Online Supporting Material for

Partner abundance controls mutualism stability and the pace of morphological change over geologic time

Guillaume Chomicki and Susanne Renner

Department of Biology, Systematic Botany and Mycology, Menzinger Str. 67, University of Munich (LMU), Munich 80638

Corresponding author: guillaume.chomicki@gmail.com (G.C.)

This pdf contains:

Taxon sampling, DNA extraction and phylogenetic analyses

We generated a matrix of six markers (nuclear ITS and ETS and plastid *ndhF*, *psbA-trnH*, *trnL* intron and *trnL-trnF* spacer), sampling 76 species out of *ca.*106 Hydnophytinae species. We sampled all 12 *Squamellaria* species recognized by Chomicki and Renner (1), 5 of the 8 species of *Anthorrhiza* recognized by Huxley and Jebb (2), 32 of the 51 *Hydnophytum* species recognized by Jebb and Huxley, 4 of the 5 described species of *Myrmephytum* (3) and 19 of the 26 *Myrmecodia* species recognized by Huxley and Jebb (4). In addition to these 72 species, we also sequenced 4 species that were previously synonymized but stand as good species in light of molecular data. The new *Hydnophytum* species have been long described by Jebb, distributed into many herbaria, but never formally published. We refer to them as *Hydnophytum* followed by the voucher name in Table S2, and provide the name (nomen nudum) in both supplementary tables S1 and S2. In terms of mutualistic strategy, our sampling was reflected as 61% of the 44 generalists, 81% of the 41 specialists, and 74% of the 23 non-mutualists. A sampling of outgroups (in the tribe Psychotrieae) was selected based on Ref. 5. Voucher information is reported in Table S2.

Total genomic DNA was extracted from c. 20 mg of leaf tissues, using a commercial plant DNA extraction kit (NucleoSpin; Macherey–Nagel, Düren, Germany) according to manufacturer protocols. Polymerase chain reaction (PCR) was performed using Taq DNA polymerase (New England Biolabs, Cambridge, MA, USA) and a standard protocol (39 cycles, annealing temperature 56^0C). PCR products were purified using the ExoSap clean-up kit (Fermentas, St Leon-Rot, Germany), and sequencing relied on Big Dye Terminator kits (Applied Biosystems, Foster City, CA, USA) on an ABI 3130 automated sequencer (Applied Biosystems, Perkin-Elmer). Sequences were edited in Sequencher 5.1 (Gene Codes, Ann Arbor, MI, USA). All new sequences were BLAST-searched in GenBank. Sequence alignment was performed in MAFFT v. 7 in the online server (http://mafft.cbrc.jp/alignment/server) (6) under standard parameters except for the ITS region, which was aligned under Q-INS-i optimization, which takes rRNA secondary structure into consideration. Minor alignment errors were corrected manually in Mesquite v. 2.75 (7). In the absence of statistically supported incongruence (i.e., maximum likelihood bootstrap (BS) support >75) between the plastid and nuclear data partitions), we concatenated all markers, yielding an alignment of 3055 bp. Maximum-likelihood (ML) inference relied on RAxML v8.0 (8) and the GTR + Γ substitution model, with empirical nucleotide frequencies and 25 gamma rate categories; bootstrap support was assessed from 100 replicates under the same model. We also conduced Bayesian inference in MrBayes v. 3.2 (9) under the substitution models selected by jmodeltest2 (10) for each marker, and using the program's default two runs and four chains (one cold and three heated), with the uniform default priors. We set a $10X10^6$ MCMC chain, sampling trees every 1000^{th} generation. Split frequencies approaching zero indicated convergence. We used the 50% consensus tree to assess posterior probabilities for nodes of interest.

Molecular clock dating

Molecular dating analyses relied on BEAST v. 2 (11) and uncorrelated lognormal relaxed clock models. We used the GTR + G substitution model with four rate categories and a Yule tree prior. For both our plant and ant trees, MCMCs were run for 20 million generations, with parameters and trees sampled every 10,000 generations. We used Tracer v. 1.6 (12) to check that the effective sample size (ESS) of all parameters was >200, indicating that runs had converged. After discarding 10% as burn-in, trees were summarized in TreeAnnotator v. 1.8 (part of the BEAST package) using the options 'maximum clade credibility tree', which is the tree with the highest product of the posterior probability of all its nodes, 'mean node height,' and a posterior probability limit of 0.98. The final tree was visualized in FigTree v. 1.4 (13). To calibrate our tree, we constrained the age of the root, i.e., the split between the Pacific clade and the so-called *Psychotria* clade IV of Barrabé et al. (5), to 22 ± 7 Million years, based on the age of this node estimated by these authors, using a normal prior and a standard deviation of 4 corresponding to the 95% confidence interval of Barrabé et al. (5).

Ancestral state reconstructions of mutualistic strategies, entrance hole diameter, elevation and biome

We inferred the evolutionary history of mutualism strategy in the Hydnophytinae. All outgroups were coded '0' for non-ant associated, with no tuber. We coded the 76 ingroup species as '1', generalist ant-plants, for species that can be inhabited by a range of generalist ant species, '2' for specialized species that are inhabited typically by one (or two) species of the dolichoderine genera *Philidris* and *Anonychomyrma* or '3' for species that are not ant-inhabited but have a tuber. Each species was coded based on refs. 14-22, and field data from Camilla Huxley (fieldwork in Papua New Guinea in the 1970's and 1980's), Matthew Jebb (fieldwork to Papua New Guinea in the 1980's and 1990's), Milan Janda (Papua New Guinea 2004-2014), Eva Kaufmann (South East Asia, Borneo, Indonesia 1998-2001), the mission Santo 2006 to Vanuatu (in particular Jerome Orivel), and Guillaume Chomicki (field trips to Fiji in 2014, 2015 and 2016) provided in Table S1. See also table S1 for a short discussion of mutualistic strategies, and inhabitants, and traits.

To infer ancestral mutualistic strategies, we used the Maximum Clade Credibility (MCC) tree from BEAST (stochastic mapping) and a sample of 1,000 trees from BEAST (rjMCMC), and (*i*) the stochastic mapping approach implemented in the phytools package (23) and (*ii*) the reverse jump MCMC (rjMCMC) approach implemented in BayesTraits v. 2 (24). For the stochastic mapping, we used the function 'make.simmap' in the phytools package (v. 04-60) (23), which implements the stochastic character mapping approach developed by Bollback (25). We estimated ancestral states using under the ER model, and then simulated 1,000 character histories on the MCC tree. We summarized the 1,000 simulated character histories using the function 'describe.simmap'. For the Bayesian reversible jump MCMC approach, we used a sample of 1,000 from the BEAST analysis to account for phylogenetic uncertainty, a chain of 50 million generations, and rate coefficients and ancestral states were sampled every 1,000th generation. We ensured that the acceptance rate was between 20 and 40%, as recommended in the manual, and reconstructed the nodes of interest using the command 'addnode'. We reconstructed all key nodes and reported the probabilities above nodes in Fig. 1. To test the hypothesis that the absence of mutualism with ants is ancestral, we used function 'Fossil' implemented in BayesTraits v. 2 to 'fossilize' the most recent common ancestor (MRCA) of Hydnophytinae to lack symbiosis with ants, and compared it to an unconstrained run and a model where generalist symbioses are enforced. We then used Bayes Factor to compare the marginal likelihoods of these non-nested models.

We estimated ancestral state for maximum and mean elevation using the continuous character ML approach implemented in phytools (23). We relied on the function 'fastAnc' and plotted it using the function 'contMap' in phytools. Maximum elevation was recorded based on again the same references (14-22), but mean elevation was calculated for each species based on the 1,100 georeferenced specimens (Supplementary dataset 1).

We reconstructed ancestral entrance hole size using the same method. For each species we recorded the maximal entrance hole diameter based on refs. 14-22, and observations from M. Jebb reported in Table S1. Additional measures from herbarium specimens from Leiden (L), Oxford (FHO) and British Museum (BM) were performed when required for verification. Raw data is reported in Table S1.

We also reconstructed ancestral biomes using the same stochastic mapping approach in phytools. Species were coded '0' as belonging to the 'tropical forest' biome when they were native to tropical forest below 1,500 meters in altitude, '1' as belonging to the montane environment above 1,500 meters, '2' from species native to savannah or grassland, and '3' from species growing mostly in mangroves (a few species are sometimes found in mangal habitats, but these ML approaches do not allow for multistate characters). Again, each species was coded based on refs. 14-22.

