Stud* 69:75–80.
157. Veron G, Colyn M, Dunham AE, Taylor P, Gaubert P (2004) Molecular systematics and origin of sociality in mongooses (Herpestidae, Carnivora). *Mol Phyl Evol* 30:582–598.
158. von Dornum M, Ruvolo M (1999) Phylogenetic relationships of the New World monkeys (Primates, Platyrrhini) based on nuclear G6PD DNA sequences. *Mol Phyl Evol* 11:459–476.
159. Wagele H, Vonneman V, Wagele W (2003) Toward a phylogeny of the Opisthobranchia. *Molecular Systematics and Phylogeography of Mollusks*, eds Lydeard C, Lindberg DR (Smithsonian Books, Washington, DC), pp 185–228.
160. Weksler M (2003) Phylogeny of Neotropical oryzomyine rodents (Muridae: Sigmodontinae) based on the nuclear IRBP exon. *Mol Phyl Evol* 29:331–349.
161. Weksler M (2006) Phylogenetic relationships of oryzomine rodents (Muroidea: Sigmodontinae): separate and combined analyses of morphological and molecular data. *Bull Am Mus Nat Hist* 296:3–149.
162. Williams ST, Ozawa T (2006) Molecular phylogeny suggests polyphyly of both the turban shells (family Turbinidae) and the superfamily Trochoidea (Mollusca: Vetigastropoda). *Mol Phyl Evol* 39:33–51.
163. Williams ST, Reid DG, Littlewood DTJ (2003) A molecular phylogeny of the Littorininae (Gastropoda: Littorinidae): Unequal evolutionary rates, morphological parallelism, and biogeography of the Southern Ocean. *Mol Phyl Evol* 28:60–86.
164. Williams ST, Taylor JD, Glover EA (2004) Molecular phylogeny of the Lucinoidea (Bivalvia): Nonmonophyly and separate acquisition of bacterial chemosymbiosis. *J Moll Stud* 70:187–202.
165. Williams ST (2007) Origins and diversification of Indo-West Pacific marine fauna: Evolutionary history and biogeography of turban shells (Gastropoda, Turbinidae) *Biol J Linn Soc* 92:573–592.
166. Wilson AB, Glaubrecht M, Meyer A (2004) Ancient lakes as evolutionary reservoirs: Evidence from the thalassoid gastropods of Lake Tanganyika. *Proc R Soc London Ser B* 271:529–536.
167. Wilson NG, Lee MSY (2005) Molecular phylogeny of Chromodoris (Mollusca, Nudibranchia) and the identification of a planar spawning clade. *Mol Phyl Evol* 36:722–727.
168. Wollscheid E, Wagele H (1999) Initial results on the molecular phylogeny of the nudibranchia (Gastropoda, Opisthobranchia) based on 18S rDNA data. *Mol Phyl Evol* 13:215–226.
169. Wollscheid-Lengeling E, Boore J, Brown W, Wagele H (2001) The phylogeny of Nudibranchia (Opisthobranchia, Gastropoda, Mollusca) reconstructed by three molecular markers. *Org Divers Evol* 1:241–256.
170. Wood AR, Apte S, MacAvoy ES, Gardner JPA (2007) A molecular phylogeny of the marine mussel genus Perna (Bivalvia: Mytilidae) based on nuclear (ITS1&2) and mitochondrial (COI) DNA sequences. *Mol Phyl Evol* 44:685–698.
171. Wynen LP, et al. (2001) Phylogenetic relationships within the eared seals (Otariidae: Carnivora): Implications for the historical biogeography of the family. *Mol Phyl Evol* 21:270–284.
172. Xing JC, et al. (2005) A mobile element based phylogeny of Old World monkeys. *Mol Phyl Evol* 37:872–880.
173. Yan H, Zhou KY, Yang G (2005) Molecular phylogenetics of ''river dolphins'' and the baiji mitochondrial genome. *Mol Phyl Evol* 37:743–750.
174. Yu L, Zhang YP (2005) Phylogenetic studies of pantherine cats (Felidae) based on multiple genes, with novel application of nuclear β-fibrinogen intron 7 to carnivores. *Mol Phyl Evol* 35:483–495.
175. Yu L, Li QW, Ryder OA, Zhang YP (2004) Phylogeny of the bears (Ursidae) based on nuclear and mitochondrial genes. *Mol Phyl Evol* 32:480–494.
176. Yu L, Li YW, Ryder OA, Zhang YP (2007) Analysis of complete mitochondrial genome sequences increases phylogenetic resolution of bears (Ursidae), a mammalian family that experienced rapid speciation. *BMC Evol Biol* 7:1–11.
177. Canavez FC, *et al.* (1999) Molecular phylogeny of New World primates (Platyrrhini) based on β^2-microglobulin DNA sequences. *Mol Phyl Evol* 12:74–82.
178. de Weerd DRU, Piel WH, Gittenberger E (2004) Widespread polyphyly among Aloplinae snail genera: When phylogeny mirrors biogeography more closely than morphology. *Mol Phyl Evol* 33:533–548.
179. Arnason U, Gullberg A (1996) Cytochrome *b* nucleotide sequences and the identification of five primary lineages of extant Cetaceans. *Mol Biol Evol* 13:407–417.
180. Galewski T, Mauffrey JF, Leite YLR, Patton JL, Douzery EJP (2005) Ecomorphological diversification among South American spiny rats (Rodentia: Echimyidae): a phylogenetic and chronological approach. *Mol Phyl Evol* 34:601–615.
181. Galewski T, et al. (2006) The evolutionary radiation of Arvicolinae rodents (voles and lemmings): Relative contribution of nuclear and mitochondrial DNA phylogenies. *BMC Evol Biol* 6:1–17.

