Supporting Information

Labonte et al. 10.1073/pnas.1519459113

Species Included in the Study

Amphibia: Anura, Dendrobatidae: *Mannophryne trinitatis* (Garman, 1887), Hemiphractidae: *Flectonotus fitzgeraldi* (Parker, 1933), Hylidae: *Dendropsophus microcephalus* (Cope, 1886); *Dendropsophus minusculus* (Rivero, 1971); *Dendropsophus minutus* (Peters, 1872); *Hyla cinerea* (Schneider, 1799); *Hyla versicolor* LeConte, 1825; *Hypsiboas boans* (Linnaeus, 1758); *Hypsiboas crepitans* (Wied-Neuwied, 1824); *Hypsiboas geographicus* (Spix, 1824); *Hypsiboas punctatus* (Schneider, 1799); *Litoria caerulea* (White, 1790); *Osteopilus septentrionalis* (Duméril & Bibron, 1841); *Phyllodytes auratus* (Boulenger, 1917); *Phyllomedusa trinitatis* Mertens, 1926; *Scinax ruber* (Laurenti, 1768); *Smilisca phaeota* (Cope, 1862); *Sphaenorhynchus lacteus* (Daudin, 1801); *Trachycephalus venulosus* (Laurenti, 1768), Craugastoridae: *Pristimantis euphronides* (Schwartz, 1967), Ranidae: *Staurois guttatus* (Günther, 1858), Rhacophoridae: *Rhacophorus pardalis* Gühnter, 1858.

Arachnida: Araneae, Ctenidae: *Ctenus curvipes* (Keyserling, 1881); *Ctenus sinuatipes* Pickard-Cambridge, 1897; *Ctenus sp. 3* Walckenaer, 1805; *Cupiennius coccineus* Pickard-Cambridge, 1901; *Cupiennius getazi* Simon, 1891; *Cupiennius salei* (Keyserling, 1877); *Phoneutria boliviensis* (Pickard-Cambridge, 1897), Philodromidae: *Philodromus aureolus* (Clerck, 1757); *Philodromus dispar* Walckenaer, 1826, Salticidae: *Evarcha arcuata* (Clerck, 1757); *Marpissa muscosa* (Clerck, 1757); *Salticus scenicus* (Clerck, 1757); *Sitticus pubescens* (Fabricius, 1775); *Pseudeuophrys lanigera* (Simon, 1871), Theraphosidae: *Aphonopelma seemanni* (Pickard-Cambridge, 1897), Thomisidae: *Misumenops spec.*

Mesostigmata, Laelapidae: *Androlaelaps schaeferi* (Till, 1969).

Trombidiformes, Tetranychidae: *Tetranychus cinnabarinus* Boudreaux, 1956; *Tetranychus urticae* (Koch, 1836).

Insecta: Blattodea, Blaberidae: *Gromphadorhina portentosa* (Schaum, 1853); *Nauphoeta cinerea* (Olivier, 1789), Blattellidae: *Blattella germanica* Linnaeus, 1767, Blattidae: *Blatta orientalis* Linnaeus, 1758; *Periplaneta americana* (Linnaeus, 1758); *Periplaneta australasiae* Fabricius, 1775; *Supella supellectilium* (Serville, 1839).

Coleoptera, Brentidae: *Cylas puncticollis* (Boheman, 1833), Cantharidae: *Cantharis rustica* Fallén, 1807; *Rhagonycha fulva* Scopoli, 1763, Cerambycidae: *Agrianome Spinicollis* (Macleay, 1827); *Clytus arietis* (Linnaeus, 1758), Chrysomelidae: *Altica lythri* Aubé, 1843; *Cassida canaliculata* Laicharting, 1781; *Chrysolina americana* (Linnaeus, 1758); *Chrysolina fastuosa* Scopoli, 1763; *Chrysolina menthastri* (Suffrian, 1851); *Chrysolina polita* (Linnaeus, 1758); *Clytra quadripunctata* Linnaeus, 1758; *Cryptocephalus spec.* Geoffroy, 1762; *Galerucella nymphaeaei* (Linnaeus, 1758); *Gastrophysa viridula* (De Geer, 1775); *Hemisphaerota cyanea* (Say, 1824); *Leptinotarsa decemlineata* Say, 1824; *Oulema melanopus* (Linnaeus, 1758); *Psylliodes chrysocephalus* (Linnaeus, 1758), Cleridae: *Trichodes alvearius* (Fabricius, 1792), Coccinellidae: *Adalia bipunctata* (Linnaeus, 1758); *Coccinella septempunctata* (Linnaeus, 1758); *Harmonia axyridis* (Pallas, 1773); *Henosepilachna vigintioctopunctata* (Fabricius, 1775); *Psyllobora vigintiduopunctata* (Linnaeus, 1758); *Subcoccinella vigintiquatuorpunctata* (Linnaeus, 1758), Pyrochroidae: *Pyrochroa coccinea* Linnaeus, 1762, Silphidae: *Nicrophorus spec.* Fabricius, 1775.