Multinomial logistic regressions

To ask whether the distinct mutualistic strategies (*i*) significantly varied in altitude and (*ii*) significantly varied in entrance hole rate morphorate, we used a probabilistic framework to provide the probability of belonging to a particular mutualistic strategy given a value of altitude or entrance hole size morphorate. We used the R package 'MASS' (26), and dependencies, relying on the function 'polr'. In each case, we used a continuous variable (maximal altitude, mean altitude, BAMM-inferred entrance hole size morphorate) and mutualistic strategy as dependent variable. These analyses are do not control for phylogenetic autocorrelation and are complementary to phylogenetic ANOVA and hierarchical Bayesian Modelling. For the altitude, we ran two analyses. First using all Hydnophytinae taxa and their mean altitude calculated from (*i*) over 1,100 georeferenced points (Supplementary Dataset S1) and (*ii*) maximum altitude taken from the literature (14-22) for all Hydnophytinae sampled in our tree. Our multinomial logistic regressions identified a positive exponential relationship between increasing altitude and the probability of being a non-mutualist, as opposed to a generalist mutualist, which showed the reverse pattern (Fig. S2, S3). For the entrance hole morphorate, our multinomial logistic regression (t-value = 0.59, AIC =165.1) identified a positive relationship between increasing morphorate and the probability of being a non-mutualist, and the inverse relationship for the probability of being a specialist (Fig. S13).

Phylogenetic ANOVA

To test whether the distinct mutualistic strategies (generalists, specialists, non-mutualists) have significantly different altitudinal ranges, while accounting for phylogenetic autocorrelation, we performed a phylogenetic ANOVA using the function 'phylANOVA' implemented in the R package 'phytools' (23). We used 1,000 simulations and performed a post-hoc test using the Bonferroni-Holm method. We used either maximal or mean (calculated using over 1,100 georeferenced points from herbarium specimens) altitude as independent variable, which yielded highly similar results.

Bayesian correlation between mutualistic strategy and altitude, and mutualism strategy and entrance hole evolutionary rate

To ask (*i*) do mutualism was lost following shifts to high altitude environments and (*ii*) do entrance hole morphorate evolution increased after shifts to high altitude, we fitted different Bayesian trait models implemented in the program BayesTraits v. 2 (24). The models require all characters to be binary. We thus coded *mutualism strategy* as mutualism present [merging generalist and specialized mutualists showed in Table 1] ("0") and mutualism absent ("1"); *altitude* using maximal altitude, coding ("0") species that lived below 1500 meters and ("1") species living above 1500 m (we repeated the analysis using mean altitude determined based on over 1,100 herbarium specimen data points, which gave similar results); and finally, we coded the BAMM-inferred *entrance hole morphorate* as low ("0") when it was comprised between 0 and 0.05 and high ("1") when it was above 0.05. This cutoff was slightly above the mean of generalist morphorates but twice lower than the non-mutualist mean ($Mean_{Generalists}$ = 0.043; $Mean_{Non\text{-}mutualists}$ =0.1), and thus appropriately separated high morphorates.

After pruning the outgroups, we used the maximum clade credibility (MCC) tree from BEAST. Using BayesTraits v. 2 (24), we ran three models of trait evolution in each case. The first ran a model of independent trait evolution (M_1) estimating the four transition rate parameters α1, α2, β1, β2, wherein double transitions from state 0,0 to 1,1 or from 0,1 to 1,0 are set to zero. We next ran a model of dependent trait evolution (M_2) with eight parameters (q12, q13, q21, q24, q31, q34, q42, q43). Finally, we ran a dependent model of evolution where the non-mutualistic clades states were forced to be "low altitude and mutualism absent" and "low altitude and high entrance hole morphorate" (M_3), respectively. However, this third approach was limited (underestimated) because 9 of the 12 losses are singletons, and therefore only three clades between 2 to 4 species representing three independent losses (Fig. 1) could be constrained. The significant difference in marginal likelihood of both M_3 models (compared to M_2) indicated that this approach was nevertheless useful. To compare these non-nested models, we calculated the Bayes Factor score.

Comparing niche space across mutualistic strategies

To test the hypothesis that 'generalist' and 'loss' strategies have separate smaller niches embedded into the larger niche of specialised ant-plants, we generated a list of over 1,100 occurrence data for all species, subspecies, varieties and forms of Hydnophytinae. We first downloaded all information from the Global Biodiversity Information Facility (gbif, http://www.gbif.org) and cleaned each of data point, checking that the geographic and altitudinal range matched the protologue or description from refs. 14-22. The majority of the data (>70%) comes from herbarium specimens that were either cited within the aforementioned revisions, of viewed by the first author at Leiden (L), Kew (K) or Oxford (FHO). For some important specimens were GPS data was missing, we inferred it when sufficient geographic data was provided (e.g. 3 km NE of Sorong, Papua, Indonesia) on google maps (https://maps.google.com/).

We next downloaded all 19 bioclim variables (plus altitude) at 30 second resolution on WordClim (http://www.worldclim.org). For each data point, we extracted the 19 bioclim variable values plus altitude using the function 'extract' from the R package 'raster' (27). We next generated a file with a single average value per bioclim variable for each species and subspecific form. Since using correlated variables can result in spurious results, we first determined the Pearson's correlation coefficients between all 19 bioclim variables plus altitude. We then selected variables for analysis with a Pearson's correlation coefficient < 0.5, taking a single variable in correlated clusters. The analyses were thus performed with bio_2, bio_3, bio_13, bio_15, bio_18 and altitude. We used the R package vegan (28) to perform non-dimensional metric scaling analyses (NMDS) and used (*i*) the whole dataset and (*ii*) only the 76 species sampled in our phylogeny. We plotted the first analysis using the package ggplot2 (29). For the second analysis, we extracted the NMDS1 and NMDS2 values for each species, and used this data matched to the phylogeny tips as input data for a phylomorphospace that showed the ordination, phylogeny and mutualism strategies at once, using the function 'phylomorphospace' of the R package phytools (23).

Inferring rates of entrance hole-diameter evolution using BAMM

To assess the morphological rate of entrance hole evolution in the Hydnophytinae we first used the Bayesian time-dependent model implemented in BAMM v.2.5.0 (30), accounting for incomplete taxon sampling. We first log-transformed the entrance hole-diameter measures and then performed three BAMM runs with 1 million MCMC generations, sampling parameters every 10,000 generations. Morphorate, rate shift configurations, and macroevolutionary cohort matrix were plotted using the R package BAMMtools (31). After checking for convergence of the chains, we relied on Bayes factors to choose the best model.

Hierarchical Bayesian Modeling

To take into account phylogenetic distance in the analyses, we used a hierarchical

Bayesian (HB) approach for testing to test (*i*) whether mutualistic strategies significantly varied in altitude and (*ii*) whether mutualistic strategies significantly varied in entrance hole morphorate, while simultaneously correcting for phylogenic signal. Our approach followed ref. 32.

Regression components of the model are the following:

$\mu_{Altitude\ i} = \alpha 1 + \beta 1 \times S_{Generalist\ i}$

$\mu_{Altitude\ i} = \alpha 2 + \beta 2 \times S_{Specialized\ i}$

$\mu_{Altitude\ i} = \alpha 3 + \beta 3 \times S_{Loss\ i}$

$\mu_{Hole\ i} = \alpha 4 + \beta 4 \times S_{Generalist\ i}$

$\mu_{Hole\ i} = \alpha 5 + \beta 5 \times S_{Specialized\ i}$

$\mu_{Hole\ i} = \alpha 6 + \beta 6 \times S_{Loss\ i}$

$\mu_{Hole\ i} = \alpha 7 + \beta 7 \times \mu_{Altitude\ i}$

$\mu_{Rate\ i} = \alpha 8 + \beta 8 \times S_{Generalist\ i}$

$\mu_{Rate\ i} = \alpha 9 + \beta 9 \times S_{Specialized\ i}$

$\mu_{Rate\ i} = \alpha 10 + \beta 10 \times S_{Loss\ i}$

$\mu_{Rate\ i} = \alpha 11 + \beta 11 \times \mu_{Altitude\ i}$

Where the terms α refer to the intercept and β for the slope. We accounted for each mutualistic strategy by three dummy (binary) variables $S_{Generalist\ i}$, $S_{Specialized\ i}$, and $S_{Loss\ i}$, where each taxa is coded absent “0” or present “1”. We used mean altitude ($\mu_{Altitude\ i}$), entrance hole maximum diameter per species ($\mu_{Hole\ i}$), and entrance hole morphorate (inferred using BAMM, see above, $\mu_{Rate\ i}$), as dependent variables. To examine the relative effect sizes, all continuous variables were standardized by subtracting their mean and dividing by 2 SD before the analysis (33). We integrated phylogenetic information into the model using the Bayesian phylogenetic regression method of de Villemereuil et al. (ref. 34), by converting the 76 species-dated tree into a scaled (0-1) variance-covariance matrix, using the function ‘vcv.phylo’ of the ape package (35). We adapted the R script from ref. 30, where the model is parameterized using ‘JAGS’ package (36), into the $R2_{JAGS}$ package (37). We ran three parallel MCMC chains for 20,000 iterations followed by a 5000-iteration burn-in, and evaluated model convergence with the Gelman & Rubin (38) statistic using the ‘ggmcmc’ R package (39). Noninformative priors were specified for all parameter distributions, following ref. 32.

Inferring rates of entrance hole diameter evolution using the non-censored rate test

In addition to the Bayesian approach implemented in BAMM, we used a ML-based non-censored rate test (40) that employ a Brownian motion (BM) model to estimate and compare rates of entrance hole evolution under a one-rate model and under a three-rate (strategy-specific) model. We used again the log-transformed entrance hole diameter as input data (together with the tree, and a matrix of the mutualistic strategy). This method has been implemented in R in the ‘phytools’ package (23) using the function ‘brownieREML’. We used the Restricted Maximum Likelihood (REML) version to fit the Brownian rate variation model (non-censored) models, rather than the standard ML optimization since it has been shown to be both faster and unbiased (23). We compared these models using a likelihood ratio test, after determining the critical X^2 value at the 95% confidence level.