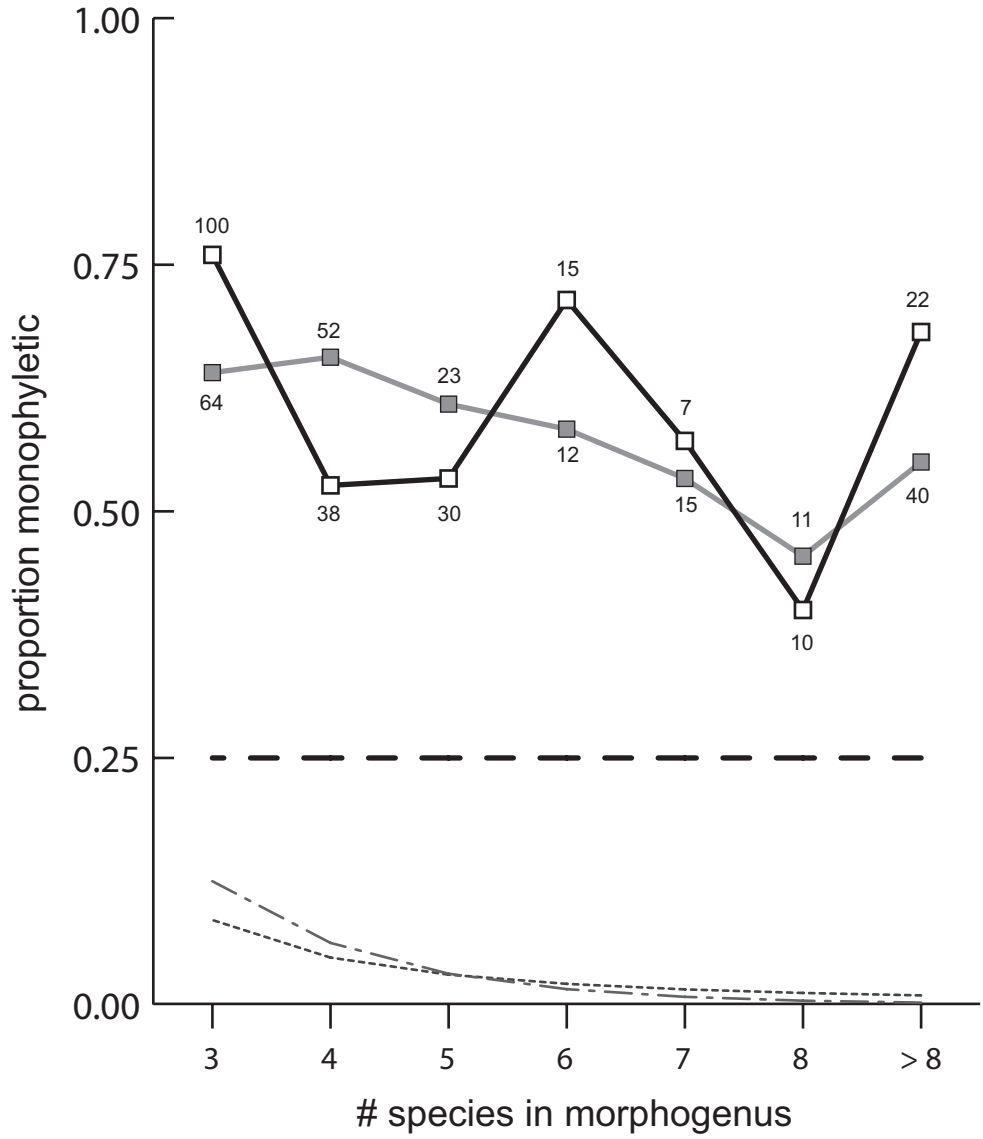

Fig. S1. Proportion of monophyletic morphogenera as a function of the number of species in the morphogenus included in the molecular phylogeny. The sample sizes of analyzed morphogenera are shown next to each data point. Genera with >8 species are grouped together because of low numbers of molecular analyses sampling large numbers of species in the same genus. Black line with open squares: Mammalia; gray line with filled squares: Mollusca. Dashed, horizontal line is the 25% cutoff for the expectation of monophyly (model 3). Below are the maximum expected monophyly rates at each morphogenus size for the coin-flip model (dot-dash line: model 2), and the random permutation model (dotted line: model 1). At all sizes, observed monophyly rates are significantly higher than those expected if morphogenera contained no phylogenetic information.

Table S1. Primary data for molecular phylogenies surveyed in this analysis

Ref.	Phylum	Class	Clade	Genus	Marine (M)/ nonmarine (NM)	ngen	ntaxa	MC3	MPBoot	MLBoot	# species in genus	Mono-phyletic	Uni-para-phyletic	Multi-para-phyletic	Poly-phyletic
32	Chordata	Mammalia	''Insectivora''	Chodsigoa		18	74	100	100	100	3	1	0	0	0
32	Chordata	Mammalia	''Insectivora''	Crocidura		18	74	100	84	100	12	1	0	0	0
97	Chordata	Mammalia	''Insectivora''	Crocidura		109	158	>95	>70		4	1	0	0	0
111	Chordata	Mammalia	''Insectivora''	Crocidura		15	76			75	12	1	0	0	0
32	Chordata	Mammalia	''Insectivora''	Cryptotis		18	74	100	99	100	3	1	0	0	0
111	Chordata	Mammalia	''Insectivora''	Cryptotis		15	76			78	4	1	0	0	0
111	Chordata	Mammalia	''Insectivora''	Episoriculus		15	76			53	4	0	0	0	1
141	Chordata	Mammalia	''Insectivora''	Mogera		15	21		81		4	1	0	0	0
32	Chordata	Mammalia	''Insectivora''	Myosorex		18	74	100	100	100	3	1	0	0	0
141	Chordata	Mammalia	''Insectivora''	Scapanus		15	21		93		3	1	0	0	0
32	Chordata	Mammalia	''Insectivora''	Sorex		18	74	100	100	100	11	1	0	0	0
111	Chordata	Mammalia	''Insectivora''	Sorex		15	76			78	37	1	0	0	0
32	Chordata	Mammalia	''Insectivora''	Suncus		18	74	100	99	97	6	0	0	1	0
122	Chordata	Mammalia	''Insectivora''	Suncus		10	27		1		6	0	0	0	1
122	Chordata	Mammalia	''Insectivora''	Sylvisorex		10	27		70		4	0	0	0	1
39	Chordata	Mammalia	Carnivora	Arctocephalus		47	77	100	94		3	0	1	0	0
171	Chordata	Mammalia	Carnivora	Arctocephalus		7	14		41		8	0	0	0	1
7	Chordata	Mammalia	Carnivora	Canis		14	23	99	1	1	7	1	0	0	0
38	Chordata	Mammalia	Carnivora	Canis		57	74	100	100		3	1	0	0	0
38	Chordata	Mammalia	Carnivora	Felis		57	74	59			4	0	0	0	1
44	Chordata	Mammalia	Carnivora	Genetta		23	34	100	100	100	7	1	0	0	0
43	Chordata	Mammalia	Carnivora	Genetta		14	22		100	100	6	1	0	0	0
44	Chordata	Mammalia	Carnivora	Herpestes		23	34	100	100	100	3	0	1	0	0
157	Chordata	Mammalia	Carnivora	Herpestes		13	19		1	1	4	0	0	0	1
39	Chordata	Mammalia	Carnivora	Lontra		47	77	100	100		3	1	0	0	0
71	Chordata	Mammalia	Carnivora	Lontra		16	22	100	100	100	3	1	0	0	0
38	Chordata	Mammalia	Carnivora	Martes		57	74	100	86		3	0	0	0	1
39	Chordata	Mammalia	Carnivora	Martes		47	77	100	87		7	0	0	0	1
91	Chordata	Mammalia	Carnivora	Martes		11	18	100			3	0	1	0	0
136	Chordata	Mammalia	Carnivora	Martes		5	17		81		5	0	1	0	0
135	Chordata	Mammalia	Carnivora	Martes		14	29	100	100	100	6	0	1	0	0
31	Chordata	Mammalia	Carnivora	Mustela		22	24		95		3	1	0	0	0
35	Chordata	Mammalia	Carnivora	Mustela		98	118		95		3	0	0	0	1
38	Chordata	Mammalia	Carnivora	Mustela		57	74	100	99		7	1	0	0	0
39.	Chordata	Mammalia	Carnivora	Mustela		47	77	100	100		11	1	0	0	0
71	Chordata	Mammalia	Carnivora	Mustela		16	22	100	100	100	3	1	0	0	0
82	Chordata	Mammalia	Carnivora	Mustela		24	32		74		3	1	0	0	0
91	Chordata	Mammalia	Carnivora	Mustela		11	18	100			6	1	0	0	0
136	Chordata	Mammalia	Carnivora	Mustela		5	17		100		8	1	0	0	0
135	Chordata	Mammalia	Carnivora	Mustela		14	29	100	100	100	9	1	0	0	0
38	Chordata	Mammalia	Carnivora	Panthera		57	74		71		3	0	1	0	0
174	Chordata	Mammalia	Carnivora	Panthera		9	14			99	5	1	0	0	0
39	Chordata	Mammalia	Carnivora	Phoca		47	77	100	79		5	1	0	0	0
106	Chordata	Mammalia	Carnivora	Phoca		4	8		98		5	0	0	1	0
7	Chordata	Mammalia	Carnivora	Pseudalopex		14	23	100	100	100	3	1	0	0	0
5	Chordata	Mammalia	Carnivora	Ursus		26	29	100			3	0	1	0	0
26	Chordata	Mammalia	Carnivora	Ursus		27	35	100	100		4	1	0	0	0
82	Chordata	Mammalia	Carnivora	Ursus		24	32		100		3	1	0	0	0
175	Chordata	Mammalia	Carnivora	Ursus		4	7	95	80	68	4	0	1	0	0
176	Chordata	Mammalia	Carnivora	Ursus		4	8	95	72	85	4	0	1	0	0
44	Chordata	Mammalia	Carnivora	Viverra		23	34	100	95	87	3	1	0	0	0
43	Chordata	Mammalia	Carnivora	Viverra		14	22		100	100	3	1	0	0	0
7	Chordata	Mammalia	Carnivora	Vulpes		14	23	100	100	100	3	0	1	0	0
5	Chordata	Mammalia	Cetartiodactyla	Balaenoptera		32	38		83		4	0	1	0	0
98	Chordata	Mammalia	Cetartiodactyla	Balaenoptera		39	63	100			3	0	0	0	1
173	Chordata	Mammalia	Cetartiodactyla	Balaenoptera		15	17	100		95	3	1	0	0	0
51	Chordata	Mammalia	Cetartiodactyla	Bos		8	16	100	90		5	0	0	1	0
62	Chordata	Mammalia	Cetartiodactyla	Bos		7	11		71		4	0	1	0	0
53	Chordata	Mammalia	Cetartiodactyla	Bubalus		36	51		100		4	1	0	0	0
53	Chordata	Mammalia	Cetartiodactyla	Capra		36	51		90		3	0	1	0	0
54	Chordata	Mammalia	Cetartiodactyla	Capra		15	30		93		8	0	1	0	0
78	Chordata	Mammalia	Cetartiodactyla	Capra		19	21		100	100	3	1	0	0	0
131	Chordata	Mammalia	Cetartiodactyla	Capra		30	33	100			3	0	1	0	0
131	Chordata	Mammalia	Cetartiodactyla	Capra		30	33		78		3	1	0	0	0
132	Chordata	Mammalia	Cetartiodactyla	Capra		20	30	100		100	5	0	1	0	0
54	Chordata	Mammalia	Cetartiodactyla	Capricornis		15	30		80		3	1	0	0	0
23	Chordata	Mammalia	Cetartiodactyla	Cervus		18	23		97		3	0	1	0	0
45	Chordata	Mammalia	Cetartiodactyla	Cervus		15	25	100	100	100	7	0	0	0	1
121	Chordata	Mammalia	Cetartiodactyla	Cervus		9	16				3	0	0	0	1
98	Chordata	Mammalia	Cetartiodactyla	Delphinus		39	63	100			3	1	0	0	0
53	Chordata	Mammalia	Cetartiodactyla	Gazella		36	51		89		3	0	1	0	0
10	Chordata	Mammalia	Cetartiodactyla	Kobus		3	12		100		8	1	0	0	0
98	Chordata	Mammalia	Cetartiodactyla	Lagenorhynchus		39	63	99			4	0	0	0	1
179	Chordata	Mammalia	Cetartiodactyla	Mesoplodon		32	38		63		3	0	0	0	1
121	Chordata	Mammalia	Cetartiodactyla	Muntiacus		9	16	100	100	1	3	1	0	0	0
42	Chordata	Mammalia	Cetartiodactyla	Oryx		16	22		82		3	1	0	0	0