Dermaptera, Forficulidae: *Forficula auricularia* Linnaeus, 1758.

Diptera, Calliphoridae: *Calliphora vicina* Robineau-Desvoidy, 1830; *Calliphora vomitoria* (Linnaeus, 1758); *Lucilia caesar* (Linnaeus, 1758), Syrphidae: *Episyrphus balteatus* (De Geer, 1776); *Eristalis tenax* (Linnaeus, 1758); *Myathropa florea* (Linnaeus, 1758); *Sphaerophoria scripta* (Linnaeus, 1758); *Syrphus ribesii* (Linnaeus, 1758); *Volucella pellucens* (Linnaeus, 1758), Tabanidae: *Tabanus spec* Linnaeus, 1758, Tachinidae: *Tachina fera* (Linnaeus, 1761).

Hemiptera, Aphididae: *Aphis fabae* Scopoli, 1763; *Megoura viciae* Buckton, 1876, Cicadellidae: *Aphrodes sp.* Curtis, 1833; *Eupteryx aurata* (Linnaeus, 1758), Coreidae: *Coreus marginatus* (Linnaeus, 1758); *Gonocerus acuteangulatus* (Goeze, 1778); *Leptoglossus occidentalis* Heidemann, 1910, Delphacidae: *Asiraca clavicornis* (Fabricius, 1775); *Javesella pellucida* (Fabricius, 1794); *Ribautodelphax spec* (Ribaut, 1953); *Stenocranus minutus* (Fabricius, 1787), Heterogastridae: *Heterogaster urticae* (Fabricius, 1775), Miridae: *Dicyphus errans* (Wolff, 1804); *Lygocoris pabulinus* (Linnaeus, 1761), Pentatomidae: *Aelia acuminata* (Linnaeus, 1758); *Palomena prasina* (Linnaeus, 1761), Triozidae: *Trioza urticae* (Linnaeus, 1758).

Hymenoptera, Formicidae: *Atta cephalotes* (Linnaeus, 1758); *Atta colombica* (Guérin-Méneville, 1844); *Camponotus schmitzi* Stärcke, 1933; *Myrmica scabrinodis* Nylander, 1846; *Oecophylla smaragdina* Fabricius, 1775; *Polyrhachis dives* Smith, 1857, Vespidae: *Vespa crabro* Linnaeus, 1758.

Lepidoptera, Tortricidae: *Cydia pomonella* (Linnaeus, 1758).

Mantodea, Mantidae: *Stagmomantis theophila* Rehn, 1904.

Orthoptera, Acrididae: *Chorthippus brunneus* (Thunberg, 1815); *Locusta migratoria manilensis* (Linnaeus, 1758), Tettigoniidae: *Conocephalus discolor* (Thunberg, 1815); *Metrioptera roeselii* (Hagenbach, 1822).

Phasmatodea, Bacillidae: *Heteropteryx dilatata* (Parkinson, 1798), Diapheromeridae: *Carausius morosus* Sinety, 1901; *Clonaria conformans* (Brunner, 1907), Heteropterygidae: *Trachyaretaon carmelae* Lit & Eusebio, 2005, Phasmatidae: *Eurycantha calcarata* (Lucas, 1869); *Medauroidea extradentata* Brunner, 1907; *Ramulus spec* Saussure, 1862; *Sceptrophasma hispidulum* Wood-Mason, 1873.

Raphidioptera, Raphidiidae: *Phaeostigma notatum* (Fabricius, 1781).

Mammalia: Chiroptera, Myzopodidae: *Myzopoda aurita* Milne-Edwards & A. Grandidier, 1878.