Entrance hole morphological disparity-through-time plots

To examine the time course of morphological variation independently from BAMM, we calculated disparity-through-time plots. We used the method developed by Harmon et al. (41), as implemented in the R package Geiger (42) which calculates disparity as average pairwise Euclidian distances between species, and this variance-related method of estimating the dispersion of points in multivariate space has been shown to be insensitive to sample size (39). We used the Geiger function 'dtt' (disparity-through-time) and run 1000 simulations to calculate the null distribution-trough-time distribution. By removing taxa in the tree, we performed several 'experiments' to examine disparity-through-time (*i*) for all Hydnophytinae, (*ii*) for all Hydnophytinae except the specialists, (*iii*) for all Hydnophytinae except the non-mutualists and (*iv*) for the specialist subclade *Myrmecodia* alone.

Mapping morphological evolutionary rate in New Guinea

To identify hotspots of morphological evolutionary rate, we developed a method to infer rates of morphological evolution using (i) a morphological rate analysis in BAMM (30) and (ii) a matrix of GPS coordinates for all specimens for each species sampled in the tree used in the BAMM analysis. To do so, we retrieved morphorate from each tip from the BAMM analyses using the function "GetTipsRates" in BAMMtools v.2.1 (31). Rates were interpolated to a polygon representing mainland New Guinea [politically split in Indonesian Papua (western part) and Papua New Guinea (eastern part)], using the Inverse Distance Weight method implemented in the software ArcMap v.9.3 (43).

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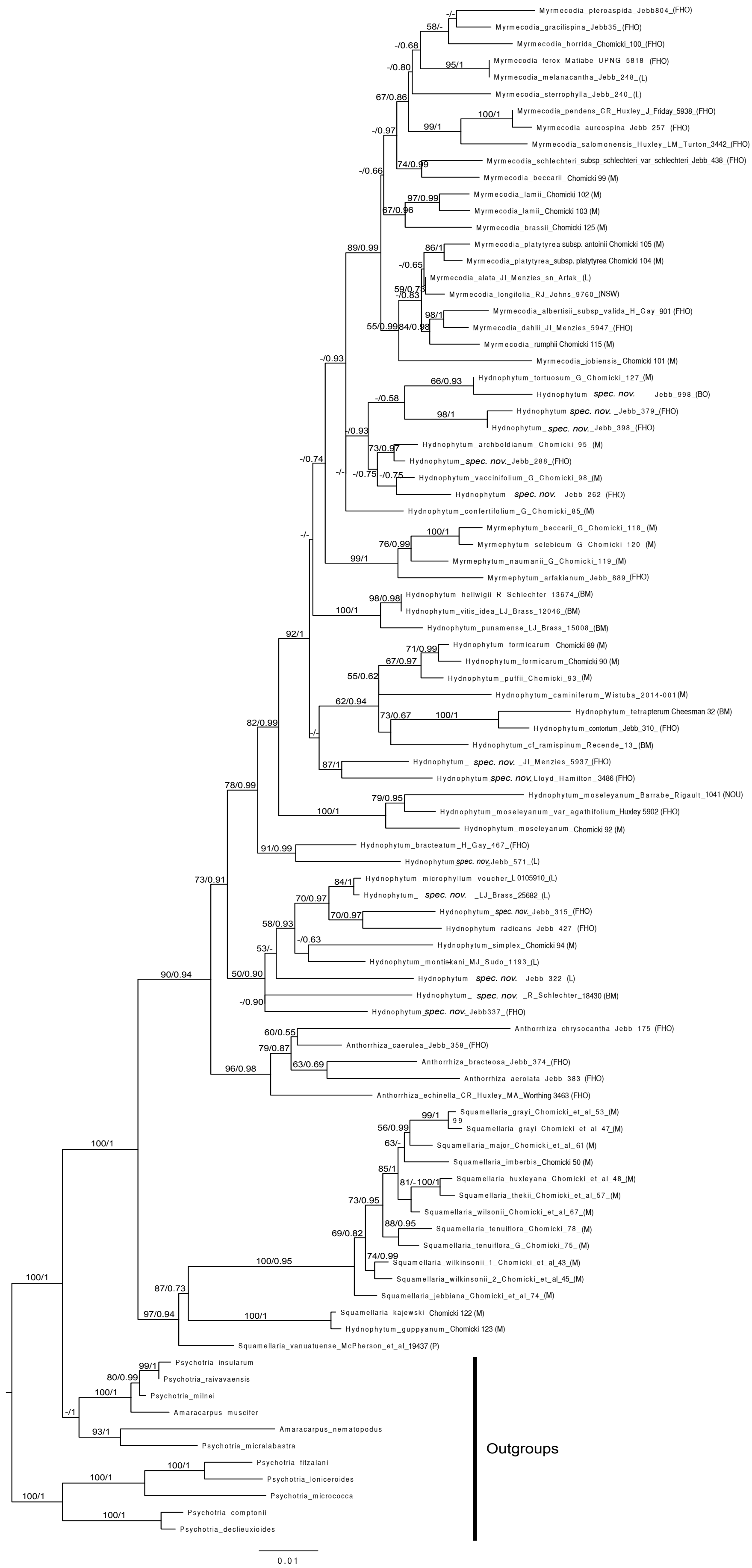

Figure S1. Maximum likelihood tree for the Hydnophytinae. Numbers above branches show the bootstrap support from 100 replicates, and the posterior probabilities from a Bayesian analysis.

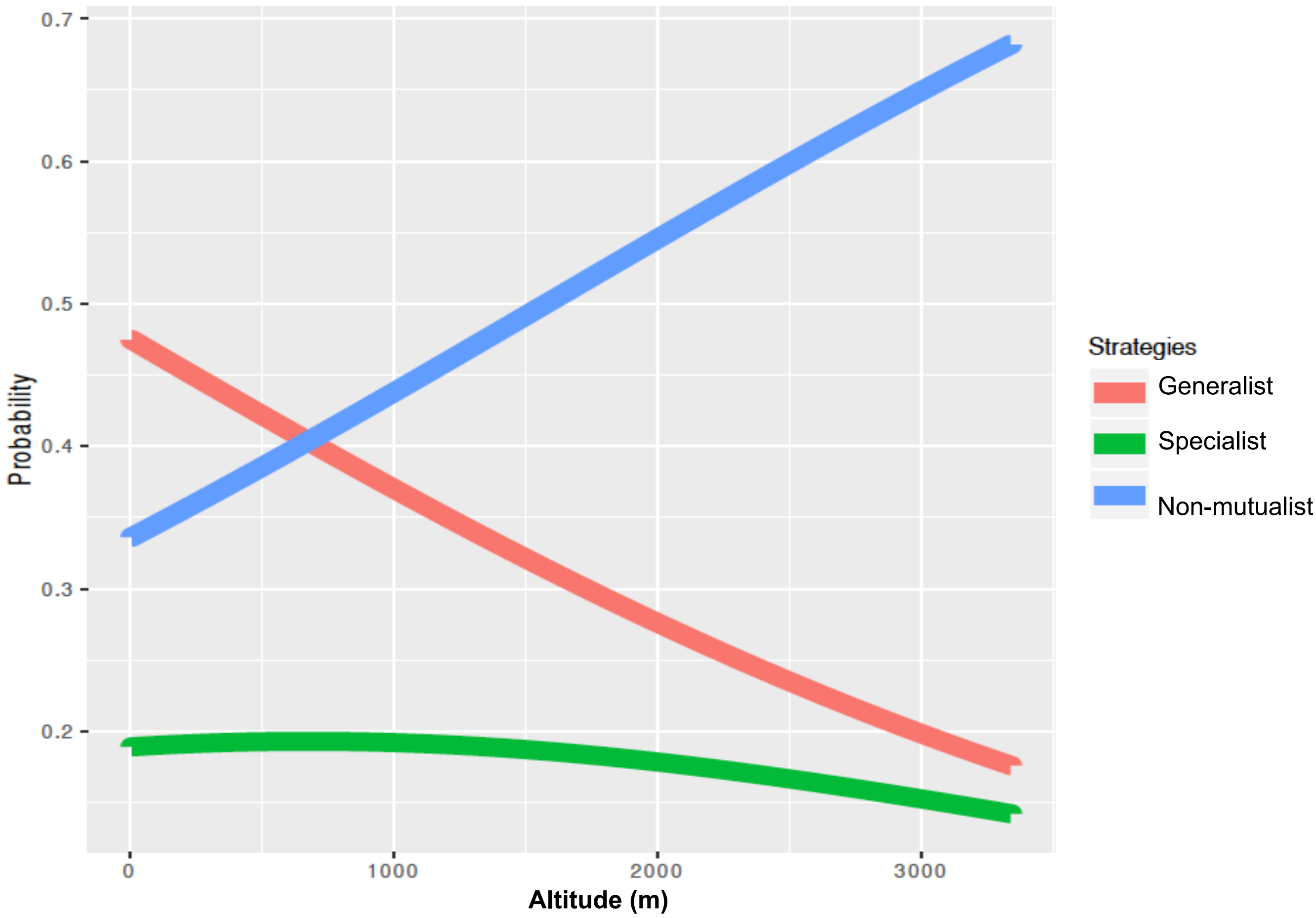

Figure S2. Multinomial logistic regression (t = 2.0, AIC = 270) of mean altitude on mutualistic strategy, calculated for each Hydnophytinae taxon (including subspecific forms, 130 taxa in total), from over 1,100 occurence data points.