Ref.	Phylum	Class	Clade	Genus	Marine (M)/ nonmarine (NM)	ngen	ntaxa	MC3	MPBoot	MLBoot	# species in genus	Mono-phyletic	Uni-para-phyletic	Multi-para-phyletic	Poly-phyletic
54	Chordata	Mammalia	Cetartiodactyla	Ovis		15	30		89		5	1	0	0	0
79	Chordata	Mammalia	Cetartiodactyla	Ovis		14	19			84	5	1	0	0	0
132	Chordata	Mammalia	Cetartiodactyla	Ovis		20	30	100		94	4	1	0	0	0
84	Chordata	Mammalia	Cetartiodactyla	Procapra		18	23		100		3	1	0	0	0
84	Chordata	Mammalia	Cetartiodactyla	Raphicerus		18	23		100		3	1	0	0	0
94	Chordata	Mammalia	Cetartiodactyla	Raphicerus		28	35		100	100	3	1	0	0	0
95	Chordata	Mammalia	Cetartiodactyla	Raphicerus		26	37		100		3	1	0	0	0
97	Chordata	Mammalia	Cetartiodactyla	Raphicerus		109	158	>95	>70		3	1	0	0	0
10	Chordata	Mammalia	Cetartiodactyla	Redunca		3	12		100		3	1	0	0	0
98	Chordata	Mammalia	Cetartiodactyla	Stenella		39	63	99			5	0	0	1	0
52	Chordata	Mammalia	Cetartiodactyla	Tragelaphas		17	25	100	86		6	0	1	0	0
53	Chordata	Mammalia	Cetartiodactyla	Tragelephas		36	51		100		5	0	1	0	0
95	Chordata	Mammalia	Cetartiodactyla	Tragelephas		26	37		67		5	0	0	1	0
97	Chordata	Mammalia	Cetartiodactyla	Tragelephas		109	158	>95	>70		9	1	0	0	0
49	Chordata	Mammalia	Lagomorpha	Lepus		8	12		100		3	1	0	0	0
96	Chordata	Mammalia	Lagomorpha	Lepus		11	25	100	100	100	6	1	0	0	0
97	Chordata	Mammalia	Lagomorpha	Lepus		109	158	>95	>70		6	1	0	0	0
96	Chordata	Mammalia	Lagomorpha	Pronolagus		11	25	100	100	100	4	1	0	0	0
97	Chordata	Mammalia	Lagomorpha	Pronolagus		109	158	>95	>70		4	1	0	0	0
49	Chordata	Mammalia	Lagomorpha	Sylvilagus		8	12		95		3	1	0	0	0
96	Chordata	Mammalia	Lagomorpha	Sylvilagus		11	25	100	100	100	6	1	0	0	0
97	Chordata	Mammalia	Lagomorpha	Sylvilagus		109	158	>95	>70		6	1	0	0	0
76	Chordata	Mammalia	Marsupialia	Antechinus		21	62		92		8	1	0	0	0
75	Chordata	Mammalia	Marsupialia	Dasyurus		13	22		99		6	1	0	0	0
63	Chordata	Mammalia	Marsupialia	Didelphis		15	39	>95			3	1	0	0	0
128	Chordata	Mammalia	Marsupialia	Macropus		14	18		100		5	0	1	0	0
63	Chordata	Mammalia	Marsupialia	Marmosa		15	39	>95			5	0	1	0	0
145	Chordata	Mammalia	Marsupialia	Marmosa		11	19	100	100	100	3	0	1	0	0
63	Chordata	Mammalia	Marsupialia	Marmosops		15	39	>95			5	1	0	0	0
145	Chordata	Mammalia	Marsupialia	Marmosops		11	19	100	100	100	4	1	0	0	0
63	Chordata	Mammalia	Marsupialia	Micoureus		15	39	>95			3	1	0	0	0
63	Chordata	Mammalia	Marsupialia	Monodelphis		15	39	>95			4	1	0	0	0
76	Chordata	Mammalia	Marsupialia	Murexia		21	62		100		5	1	0	0	0
11	Chordata	Mammalia	Marsupialia	Ningaui		3	23		94		3	1	0	0	0
76	Chordata	Mammalia	Marsupialia	Ningaui		21	62		92		3	1	0	0	0
123	Chordata	Mammalia	Marsupialia	Phalanger		9	13	100	96	97	3	1	0	0	0
63	Chordata	Mammalia	Marsupialia	Philander		15	39	>95			3	1	0	0	0
76	Chordata	Mammalia	Marsupialia	Planigale		21	62		100		4	1	0	0	0
75	Chordata	Mammalia	Marsupialia	Pseudantechinus		13	22		100		3	1	0	0	0
11	Chordata	Mammalia	Marsupialia	Sminthopsis		3	23		90		19	0	1	0	0
63	Chordata	Mammalia	Marsupialia	Thylamys		15	39	>95			4	1	0	0	0
35	Chordata	Mammalia	Perrisodactyla	Equus		98	118		100		3	1	0	0	0
120	Chordata	Mammalia	Perrisodactyla	Equus		5	8		>94	>94	3	1	0	0	0
99	Chordata	Mammalia	Primates	Allouatta		7	10		100	100	3	1	0	0	0
21	Chordata	Mammalia	Primates	Ateles		3	6		100		4	1	0	0	0
109	Chordata	Mammalia	Primates	Ateles		6	10			97	3	1	0	0	0
177	Chordata	Mammalia	Primates	Callicebus		16	25		100		4	1	0	0	0
9	Chordata	Mammalia	Primates	Callithrix		16	24		100		4	0	1	0	0
177	Chordata	Mammalia	Primates	Callithrix		16	25		100		4	0	1	0	0
15	Chordata	Mammalia	Primates	Callithrix		7	21		99		8	0	1	0	0
17	Chordata	Mammalia	Primates	Callithrix		12	17		99	98	5	0	1	0	0
139	Chordata	Mammalia	Primates	Callithrix		3	12		100		5	1	0	0	0
133	Chordata	Mammalia	Primates	Cebus		6	9		92		3	0	0	0	1
158	Chordata	Mammalia	Primates	Cebus		15	22		100		4	1	0	0	0
154	Chordata	Mammalia	Primates	Cercopithecus		8	19		100		12	0	0	0	1
155	Chordata	Mammalia	Primates	Cercopithecus		10	25		100		16	0	0	0	1
24	Chordata	Mammalia	Primates	Cercopithecus		10	15	91		79	5	0	1	0	0
27.	Chordata	Mammalia	Primates	Eulemur		10	17		86		5	1	0	0	0
28	Chordata	Mammalia	Primates	Eulemur		9	11	>95		>95	3	1	0	0	0
60	Chordata	Mammalia	Primates	Eulemur		13	22	100	90	90	5	1	0	0	0
69	Chordata	Mammalia	Primates	Eulemur		21	25	100			4	1	0	0	0
117	Chordata	Mammalia	Primates	Eulemur		12	25		100		5	1	0	0	0
144	Chordata	Mammalia	Primates	Eulemur		10	16		89	71	4	1	0	0	0
130	Chordata	Mammalia	Primates	Galago		22	35		1	90	5	0	0	1	0
117	Chordata	Mammalia	Primates	Hapalemur		12	25		99		3	0	1	0	0
151	Chordata	Mammalia	Primates	Hylobates		4	12		100		6	1	0	0	0
15	Chordata	Mammalia	Primates	Lentopithecus		7	21		100		3	1	0	0	0
27	Chordata	Mammalia	Primates	Lepilemur		10	17		100		3	1	0	0	0
117	Chordata	Mammalia	Primates	Lepilemur		12	25		100		3	1	0	0	0
24	Chordata	Mammalia	Primates	Macaca		10	15	100		99	3	1	0	0	0
116	Chordata	Mammalia	Primates	Macaca		13	18		100	97	3	1	0	0	0
172	Chordata	Mammalia	Primates	Macaca		14	19		100		3	1	0	0	0
139	Chordata	Mammalia	Primates	Mico		3	12		100		6	1	0	0	0
60	Chordata	Mammalia	Primates	Microcebus		13	22	100	90	90	3	1	0	0	0
117	Chordata	Mammalia	Primates	Microcebus		12	25		100		3	1	0	0	0
151	Chordata	Mammalia	Primates	Nomascus		4	12		95		4	1	0	0	0
60	Chordata	Mammalia	Primates	Propithecus		13	22	100	90	90	3	1	0	0	0
117	Chordata	Mammalia	Primates	Propithecus		12	25		100		3	1	0	0	0