Reptilia: Squamata, Dactyloidae: *Anolis auratus* Daudin, 1802; *Anolis biporcatus* Wiegmann, 1834; *Anolis capito* (Peters, 1863); *Anolis carolinensis* Voigt, 1832; *Anolis cristatellus* (Duméril & Bibron, 1837); *Anolis cupreus* (Hallowell, 1860); *Anolis distichus* (Cope, 1861); *Anolis equestris* (Merrem, 1820); *Anolis evermanni* (Stejneger, 1904); *Anolis frenatus* (Cope, 1899); *Anolis garmani* (Stejneger, 1899); *Anolis grahami* (Gray, 1845); *Anolis humilis* (Peters, 1863); *Anolis leachi* (Duméril & Bibron, 1837); *Anolis lemurinus* (Cope, 1861); *Anolis limifrons* (Cope, 1871); *Anolis lineatopus* Gray, 1840; *Anolis lionotus* (Cope, 1861); *Anolis pentaprion* (Cope, 1863); *Anolis poecilopus* (Cope, 1862); *Anolis polylepis* (Peters, 1874); *Anolis pulchellus* Duméril & Bibron, 1837; *Anolis sagrei* (Duméril & Bibron, 1837); *Anolis valencienni* (Duméril & Bibron, 1837), Diplodactylidae: *Correlophus ciliatus* Guichenot, 1866, Gekkonidae: *Chondrodactylus bibronii* (Smith, 1846); *Gehyra mutilata* (Wiegmann, 1834); *Gehyra oceanica* (Lesson 1830); *Gehyra vorax* Girard, 1858; *Gekko athymus* Brown

& Alcala, 1962; *Gekko gecko* (Linnaeus, 1758); *Gekko gigante* Brown & Alcala, 1978; *Gekko japonicus* (Schlegel, 1836); *Gekko mindorensis* Taylor, 1919; *Gekko monarchus* (Taylor, 1917); *Gekko palawanensis* Taylor, 1925; *Gekko romblon* (Brown & Alcala, 1978); *Gekko Smithii* Gray, 1842; *Gekko subpalmatus* (Günther, 1864); *Gekko swinhonis* Günther 1864; *Gekko vittatus* Houttuyn, 1782; *Hemidactylus frenatus* Schlegel, 1836; *Hemidactylus turcicus* (Linnaeus, 1758); *Lepidodactylus lugubris* (Duméril & Bibron, 1836); *Lepidodactylus pumilus* (Boulenger, 1885); *Phelsuma dubia* (Boettger, 1881); *Phelsuma grandis* Gray, 1870; *Phelsuma laticauda* (Boettger, 1880); *Rhoptropus afer* Peters, 1869; *Rhoptropus barnardi* Hewitt, 1926; *Rhoptropus biporosus* FitzSimons, 1957; *Rhoptropus boultoni* Schmidt, 1933; *Rhoptropus bradfieldi* Hewitt, 1935; *Rhoptropus cf biporosus* (Fitzsimons,1957); *Rhoptropus diporus* Haacke, 1965, Scincidae: *Prasinohema virens* Peters, 1881; *Prasinohema prehensicauda* (Loveridge, 1945); *Prasinohema flavipes* (Parker, 1936); *Lipinia leptosoma* (Brown & Fehlmann, 1958).

SI Materials and Methods

Scaling of Pad Performance in Tree Frogs. All data are from whole-animal force measurements, conducted using a tilting platform. In total, we extracted data for pad area and body weight for 17 species belonging to four families from references (33–36). The phylogenetic tree underlying the phylogenetic regressions was extracted from the detailed phylogeny in ref. 107 and is shown in Fig. S2.

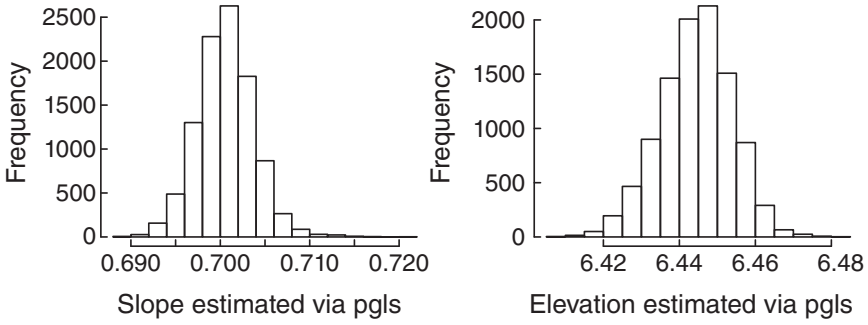

Fig. S1. Results from 10,000 phylogenetic generalized least squares (pgls) regressions on ultrametric trees with randomized branch lengths.