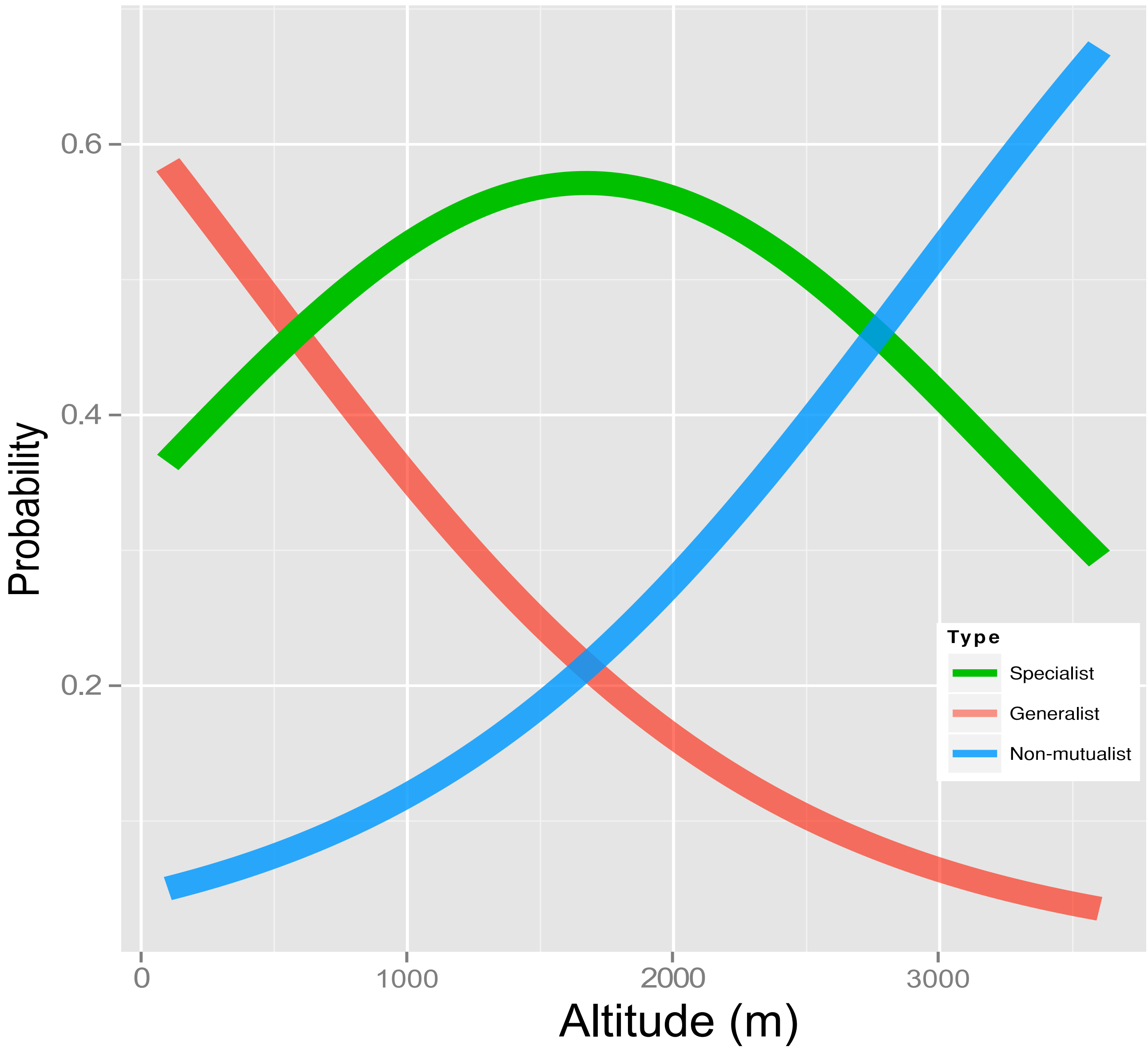

Figure S3. Multinomial logistic regression (t = 4.42, AIC = 233.1) of maximum altitude on mutualistic strategy, using each Hydnophytinae taxon sampled in our tree.

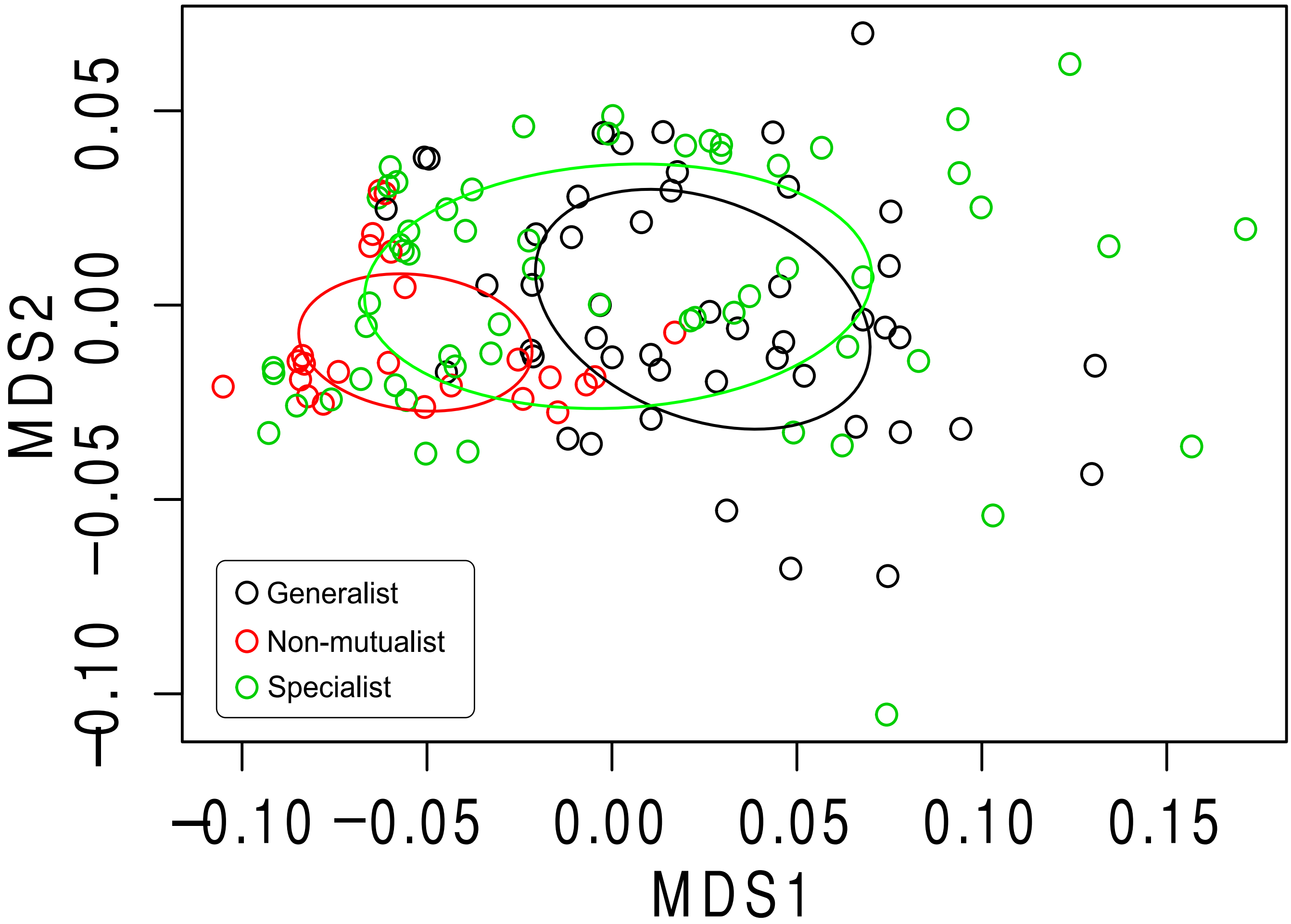

Figure S4. Non-dimensional metric scaling analysis (NDMS) showing the climatic niche space of the three mutualistic strategies in the Hydnophytinae. Ellipses show the 95% confidence intervals for each strategy. This analysis is based on all species, subspecies and varieties (130 taxa). A large dataset of over 1,100 occurences was compiled, and we then took the mean for Altitude or each bioclim variable. We excluded all variables that were correlated among themselves (Pearson's correlation coefficient > 0.5) and only kept a single variable per cluster. This analysis is based on bio_2, bio_3, bio_13, bio_18 and altitude.