Ref.	Phylum	Class	Clade	Genus	Marine (M)/ nonmarine (NM)	ngen	ntaxa	MC3	MPBoot	MLBoot	# species in genus	Mono-phyletic	Uni-para-phyletic	Multi-para-phyletic	Poly-phyletic
15	Chordata	Mammalia	Primates	Saguinus		7	21		100		6	1	0	0	0
177	Chordata	Mammalia	Primates	Saimiri		16	25		100		3	1	0	0	0
158	Chordata	Mammalia	Primates	Saimiri		15	22		100		3	1	0	0	0
59	Chordata	Mammalia	Rodentia	Aconaemys		10	15			93	3	0	1	0	0
56	Chordata	Mammalia	Rodentia	Ammospermophilus		21	124	90	85		3	1	0	0	0
19	Chordata	Mammalia	Rodentia	Apodemus		4	21	100	100	100	3	1	0	0	0
92	Chordata	Mammalia	Rodentia	Apodemus		9	18		1	89	6	1	0	0	0
150	Chordata	Mammalia	Rodentia	Apodemus		51	63	100	96	100	3	1	0	0	0
64	Chordata	Mammalia	Rodentia	Apomys		23	36	100	100	100	3	1	0	0	0
64	Chordata	Mammalia	Rodentia	Bullimus		23	36	100	100	100	3	1	0	0	0
56	Chordata	Mammalia	Rodentia	Callosciurus		21	124	100	99		6	1	0	0	0
36	Chordata	Mammalia	Rodentia	Calomys		29	39		100		3	0	0	0	1
2	Chordata	Mammalia	Rodentia	Chaetodipus		6	52	100	85		15	1	0	0	0
64	Chordata	Mammalia	Rodentia	Chrotomys		23	36	100	100	100	3	1	0	0	0
22	Chordata	Mammalia	Rodentia	Clethrionomys		14	24	95			6	0	0	0	1
108	Chordata	Mammalia	Rodentia	Cricetulus		6	15	100	100	100	4	0	0	1	0
37	Chordata	Mammalia	Rodentia	Cryptomys		4	14		100		9	1	0	0	0
56	Chordata	Mammalia	Rodentia	Cynomys		21	124	100	100		5	1	0	0	0
2	Chordata	Mammalia	Rodentia	Dipodomys		6	52	100	97		22	1	0	0	0
65	Chordata	Mammalia	Rodentia	Eliurus		22	30			85	8	0	1	0	0
22	Chordata	Mammalia	Rodentia	Eothenomys		14	24	99			4	0	0	0	1
18	Chordata	Mammalia	Rodentia	Gerbillurus		11	28	>95	>90	>90	3	1	0	0	0
18	Chordata	Mammalia	Rodentia	Gerbillus		11	28	>95	>90	>90	4	1	0	0	0
104	Chordata	Mammalia	Rodentia	Graphiurus		7	14	100	100	100	6	1	0	0	0
114	Chordata	Mammalia	Rodentia	Hylopetes		5	10			90	3	0	1	0	0
180	Chordata	Mammalia	Rodentia	Isothrix		18	35			100	3	1	0	0	0
81	Chordata	Mammalia	Rodentia	Malacomys		20	35		100		3	0	0	0	1
56	Chordata	Mammalia	Rodentia	Marmota		21	124	100	100		14	1	0	0	0
149	Chordata	Mammalia	Rodentia	Marmota		21	34	100	99	9	3	1	0	0	0
81	Chordata	Mammalia	Rodentia	Mastomys		20	35		1		4	0	0	0	1
18	Chordata	Mammalia	Rodentia	Meriones		11	28	>95	>90	>90	6	1	0	0	0
108	Chordata	Mammalia	Rodentia	Mesocricetus		6	15	100	100	100	5	1	0	0	0
181	Chordata	Mammalia	Rodentia	Microtus		14	25	97		50	11	0	1	0	0
92	Chordata	Mammalia	Rodentia	Microtus		9	18		97	100	3	1	0	0	0
19	Chordata	Mammalia	Rodentia	Mus		4	21	100	100	100	16	1	0	0	0
35	Chordata	Mammalia	Rodentia	Mus		98	118		81		8	0	0	0	1
92	Chordata	Mammalia	Rodentia	Mus		9	18		100	100	3	1	0	0	0
81	Chordata	Mammalia	Rodentia	Myomys		20	35		100	100	6	0	0	0	1
110	Chordata	Mammalia	Rodentia	Myospalax		20	27		100	100	7	1	0	0	0
160	Chordata	Mammalia	Rodentia	Neacomys		16	40		96	96	3	1	0	0	0
161	Chordata	Mammalia	Rodentia	Neacomys		19	47			98	3	1	0	0	0
56	Chordata	Mammalia	Rodentia	Neotamias		21	124	100	100		22	1	0	0	0
12	Chordata	Mammalia	Rodentia	Neotoma		15	28	100	62		3	1	0	0	0
125	Chordata	Mammalia	Rodentia	Neotoma		19	13	99	100		3	1	0	0	0
126	Chordata	Mammalia	Rodentia	Neotoma		13	19		99		3	1	0	0	0
161	Chordata	Mammalia	Rodentia	Oecomys		19	47			74	5	1	0	0	0
160	Chordata	Mammalia	Rodentia	Oligoryzomys		16	40		97	98	5	1	0	0	0
161	Chordata	Mammalia	Rodentia	Oligoryzomys		19	47			98	5	1	0	0	0
41	Chordata	Mammalia	Rodentia	Octodon		7	11		93		3	1	0	0	0
59	Chordata	Mammalia	Rodentia	Octodon		10	15			89	3	1	0	0	0
161	Chordata	Mammalia	Rodentia	Oryzomys		19	47			73	16	0	0	0	1
160	Chordata	Mammalia	Rodentia	Oryzomys		16	40		72	83	16	0	0	0	1
149	Chordata	Mammalia	Rodentia	Paraxerus		21	34	100	100	100	3	1	0	0	0
2	Chordata	Mammalia	Rodentia	Perognathus		6	52	100	83		10	1	0	0	0
12	Chordata	Mammalia	Rodentia	Peromyscus		15	28	99			8	0	0	0	1
36	Chordata	Mammalia	Rodentia	Peromyscus		29	39		100		5	0	0	0	1
125	Chordata	Mammalia	Rodentia	Peromyscus		19	13	100	100		4	0	1	0	0
126	Chordata	Mammalia	Rodentia	Peromyscus		13	19		98		4	0	1	0	0
56	Chordata	Mammalia	Rodentia	Petaurista		21	124	100	94		5	1	0	0	0
108	Chordata	Mammalia	Rodentia	Phodopus		6	15	100	100	100	3	1	0	0	0
150	Chordata	Mammalia	Rodentia	Praomys		51	63	100	53	97	3	0	0	1	0
64	Chordata	Mammalia	Rodentia	Rattus		23	36	100	62	91	4	0	1	0	0
12	Chordata	Mammalia	Rodentia	Reithrodontomys		15	28	100	100		3	1	0	0	0
56	Chordata	Mammalia	Rodentia	Sciurus		21	124	100	92		7	0	1	0	0
149	Chordata	Mammalia	Rodentia	Sciurus		21	34	100	100	100	3	0	1	0	0
56	Chordata	Mammalia	Rodentia	Spermophilus		21	124	100	82		37	0	0	1	0
119	Chordata	Mammalia	Rodentia	Spermophilus		3	36		100		4	0	1	0	0
119	Chordata	Mammalia	Rodentia	Tamias		3	36		73		23	1	0	0	0
149	Chordata	Mammalia	Rodentia	Tamias		21	34	100	100	100	3	1	0	0	0
56	Chordata	Mammalia	Rodentia	Tamiasciurus		21	124	100	100		3	1	0	0	0
18	Chordata	Mammalia	Rodentia	Tatera		11	28	1	72	58	5	0	0	0	1
18	Chordata	Mammalia	Rodentia	Taterillus		11	28	>95	>90	>90	4	1	0	0	0
142	Chordata	Mammalia	Rodentia	Thomomys		5	10		84		6	1	0	0	0
180	Chordata	Mammalia	Rodentia	Trinomys		18	35			100	8	1	0	0	0
10	Chordata	Mammalia	Xenarthra	Bradypus		6	8	100	100	99	3	1	0	0	0
50	Mollusca	Bivalvia	Anomalodesmata	Lyonsia	M	21	32	99	80		3	0	0	0	1
89	Mollusca	Bivalvia	Arcoidea	Anadara	M	5	26		87		9	1	0	0	0
89	Mollusca	Bivalvia	Arcoidea	Barbatia(Acar)	M	5	26		99		3	1	0	0	0