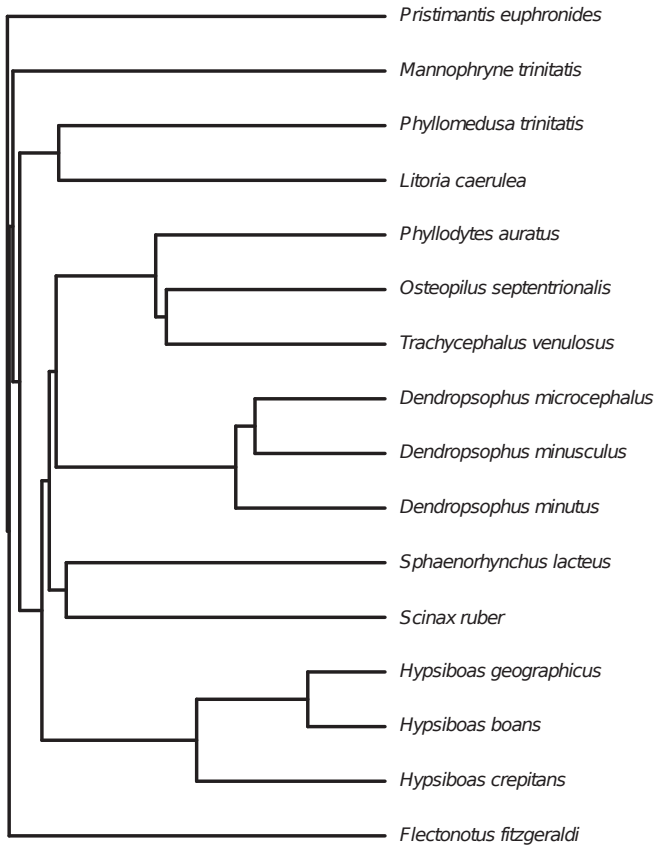

Fig. S2. Phylogenetic tree used for the phylogenetic regressions on adhesion per pad area in 17 species of tree frogs. The tree was extracted from ref. 1.

1. Pyron RA, Wiens JJ (2011) A large-scale phylogeny of Amphibia including over 2800 species, and a revised classification of extant frogs, salamanders, and caecilians. *Mol Phylogenet Evol* 61(2):543–583.

Table S1. Results for generalized least squares and reduced major axis regressions describing the relationship between $\log_{10}$ (adhesive pad area in square micrometers) and $\log_{10}$ (mass in grams) across all taxa

Regression model	Elevation	Slope	Pagel's λ
		Uncorrected	
Reduced major axis			
Pad area against mass	6.91 (6.84, 6.98)	1.02 (0.97, 1.07)	0 (fixed)
Mass against pad area	−6.76 (−7.08, −6.44)	0.98 (0.93, 1.03)	0 (fixed)
Generalized least squares			
Pad area against mass	6.88 (6.80, 6.94)	0.95 (0.9, 1)	0 (fixed)
Mass against pad area	−6.29 (−6.61, −5.96)	0.91 (0.86, 0.95)	0 (fixed)
		Corrected	
Reduced major axis			
Pad area against mass	6.54 (6.47, 6.62)	0.78 (0.74, 0.83)	0.93 (fitted)
Mass against pad area	−8.38 (−8.77, −7.99)	1.28 (1.21, 1.36)	0.93 (fitted)
Generalized least squares			
Pad area against mass	6.44 (6.28, 6.61)	0.70 (0.66, 0.75)	0.90 (fitted)
Mass against pad area	−7.54 (−7.97, −7.10)	1.13 (1.06, 1.20)	0.83 (fitted)

Covariance in pad area and body mass between related species was either ignored (uncorrected) or accounted for (corrected). Pagel's λ is a statistic measuring the strength of phylogenetic signal ($\lambda = 1$ indicates that the trait evolves like Brownian motion along the phylogeny, whereas $\lambda = 0$ indicates that the trait is not correlated with phylogeny (1). Numbers in brackets give approximate 95% confidence intervals of the estimated parameters where available.

1. Pagel M (1999) Inferring the historical patterns of biological evolution. *Nature* 401(6756):877–884.

Table S2. Results for a nested ANOVA on the residuals of a phylogenetic reduced major axis regression η^2

Taxonomic level	df	Mean squares	*F*	P value	η^2
Phylum	1	40.25	845.16	<0.001	0.58
Class	3	0.41	8.55	<0.001	0.02
Order	12	1.02	21.43	<0.001	0.18
Family	35	0.22	4.52	<0.001	0.11
Residuals	173	0.05			

η^2 is the variance in residual pad area accounted for the by the different taxonomic levels, and most of the variation occurs between phyla.