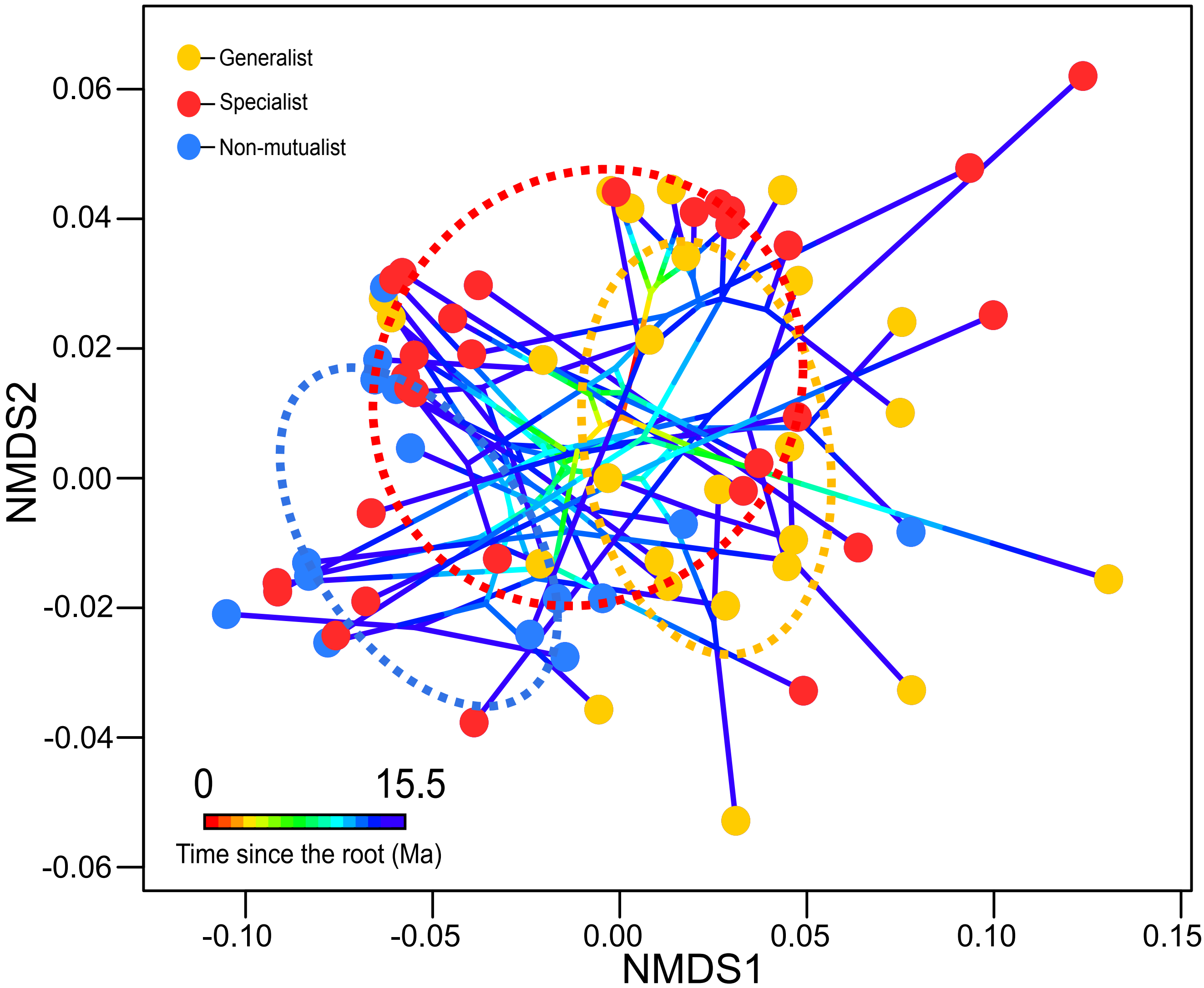

Figure S5. Phylomorphospace showing the non-metric multidimensional scaling (NMDS) analysis of species' climatic niches (Supplementary Materials and Methods). Dashed ellipses show the 95% intervals, highlighting that 'generalists' and 'non-mutualists' form discrete clusters (niche spaces) that are embedded in the larger cluster of 'specialist'. Compare with Figure S4.

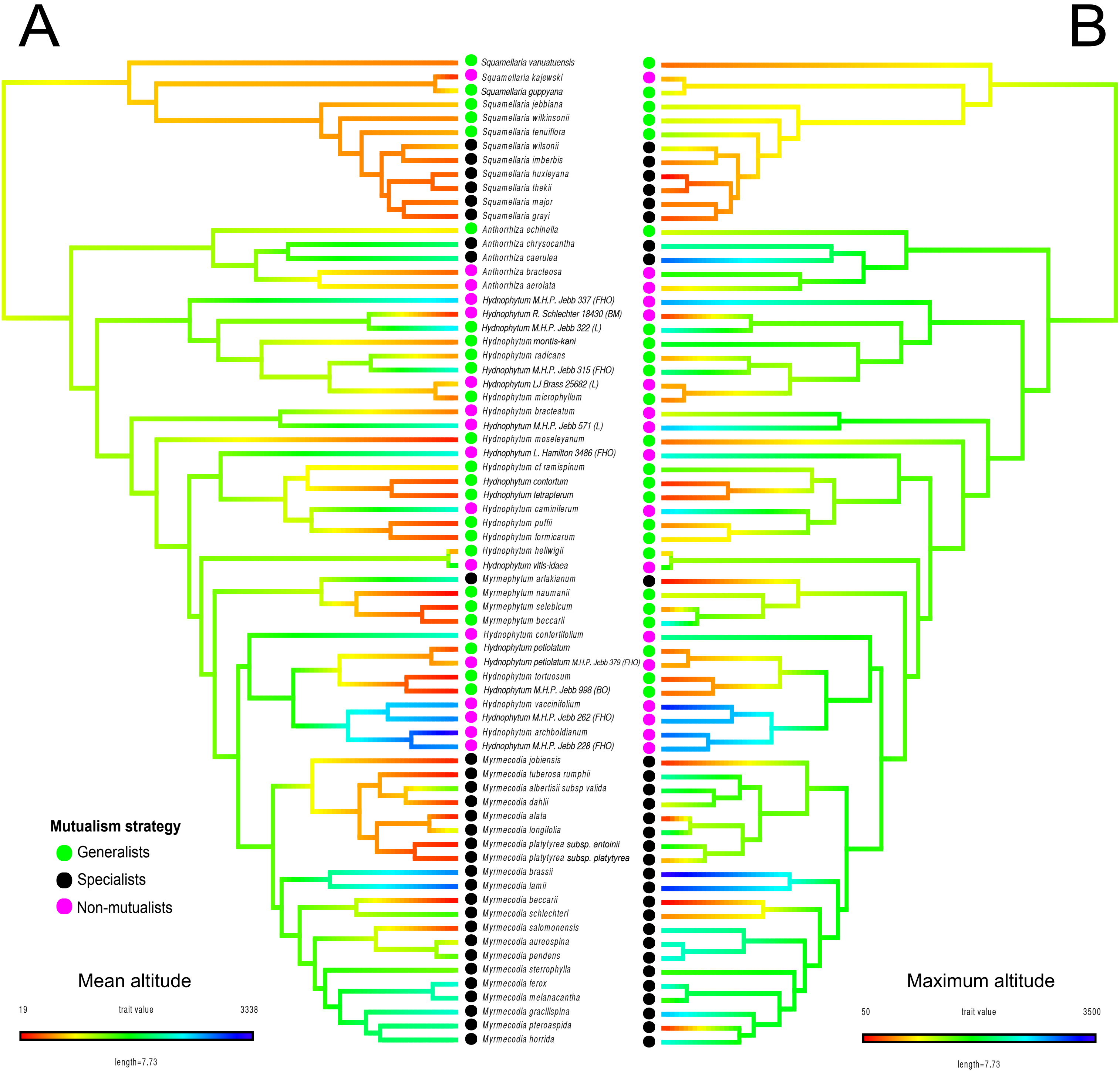

Figure S6. Ancestral state reconstruction of altitude as a continuous character in the Phytools package. (A) Mean altitude calculated based on over 1,100 occurence data points. (B) Maximum altitudinal range taken from the literature (see Materials and Methods).