Ref.	Phylum	Class	Clade	Genus	Marine (M)/ nonmarine (NM)	ngen	ntaxa	MC3	MPBoot	MLBoot	# species in genus	Mono-phyletic	Uni-para-phyletic	Multi-para-phyletic	Poly-phyletic
138	Mollusca	Bivalvia	Cardiidae	Chametrachea	M	3	8		94		3	1	0	0	0
14	Mollusca	Bivalvia	Heterdonta	Tridacna	M	19	29		100		6	1	0	0	0
164	Mollusca	Bivalvia	Lucinoidea	Anodontia	M	35	44	97		1	7	0	1	0	0
66	Mollusca	Bivalvia	Mytilidae	Bathymodiolus	M	5	15	100	98		10	0	0	0	1
115	Mollusca	Bivalvia	Mytilidae	Modiolus	M	9	20		89	90	3	1	0	0	0
29	Mollusca	Bivalvia	Mytilidae	Mytilus	M	6	12		100	99	4	1	0	0	0
115	Mollusca	Bivalvia	Mytilidae	Mytilus	M	9	20		99	94	3	1	0	0	0
124	Mollusca	Bivalvia	Ostreidae	Crassostrea	M	2	13		100		11	1	0	0	0
143	Mollusca	Bivalvia	Ostreidae	Crassostrea	M	3	13		94	95	10	1	0	0	0
70	Mollusca	Bivalvia	Ostreidae	Ostrea	M	6	14		75		7	0	0	0	1
140	Mollusca	Bivalvia	Ostreidae	Ostrea	M	8	16		71		7	0	0	0	1
170	Mollusca	Bivalvia	Pteriidae	Perna	M	5	10		100	96	4	1	0	0	0
83	Mollusca	Bivalvia	Sphaeriidae	Cyclocalyx	NM	5	34		99	98	13	1	0	0	0
83	Mollusca	Bivalvia	Sphaeriidae	Shaerium	NM	5	34		96	83	16	1	0	0	0
33	Mollusca	Bivalvia	Spondylidae	Spondylus	NM	14	18	100	100		3	1	0	0	0
93	Mollusca	Bivalvia	Spondylidae	Spondylus	NM	18	23			95	3	1	0	0	0
152	Mollusca	Bivalvia	Thyasiridae	Thyasira	M	55	68		98		13	0	0	0	1
13	Mollusca	Bivalvia	Unionoidea	Ellipito	NM	37	96		99		3	0	0	0	1
13	Mollusca	Bivalvia	Unionoidea	Epioblasma	NM	37	96	100	57		4	1	0	0	0
13	Mollusca	Bivalvia	Unionoidea	Fusconia	NM	37	96	100	83		8	0	0	0	1
6	Mollusca	Bivalvia	Unionoidea	Hyridella	NM	5	10	1			3	0	0	0	1
13	Mollusca	Bivalvia	Unionoidea	Lampsilis	NM	37	96	100			9	0	0	0	1
77	Mollusca	Bivalvia	Unionoidea	Lampsilis	NM	25	34		99		3	0	0	0	1
77	Mollusca	Bivalvia	Unionoidea	Lasmigona	NM	25	34		99		3	0	0	0	1
61	Mollusca	Bivalvia	Unionoidea	Margaritifera	NM	7	11		86		5	0	0	1	0
13	Mollusca	Bivalvia	Unionoidea	Obovaria	NM	37	96	55			5	0	0	0	1
13	Mollusca	Bivalvia	Unionoidea	Pleurobema	NM	37	96		1		18	0	0	0	1
129	Mollusca	Bivalvia	Unionoidea	Potamilus	NM	3	8		100		6	0	0	0	1
13	Mollusca	Bivalvia	Unionoidea	Quadrula	NM	37	96		52		5	0	0	1	0
77	Mollusca	Bivalvia	Unionoidea	Quadrula	NM	25	34		87		4	1	0	0	0
67	Mollusca	Bivalvia	Unionoidea	Unio	NM	4	7		100		3	1	0	0	0
6	Mollusca	Bivalvia	Unionoidea	Velesunio	NM	5	10	97			4	0	1	0	0
13	Mollusca	Bivalvia	Unionoidea	Villosa	NM	37	96		1		3	0	0	0	1
102	Mollusca	Bivalvia	Veneroidea	Circe	M	53	82	100		100	5	0	0	0	1
68	Mollusca	Bivalvia	Veneroidea	Dosinia	M	32	55	>95		96	3	0	1	0	0
102	Mollusca	Bivalvia	Veneroidea	Dosinia	M	53	82	95			4	0	0	1	0
68	Mollusca	Bivalvia	Veneroidea	Globivenus	M	32	55	>95			4	0	0	0	1
68	Mollusca	Bivalvia	Veneroidea	Katelysia	M	32	55	>95		99	4	1	0	0	0
102	Mollusca	Bivalvia	Veneroidea	Katelysia	M	53	82	97		87	4	1	0	0	0
68	Mollusca	Bivalvia	Veneroidea	Paphia	M	32	55	>95		99	3	0	1	0	0
102	Mollusca	Bivalvia	Veneroidea	Pitar	M	53	82	97		86	3	0	1	0	0
68	Mollusca	Bivalvia	Veneroidea	Ruditapes	M	32	55	>95			3	0	0	0	1
102	Mollusca	Bivalvia	Veneroidea	Ruditapes	M	53	82	100			3	0	0	0	1
68	Mollusca	Bivalvia	Veneroidea	Venus	M	32	55	1		1	3	0	0	0	1
73	Mollusca	Bivalvia	Vesicomyidae	Archivesica	M	5	41	100	97		9	1	0	0	0
73	Mollusca	Bivalvia	Vesicomyidae	Calyptogena	M	5	41	1	1		3	0	0	0	1
73	Mollusca	Bivalvia	Vesicomyidae	Ectenagena	M	5	41	100	98		6	0	0	0	1
73	Mollusca	Bivalvia	Vesicomyidae	Vesicomya	M	5	41	1	1		7	0	0	0	1
85	Mollusca	Cephalopoda	Coleoidea	Gonatopsis	M	8	19		98		4	0	0	1	0
150	Mollusca	Cephalopoda	Coleoidea	Octopus	M	31	35	100			3	0	1	0	0
3	Mollusca	Cephalopoda	Loliginidae	Loligo	M	5	19			1	10	0	0	0	1
16	Mollusca	Cephalopoda	Octopoda	Graneledone	M	21	28		73		3	0	1	0	0
16	Mollusca	Cephalopoda	Octopoda	Octopus	M	21	28		89		3	0	0	0	1
57	Mollusca	Gastropoda	Achatinellidae	Achatinella	NM	4	23		64	59	9	0	0	1	0
57	Mollusca	Gastropoda	Achatinellidae	Partulina	NM	4	23		88	64	12	0	0	0	1
20	Mollusca	Gastropoda	Calyptraeidae	Bostrycapulus	M	10	73	100	94		4	1	0	0	0
20	Mollusca	Gastropoda	Calyptraeidae	Calyptraea	M	10	73	99	1		6	0	0	0	1
20	Mollusca	Gastropoda	Calyptraeidae	Crepidula	M	10	73		1		57	0	0	1	0
20	Mollusca	Gastropoda	Calyptraeidae	Crepipatella	M	10	73	100			5	0	0	1	0
20	Mollusca	Gastropoda	Calyptraeidae	Crucibulum	M	10	73	100			9	0	1	0	0
20	Mollusca	Gastropoda	Calyptraeidae	Maoricrypta	M	10	73	100	99		3	1	0	0	0
101	Mollusca	Gastropoda	Cerithoidea	Lavigeria	NM	13	18		96		4	1	0	0	0
87	Mollusca	Gastropoda	Cochliopinae	Tryonia	NM	22	32		73		6	0	0	0	1
100	Mollusca	Gastropoda	Cypraeidae	Austrasiatica	M	64	221		99		3	1	0	0	0
100	Mollusca	Gastropoda	Cypraeidae	Bistolida	M	64	221		73		7	1	0	0	0
100	Mollusca	Gastropoda	Cypraeidae	Blasicrura	M	64	221		94		3	1	0	0	0
100	Mollusca	Gastropoda	Cypraeidae	Cribrarula	M	64	221		76		12	1	0	0	0
100	Mollusca	Gastropoda	Cypraeidae	Cypraeovula	M	64	221		100		11	1	0	0	0
100	Mollusca	Gastropoda	Cypraeidae	Eclogavena	M	64	221		82		3	1	0	0	0
100	Mollusca	Gastropoda	Cypraeidae	Erosaria	M	64	221		79		24	1	0	0	0
100	Mollusca	Gastropoda	Cypraeidae	Erronea	M	64	221		71		15	1	0	0	0
100	Mollusca	Gastropoda	Cypraeidae	Leporicypraea	M	64	221		89		3	1	0	0	0
100	Mollusca	Gastropoda	Cypraeidae	Luria	M	64	221		100		5	1	0	0	0
100	Mollusca	Gastropoda	Cypraeidae	Macrocypraea	M	64	221		93		3	1	0	0	0
100	Mollusca	Gastropoda	Cypraeidae	Mauritia	M	64	221		79		8	1	0	0	0
100	Mollusca	Gastropoda	Cypraeidae	Monetaria	M	64	221		90		6	1	0	0	0
100	Mollusca	Gastropoda	Cypraeidae	Notocypraea	M	64	221		100		6	1	0	0	0
100	Mollusca	Gastropoda	Cypraeidae	Palmadusta	M	64	221		79		9	1	0	0	0