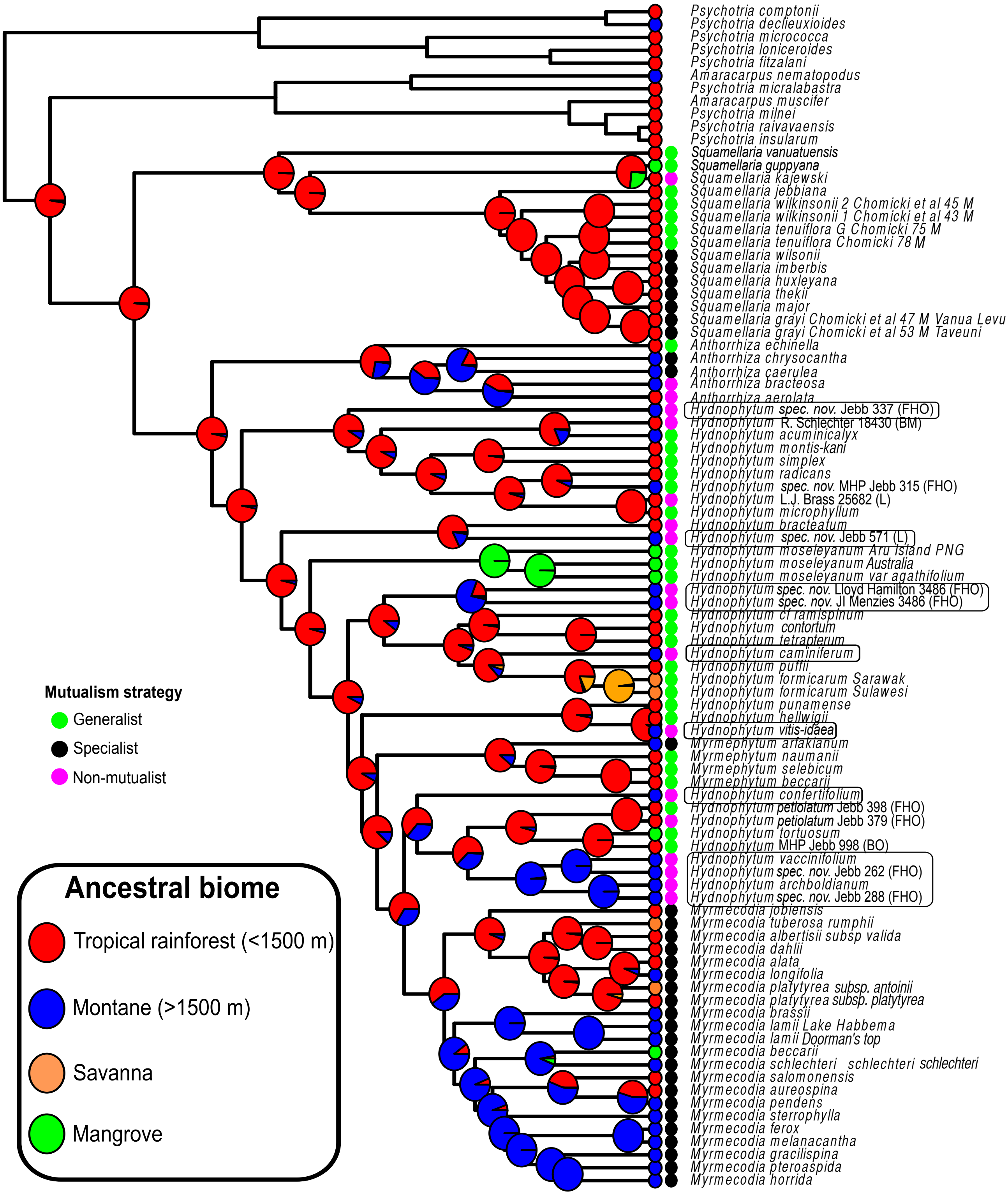

Figure S7. Ancestral state reconstruction of species occurence using stochastic mapping in the Phytools package. Rectangles highlight the lineages where loss of mutualism with ants is correlated with shift to montane habitat. For coding, see Materials and Methods. Mutualism strategy is shown for comparison (ingroups only).

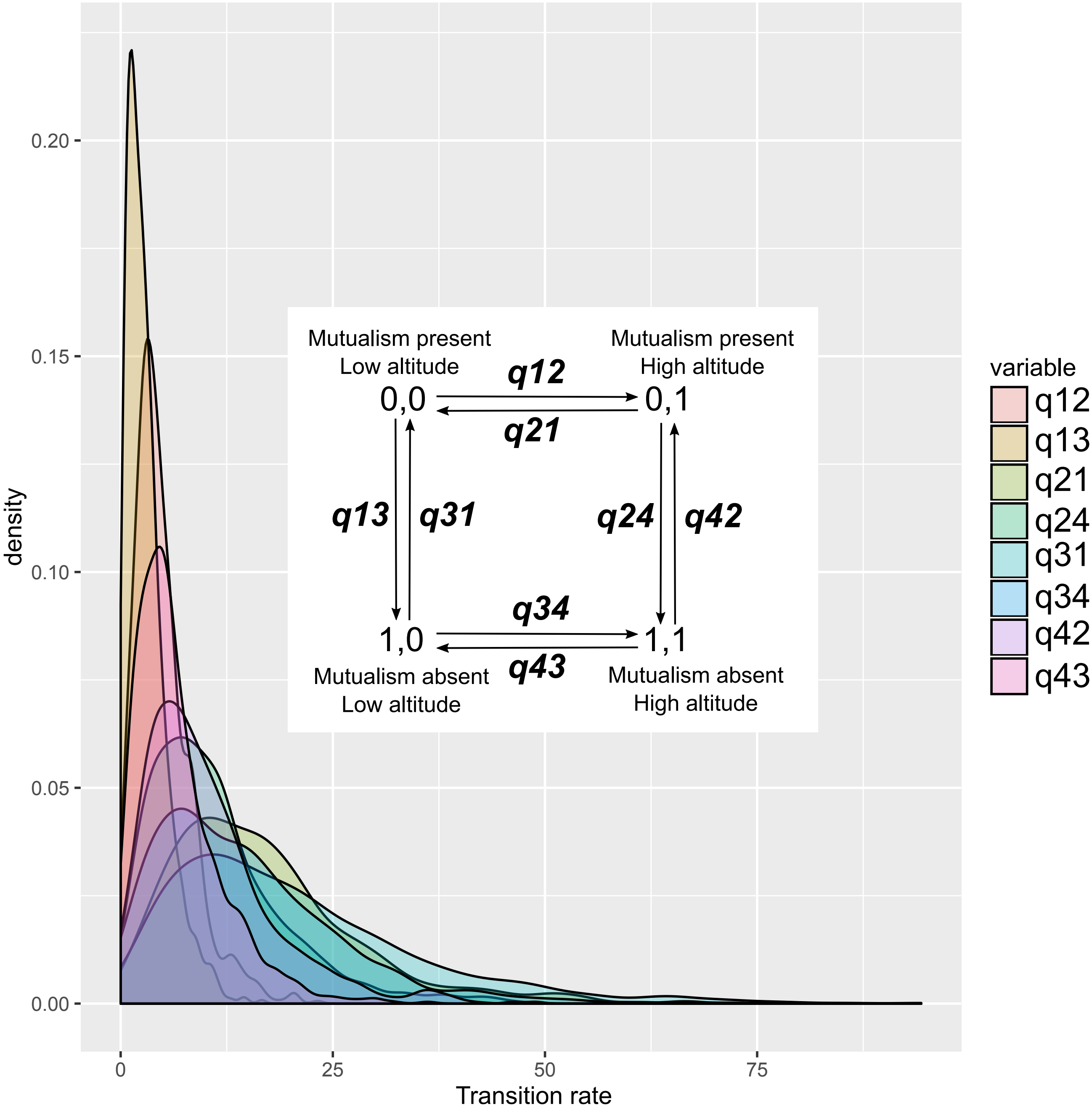

Figure S8. Transition rate parameters of a Bayesian analysis of the evolution of mutualistic strategy and altitude (correlated evolution).

Figure S9. The evolution of domatium entrance hole size in the Hydnophytinae. Ancestral state reconstruction of entrance hole size using the functions 'fastAnc' and 'contMap' in the Phytools package.