Ref.	Phylum	Class	Clade	Genus	Marine (M)/ nonmarine (NM)	ngen	ntaxa	MC3	MPBoot	MLBoot	# species in genus	Mono-phyletic	Uni-para-phyletic	Multi-para-phyletic	Poly-phyletic
100	Mollusca	Gastropoda	Cypraeidae	Pseudozonaria	M	64	221		81		4	1	0	0	0
100	Mollusca	Gastropoda	Cypraeidae	Purpuradusta	M	64	221		94		7	1	0	0	0
100	Mollusca	Gastropoda	Cypraeidae	Pustularia	M	64	221		97		5	1	0	0	0
100	Mollusca	Gastropoda	Cypraeidae	Staphylaea	M	64	221		85		3	1	0	0	0
100	Mollusca	Gastropoda	Cypraeidae	Talostolida	M	64	221		97		4	1	0	0	0
100	Mollusca	Gastropoda	Cypraeidae	Umbilia	M	64	221		100		4	1	0	0	0
100	Mollusca	Gastropoda	Cypraeidae	Zoila	M	64	221		99		7	1	0	0	0
100	Mollusca	Gastropoda	Cypraeidae	Zonaria	M	64	221		95		5	1	0	0	0
148	Mollusca	Gastropoda	Helicidae	Candidula	NM	26	37	95		77	4	0	1	0	0
148	Mollusca	Gastropoda	Helicidae	Trochoidea	NM	26	37	95		77	5	1	0	0	0
88	Mollusca	Gastropoda	Helicoidea	Cerunella	NM	30	42		86		3	0	1	0	0
118	Mollusca	Gastropoda	Hydrobiidae	Austropyrgus	NM	11	30		100		8	0	1	0	0
118	Mollusca	Gastropoda	Hydrobiidae	Jardinella	NM	11	30	100	87		11	1	0	0	0
48	Mollusca	Gastropoda	Hydrobiidae	Leptopyrgus	NM	12	27	100			3	1	0	0	0
86	Mollusca	Gastropoda	Hydrobiidae	Marstonia	NM	5	70	97			3	1	0	0	0
48	Mollusca	Gastropoda	Hydrobiidae	Opacuincola	NM	12	27	100			7	1	0	0	0
48	Mollusca	Gastropoda	Hydrobiidae	Potamopyrgus	NM	12	27	100			4	1	0	0	0
48	Mollusca	Gastropoda	Hydrobiidae	Sororipyrgus	NM	12	27	100			3	1	0	0	0
163	Mollusca	Gastropoda	Littorinidae	Afrolittorina	M	11	36	100			4	1	0	0	0
163	Mollusca	Gastropoda	Littorinidae	Austrolittorina	M	11	36	99			5	1	0	0	0
163	Mollusca	Gastropoda	Littorinidae	Echinolittorina	M	11	36	100			7	1	0	0	0
163	Mollusca	Gastropoda	Littorinidae	Littoraria	M	11	36	100			4	1	0	0	0
90	Mollusca	Gastropoda	Muricidae	Nucella	M	7	15			88	5	0	0	0	1
113	Mollusca	Gastropoda	Muricoidea	Coralliophila	M	3	7		87	95	5	0	0	1	0
159	Mollusca	Gastropoda	Nudibranchia	Aplysia	M	27	38		100		5	1	0	0	0
168	Mollusca	Gastropoda	Nudibranchia	Aplysia	M	42	52		99		3	1	0	0	0
167	Mollusca	Gastropoda	Nudibranchia	Cadlina	M	2	24	100	100		3	1	0	0	0
169	Mollusca	Gastropoda	Nudibranchia	Chromodoris	M	13	17		74		3	1	0	0	0
156	Mollusca	Gastropoda	Nudibranchia	Dendrodoris	M	8	21		73		4	1	0	0	0
156	Mollusca	Gastropoda	Nudibranchia	Doriopsilla	M	8	21		83		4	1	0	0	0
159	Mollusca	Gastropoda	Nudibranchia	Doto	M	27	38		100		3	1	0	0	0
156	Mollusca	Gastropoda	Nudibranchia	Phyllidopsis	M	8	21		87		3	0	0	0	1
72	Mollusca	Gastropoda	Pachychilidae	Brotia	NM	9	45	100	78		19	0	0	0	1
72	Mollusca	Gastropoda	Pachychilidae	Pachychilus	NM	9	45	96	100		3	1	0	0	0
72	Mollusca	Gastropoda	Pachychilidae	Paracrostoma	NM	9	45	100	100		3	1	0	0	0
46	Mollusca	Gastropoda	Pachychilidae	Tylomelania	NM	4	12		100		7	1	0	0	0
72	Mollusca	Gastropoda	Pachychilidae	Tylomelania	NM	9	45	100	100		13	1	0	0	0
74	Mollusca	Gastropoda	Patellidae	Cellana	M	5	38		97		5	1	0	0	0
74	Mollusca	Gastropoda	Patellidae	Cymbula	M	5	38		96		6	1	0	0	0
74	Mollusca	Gastropoda	Patellidae	Helcion	M	5	38		73		3	1	0	0	0
74	Mollusca	Gastropoda	Patellidae	Patella	M	5	38		100		9	1	0	0	0
74	Mollusca	Gastropoda	Patellidae	Scutellastra	M	5	38		85		13	0	1	0	0
107	Mollusca	Gastropoda	Patellogastropoda	Cellana	M	26	135	94	100		18	1	0	0	0
107	Mollusca	Gastropoda	Patellogastropoda	Cymbula	M	26	135	100	100		4	1	0	0	0
107	Mollusca	Gastropoda	Patellogastropoda	Eoacmaea	M	26	135	100	100		8	1	0	0	0
107	Mollusca	Gastropoda	Patellogastropoda	Helcion	M	26	135	100	98		3	1	0	0	0
107	Mollusca	Gastropoda	Patellogastropoda	Lottia	M	26	135	100	81		24	0	0	0	1
107	Mollusca	Gastropoda	Patellogastropoda	Nacella	M	26	135	100	100		3	1	0	0	0
107	Mollusca	Gastropoda	Patellogastropoda	Nipponoacmaea	M	26	135	100	99		8	1	0	0	0
107	Mollusca	Gastropoda	Patellogastropoda	Notoacmaea	M	26	135	100	76		9	1	0	0	0
107	Mollusca	Gastropoda	Patellogastropoda	Patella	M	26	135	100	100		4	1	0	0	0
107	Mollusca	Gastropoda	Patellogastropoda	Patelloida	M	26	135	100	99		19	1	0	0	0
107	Mollusca	Gastropoda	Patellogastropoda	Scurria	M	26	135	100	84		10	1	0	0	0
107	Mollusca	Gastropoda	Patellogastropoda	Scutellastra	M	26	135	100	99		7	0	1	0	0
105	Mollusca	Gastropoda	Planorbidae	Biomphalaria	NM	17	40		1	>75	8	1	0	0	0
105	Mollusca	Gastropoda	Planorbidae	Bulinus	NM	17	40		1	>75	7	1	0	0	0
105	Mollusca	Gastropoda	Planorbidae	Drepanotrema	NM	17	40		>75	>75	5	1	0	0	0
105	Mollusca	Gastropoda	Planorbidae	Gyraulus	NM	17	40		>75	>75	3	1	0	0	0
105	Mollusca	Gastropoda	Planorbidae	Helisoma	NM	17	40		>75	>75	3	1	0	0	0
58	Mollusca	Gastropoda	Pleuroceridae	Juga	NM	6	31		100		3	1	0	0	0
58	Mollusca	Gastropoda	Pleuroceridae	Leptoxis	NM	6	31		100		7	0	0	1	0
58	Mollusca	Gastropoda	Pleuroceridae	Lithasia	NM	6	31		100		4	0	0	0	1
103	Mollusca	Gastropoda	Pleuroceridae	Lithasia	NM	5	12		100		8	0	0	1	0
58	Mollusca	Gastropoda	Pleuroceridae	Pleurocera	NM	6	31		78		8	1	0	0	0
127	Mollusca	Gastropoda	Potamididae	Cerithideopsilla	M	14	28	100			5	0	1	0	0
127	Mollusca	Gastropoda	Potamididae	Cerithideopsis	M	14	28	100			3	1	0	0	0
127	Mollusca	Gastropoda	Potamididae	Terebralia	M	14	28	100			3	1	0	0	0
25	Mollusca	Gastropoda	Pulmonata	Albinaria	NM	17	41	100	70		3	1	0	0	0
178	Mollusca	Gastropoda	Pulmonata	Albinaria	NM	5	46	100			6	1	0	0	0
25	Mollusca	Gastropoda	Pulmonata	Carinigera	NM	17	41	100	73		10	0	0	0	1
178	Mollusca	Gastropoda	Pulmonata	Carinigera	NM	5	46	54			10	0	0	0	1
134	Mollusca	Gastropoda	Pulmonata	Catinella	NM	2	19		90	80	3	0	0	0	1
178	Mollusca	Gastropoda	Pulmonata	Cristataria	NM	5	46	100			4	1	0	0	0
25	Mollusca	Gastropoda	Pulmonata	Isabellaria	NM	17	41	83	35		8	0	0	0	1
178	Mollusca	Gastropoda	Pulmonata	Isabellaria	NM	5	46	78			14	0	0	0	1
168	Mollusca	Gastropoda	Pulmonata	Lymnaea	NM	42	52		100		4	0	0	0	1
34	Mollusca	Gastropoda	Pulmonata	Lymnaea	NM	16	19		52		3	0	0	0	1
47	Mollusca	Gastropoda	Pulmonata	Partula	NM	2	15			80	10	1	0	0	0

Ref.	Phylum	Class	Clade	Genus	Marine (M)/ nonmarine (NM)	ngen	ntaxa	MC3	MPBoot	MLBoot	# species in genus	Mono-phyletic	Uni-para-phyletic	Multi-para-phyletic	Poly-phyletic
47	Mollusca	Gastropoda	Pulmonata	Samoana	NM	2	16			80	5	1	0	0	0
25	Mollusca	Gastropoda	Pulmonata	Sericata	NM	17	41	68	46		4	0	0	0	1
178	Mollusca	Gastropoda	Pulmonata	Sericata	NM	5	46				12	0	0	0	1
134	Mollusca	Gastropoda	Pulmonata	Succinea	NM	2	19		68	78	12	0	0	0	1
137	Mollusca	Gastropoda	Pyramidellidae	Odostomia	M	17	32			1	5	0	0	0	1
137	Mollusca	Gastropoda	Pyramidellidae	Ondina	M	17	32		97	90	3	1	0	0	0
137	Mollusca	Gastropoda	Pyramidellidae	Parthenina	M	17	32		95		3	0	0	0	1
137	Mollusca	Gastropoda	Pyramidellidae	Turbonilla	M	17	32		85	82	3	0	0	0	1
80	Mollusca	Gastropoda	Strombidae	Lambis	M	11	34	100		100	3	1	0	0	0
80	Mollusca	Gastropoda	Strombidae	Strombus (Canarium)	M	11	34	63		92	10	0	0	0	1
80	Mollusca	Gastropoda	Strombidae	Strombus (Eiuprotomus)	M	11	34	100		99	3	1	0	0	0
80	Mollusca	Gastropoda	Strombidae	Strombus (Strombus)	M	11	34	100		99	3	1	0	0	0
80	Mollusca	Gastropoda	Strombidae	Strombus (Tricornis)	M	11	34	100		100	8	0	0	0	1
4	Mollusca	Gastropoda	Stylommatophora	Cochlicopa	NM	13	19	98			5	1	0	0	0
153	Mollusca	Gastropoda	Stylommatophora	Gyliotrachela	NM	7	17		90	80	6	0	0	1	0
166	Mollusca	Gastropoda	Thalassoidea	Lavigeria	NM	14	22	100	100		7	1	0	0	0
30	Mollusca	Gastropoda	Trochidae	Austrocochlea	M	6	30	100	84		5	1	0	0	0
30	Mollusca	Gastropoda	Trochidae	Chlorodiloma	M	6	30	100	100		3	1	0	0	0
30	Mollusca	Gastropoda	Trochidae	Diloma	M	6	30	100	100		11	1	0	0	0
30	Mollusca	Gastropoda	Trochidae	Monodonta	M	6	30	100	81		5	1	0	0	0
30	Mollusca	Gastropoda	Trochidae	Oxystele	M	6	30	100	100		5	1	0	0	0
165	Mollusca	Gastropoda	Turbininae	Astralium	M	14	65	100			9	1	0	0	0
165	Mollusca	Gastropoda	Turbininae	Bellastraea	M	14	65	100			3	1	0	0	0
165	Mollusca	Gastropoda	Turbininae	Euninella	M	14	65	100			3	1	0	0	0
165	Mollusca	Gastropoda	Turbininae	Lithopoma	M	14	65	100			4	0	1	0	0
165	Mollusca	Gastropoda	Turbininae	Marmarostoma	M	14	65	100			13	1	0	0	0
165	Mollusca	Gastropoda	Turbininae	Senectus	M	14	65	100			3	1	0	0	0
165	Mollusca	Gastropoda	Turbininae	Turbo s.s.	M	14	65	100			3	1	0	0	0
55	Mollusca	Gastropoda	Turrinae	Gemmula	M	6	24		86		5	1	0	0	0
55	Mollusca	Gastropoda	Turrinae	Lophiotoma	M	6	24		98		6	1	0	0	0
55	Mollusca	Gastropoda	Turrinae	Turris	M	6	24		100		6	1	0	0	0
162	Mollusca	Gastropoda	Vetigastropoda	Bolma	M	33	59	72		1	3	0	0	0	1
162	Mollusca	Gastropoda	Vetigastropoda	Phasianella	M	33	59	99		99	4	1	0	0	0
162	Mollusca	Gastropoda	Vetigastropoda	Turbo	M	33	59	79		1	8	0	0	0	1
128	Mollusca	Gastropoda	Pulmonata	Physella	NM	69	73		100	100	4	1	0	0	0
112	Mollusca	Polyplaco-phora	Ischnochitonidae	Ischnochiton	M	24	28		100		4	0	0	0	1
146	Mollusca	Scaphopoda	Dentaliidae	Antalis	M	38	48		100		4	0	0	0	1
147	Mollusca	Scaphopoda	Dentaliidae	Antalis	M	11	16		1		7	0	0	0	1

Taxonomic information is given for each morphogenus. Marine vs. nonmarine distinction are indicated for molluscan taxa. ngen indicates the number of genera included in the molecular phylogenetic analysis, ntaxa is the number of species included in the molecular phylogeny. MC3, MPBoot, and MLBoot give the support values reported in the molecular phylogeny for morphogenera for Bayesian, maximum-parsimony and maximum-likelihood analyses respectively. The number of species in the surveyed morphogenus is given, as well as a binary coding for 1 of 4 phyletic states (see *Methods* for description of phyletic states). One morphogenus (goats *Capra*) occurred in 2 conflicting phyletic states with strong support for both in the same analysis (131). We incorporated only the paraphyletic result into our analyses, conservatively lowering the observed proportion of monophyletic morphogenera (see *Methods*).