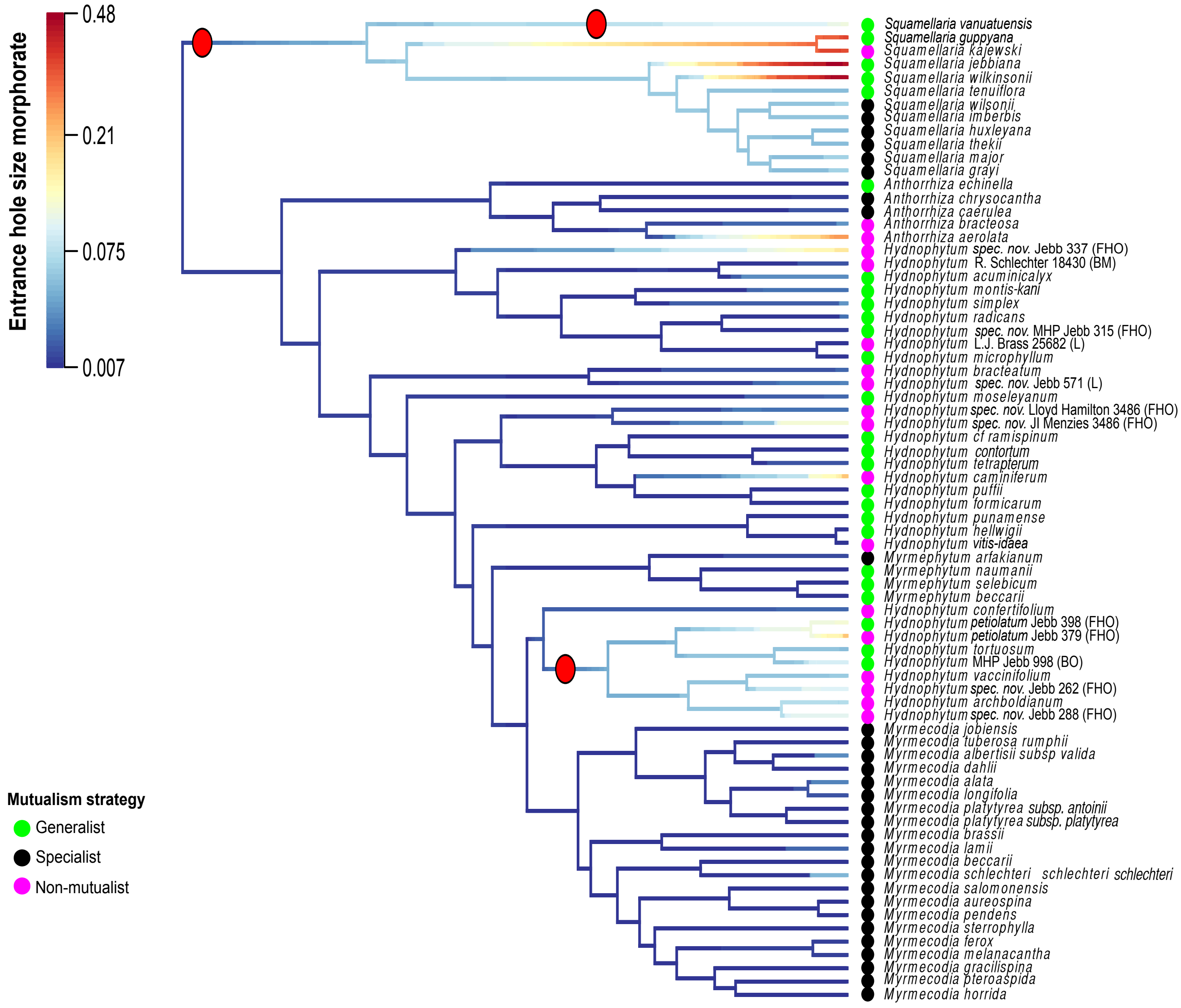

Figure S10. Phylorate plot showing the rate of entrance hole size evolution inferred using 'Bayesian Analysis of Macroevolutionary Mixtures' (BAMM). Settings are details in the Materials and Methods section. Red dots show the most significant rate shifts.

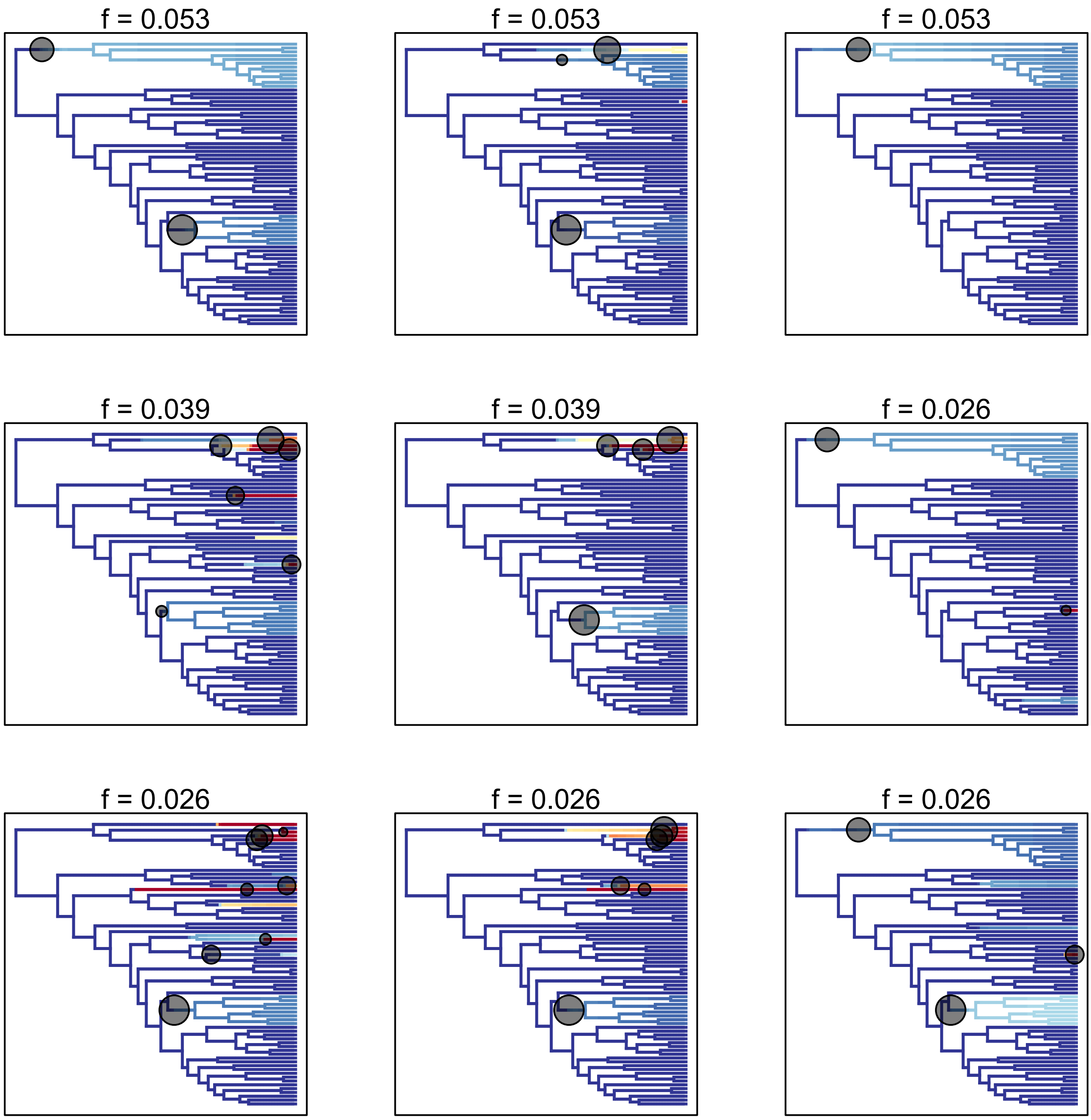

Figure S11. Credible shift set in domatium entrance hole size evolutionary rate inferred in BAMM. Each black dot shows a shift in morphological rate with diameter proportional to posterior probability.

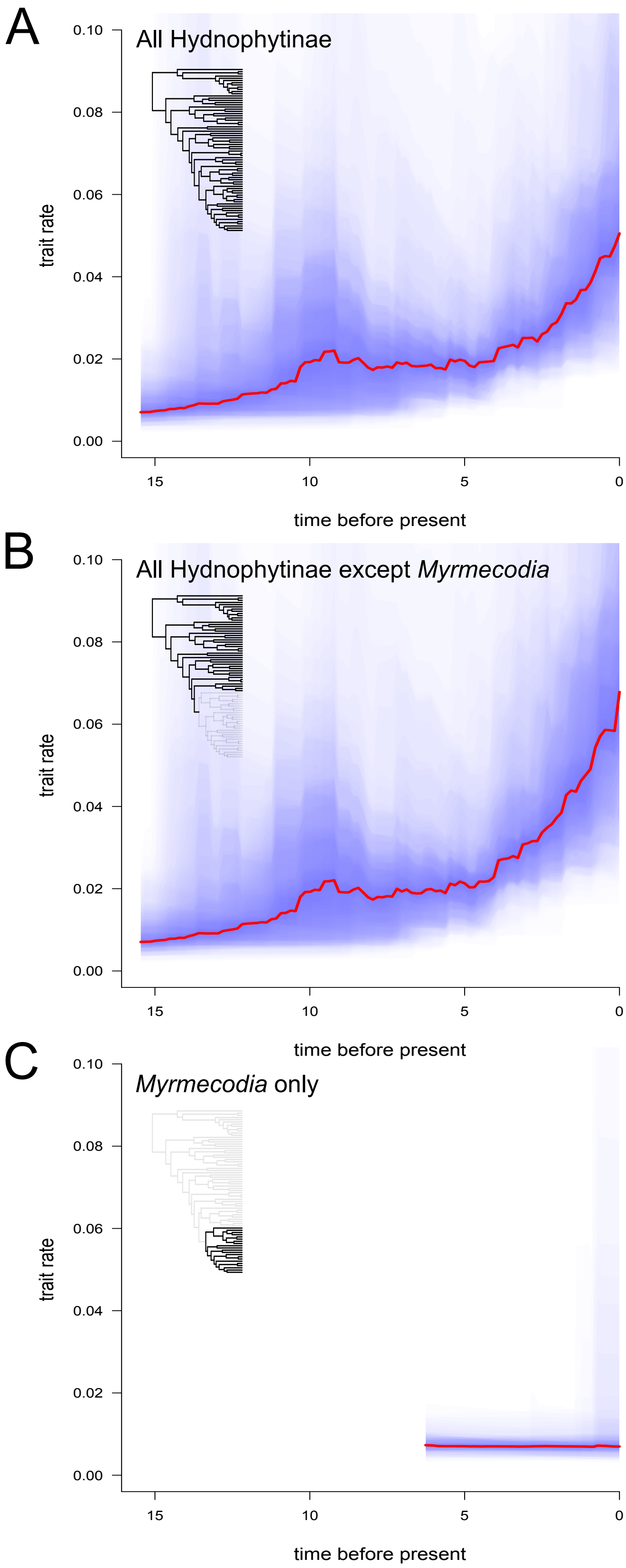

Figure S12. Entrance hole size morphorate-through-time plots inferred in BAMM. (A) All Hydnophytinae. (B) All Hydnophytinae except *Myrmecodia*, the largest clade of specialized mutualists. (C) *Myrmecodia* only. Note that when excluding *Myrmecodia* in (B), the morphorate towards the present is higher as compared to (A). Shading intensity reflects the posterior probability density.