Table S2. Counts and percentages of monophyletic, paraphyletic, and polyphyletic taxa for bivalve and gastropod mollusks, and marine and nonmarine partitions within each

	Bivalvia			Bivalves: marine			Bivalves: nonmarine			Gastropoda			Gastropoda: marine			Gastropoda: nonmarine		
Taxa	# genera	%	2SE, %	# genera	%	2SE, %	# genera	%	2SE, %	# genera	%	2SE, %	# genera	%	2SE, %	# genera	%	2SE, %
Monophyletic	20	39.2	13.2	13	41.9	16.7	7	**35.0**	**19.8**	98	*71.0*	7.7	71	78.0	8.7	27	57.4	13.9
Nonmonophyletic	*31*	*60.8*		*18*	*58.1*		*13*	*65.0*		40	*29.0*		*20*	*22.0*		20	42.6	
Uniparaphyletic	5	9.8		4	12.9		1	5.0		8	*5.8*		5	5.5		3	6.4	
Multiparaphyletic	3	5.9		1	3.2		2	10.0		7	*5.1*		3	3.3		4	8.5	
Nonpolyphyletic	*28*	*54.9*		*18*	*58.1*		*10*	*50.0*		113	*81.9*		*79*	*86.8*		34	72.3	
Polyphyletic	23	45.1	13.4	13	41.9	16.7	10	50.0	20.4	25	*18.1*	6.6	12	13.2	7.3	13	27.7	12.8
Total	51			31			20			138			91			47		

Two SE of the observed percentages are given for the rate of monophyly and polyphyly. Rows in italics are the complementary counts and percentages to the cases of monophyly and paraphyly. All of the monophyly values are significantly greater than expected by chance under our first 2 models. Nonmarine bivalves possess a rate of monophyly that is not significantly >25% (bold). This is the sole partition where this expected rate is not significantly exceeded.

Table S3. Size and range data for paraphyletic and polyphyletic morphogenera

Body mass or size				Total latitudinal range: degrees latitude			
Genus	Status	Morphogenus value	Total group value	Genus	Status	Morphogenus value	Total group value
Mammalia							
Suncus	Poly	1.43	2.18	*Suncus*	Poly	67.05	75.60
Mustela	Poly	6.59	6.85	*Sylvisorex*	Poly	29.07	75.60
Martes	Poly	7.82	8.27	*Mustela*	Poly	47.32	47.32
Felis	Poly	9.38	10.76	*Martes*	Poly	103.50	116.74
Phoca	Poly	11.51	11.70	*Felis*	Poly	114.01	114.01
Herpestes	Poly	7.19	7.19	*Herpestes*	Poly	61.76	77.57
Arctocephalus	Poly	11.47	11.49	*Mesoplodon*	Poly	66.10	126.11
Mesoplodon	Poly	15.04	15.38	*Bos*	Poly	102.73	102.73
Bos	Poly	13.59	13.46	*Tragelaphas*	Poly	37.82	46.83
Tragelaphas	Poly	11.31	11.82	*Cervus*	Poly	31.73	99.43
Cervus	Poly	11.20	11.47	*Cebus*	Poly	31.49	31.49
Cebus	Poly	7.87	7.89	*Cecopithecus*	Poly	33.52	42.17
Cercopithecus	Poly	8.48	8.47	*Peromyscus*	Poly	50.12	50.12
Peromyscus	Poly	3.33	3.69	*Tatera*	Poly	69.68	69.68
Tatera	Poly	4.60	4.11	*Clethrionomys*	Poly	39.29	50.66
Clethrionomys	Poly	3.05	3.21	*Eothenomys*	Poly	19.49	50.66
Mus	Poly	2.56	3.49	*Calomys*	Poly	50.16	96.06
Calomys	Poly	3.00	3.65	*Spermophilus*	Poly	53.64	53.64
Peromyscus	Poly	3.06	3.16	*Mastomys*	Poly	6.95	18.92
Spermophilus	Poly	5.64	5.95	*Myomys*	Poly	16.65	18.92
Myomys	Poly	3.58	3.69	*Praomys*	Poly	18.36	30.73
Orzomys	Poly	4.10	4.08	*Orzomys*	Poly	112.77	112.77
Crocidura	Para	2.28	2.38	*Crocidura*	Para	56.66	57.32
Vulpes	Para	8.19	8.45	*Vulpes*	Para	107.34	113.33
Panthera	Para	11.99	11.34	*Panthera*	Para	59.27	59.27
Martes	Para	7.16	7.25	*Martes*	Para	67.85	80.14
Ursus	Para	11.87	11.51	*Ursus*	Para	68.60	85.07
Cervus	Para	11.87	11.91	*Capra*	Para	20.88	24.44
Capra	Para	11.28	10.95	*Gazella*	Para	48.82	48.82
Gazella	Para	10.25	10.38	*Tragelaphas*	Para	37.82	46.83
Tragelaphas	Para	11.34	11.37	*Bos*	Para	102.73	102.73
Bos	Para	13.46	13.36	*Marmosa*	Para	47.05	52.10
Sminthopsis	Para	2.93	2.86	*Cecopithecus*	Para	33.52	37.57
Marmosa	Para	3.25	3.57	*Aconaemys*	Para	8.49	14.56
Macropus	Para	9.73	9.67	*Sciurus*	Para	76.40	76.40
Callithrix	Para	5.83	5.83	*Praomys*	Para	17.19	17.19
Cecopithecus	Para	8.34	8.39	*Spermophilus*	Para	29.20	38.54
Aconaemys	Para	4.73	4.85				
Sciurus	Para	6.08	5.66				
Praomys	Para	3.60	3.52				
Spermophilus	Para	5.63	6.90				
Peromyscus	Para	3.33	3.33				
Hapalemur	Para	7.36	7.56				
Hylopetes	Para	5.42	5.11				
Tupia	Para	5.10	5.14				
Mollusca							
Venus	Poly	3.87	3.86	Venus	Poly	88.00	102.00
Circe	Poly	3.94	3.67	Circe	Poly	69.00	69.00
Paphia	Poly	3.95	3.79	Paphia	Poly	79.00	107.00
Ruditapes	Poly	3.89	3.79	Ruditapes	Poly	39.00	113.00
Lyonsia	Poly	2.43	2.79	Lyonsia	Poly	143.00	143.00
Tricornis	Poly	5.27	4.73	Tricornis	Poly	58.00	69.00
Coralliophila	Poly	3.69	3.69	Coralliophila	Poly	67.00	67.00
Ectenagena	Poly	4.19	4.11	Ectenagena	Poly	41.00	66.00
Vesicomya	Poly	3.88	4.05	Vesicomya	Poly	54.00	66.00
Calyptogena	Poly	4.11	4.16	Calyptogena	Poly	51.00	66.00
Ostrea	Poly	4.40	4.49	Ostrea	Poly	108.50	108.50
Bathymodiolus	Poly	4.46	4.46	Bathymodiolus	Poly	79.00	79.00
Anodontia	Poly	3.45	3.26	Anodontia	Poly	70.00	78.00
Globivenus	Para	3.50	3.56	Globivenus	Para	67.00	67.00
Canarium	Para	3.75	3.85	Canarium	Para	67.00	74.00
Contradusta	Para	3.38	3.11	Contradusta	Para	60.00	64.00
Scutellastra	Para	4.01	4.01	Scutellastra	Para	70.00	70.00
Spisula	Para	3.91	3.61	Spisula	Para	55.00	55.00
Cuspidaria	Para	3.46	3.22	Cuspidaria	Para	146.00	146.00

Median body mass [ln(kg)] and total latitudinal range (degrees) are given for mammalian morphogenera. Body size (maximum shell dimension in gastropods, geometric mean of length and height in bivalves) and total latitudinal range (degrees) are given for molluscan morphogenera.

Table S4. Summary of morphogenera that were duplicated across phylogenetic analyses

	Monophyletic	Uniparaphyletic	Multiparaphyletic	Polyphyletic
Mammalia (Total duplicated genera: 51)				
Monophyletic	**29**	–	–	–
Uniparaphyletic	4	**2**	–	–
Multiparaphyletic	1	2	**0**	–
Polyphyletic	3	6	1	**1**
Mollusca (Total duplicated genera: 26)				
Monophyletic	**12**	–	–	–
Uniparaphyletic	0	**2**	–	–
Multiparaphyletic	1	1	0	–
Polyphyletic	0	1	1	**8**

Shown are genera that occur in only 1 phyletic state across all analyses (bold) or across two states. Two mammalian genera are observed in 3 states: *Balaenoptera* (monophyletic, uniparaphyletic, and polyphyletic) and *Tragelephas* (monophyletic, uniparaphyletic, and multiparaphyletic). No molluscan genera are observed in 3 states.