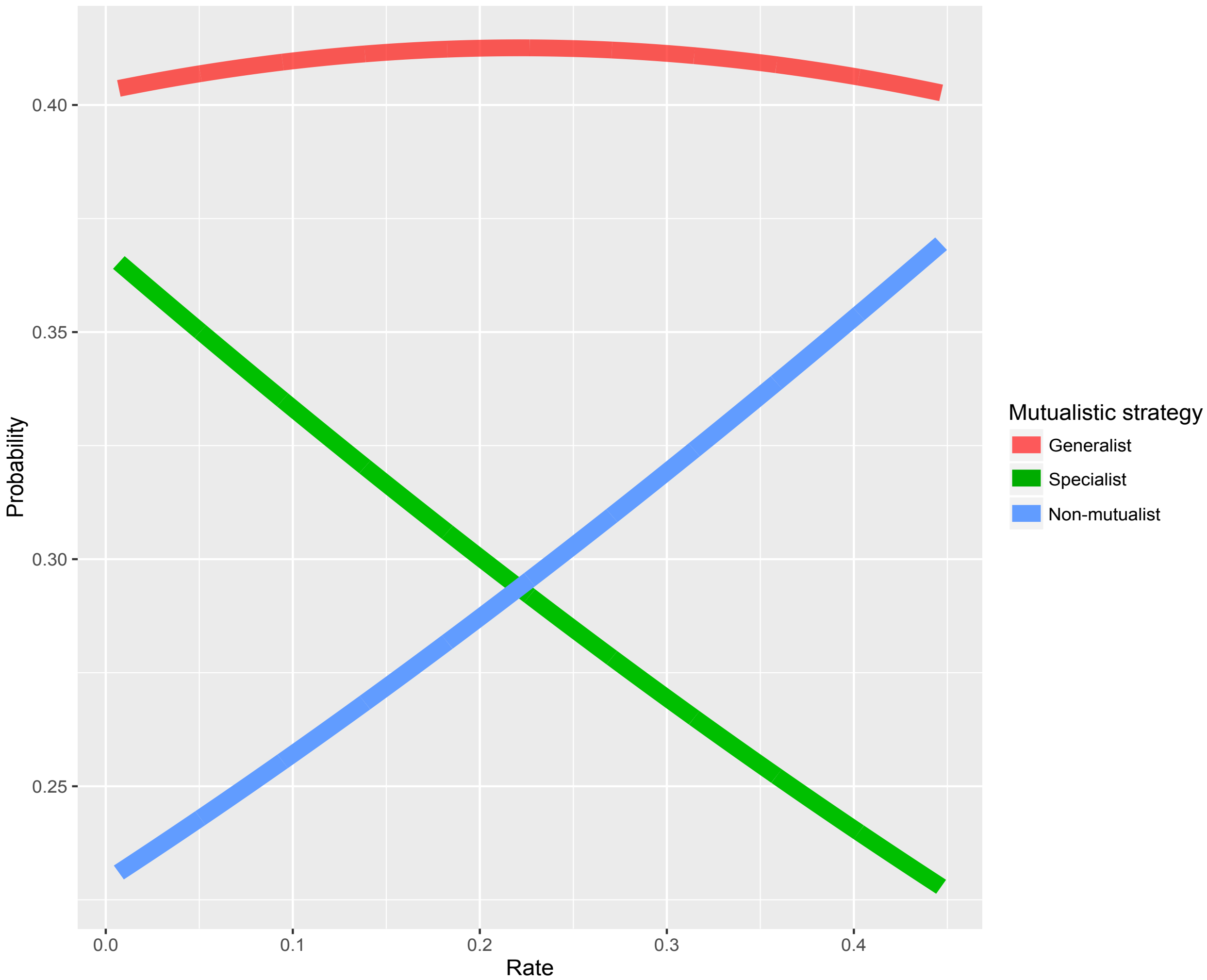

Figure S13. Multinomial logistic regression of the BAMM-inferred entrance hole size morphorate on mutualistic strategies (t-value = 0.59, AIC =165.1; t-value$_{\text{Generalists | Specialists}}$ = -2.0; t-value$_{\text{Specialists | Non-mutualists}}$ = 4.0).

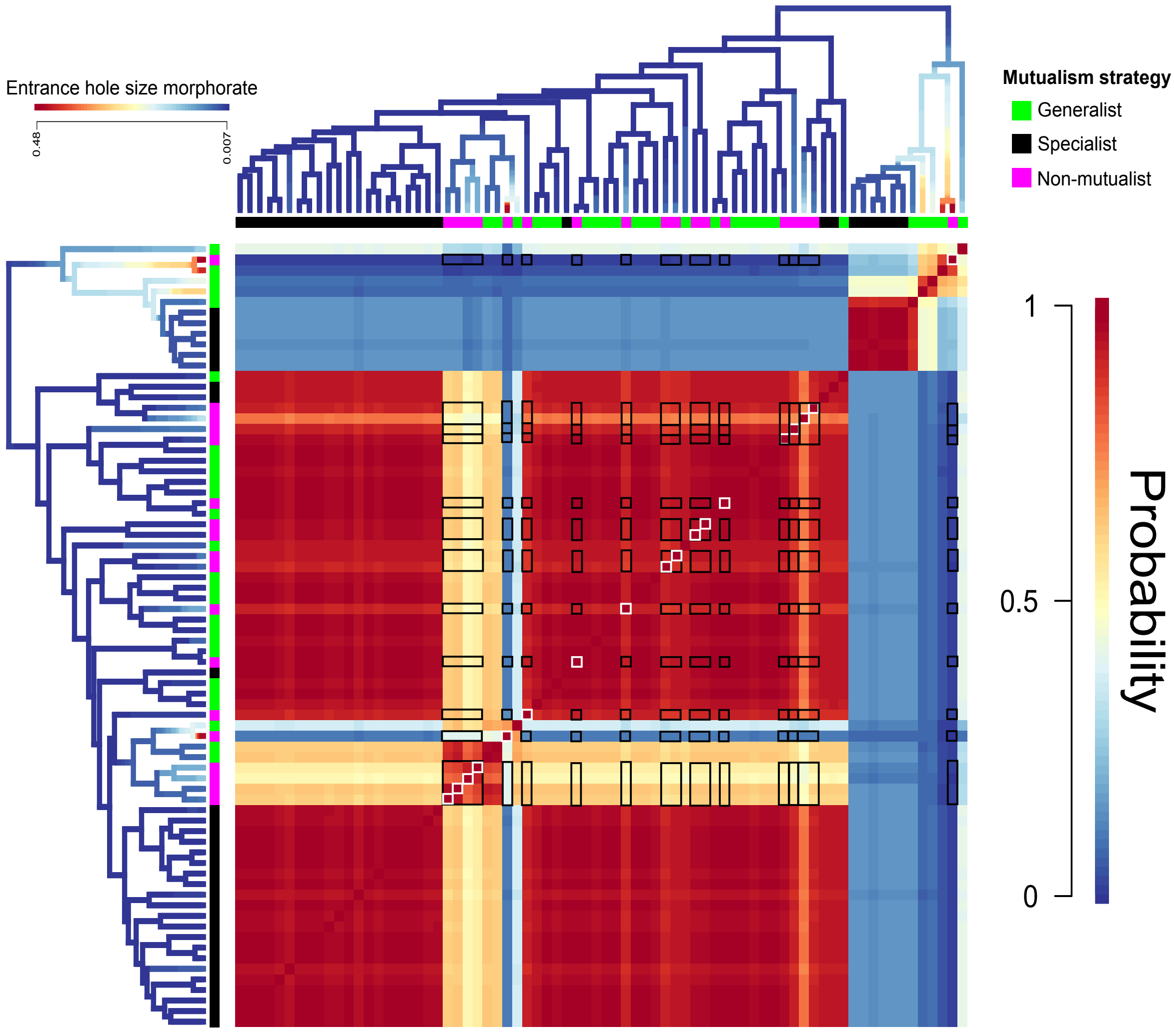

Figure S14. Macroevolutionary cohort matrix showing the pairwise probabilities that any two species share the same rate of entrance hole evolution. The plot shows the inferred rate of entrance hole evolution. Black squares compare non-mutualists, while white squares indicate autocorrelation. This shows that most non-mutualists share the same evolutionary dynamics.

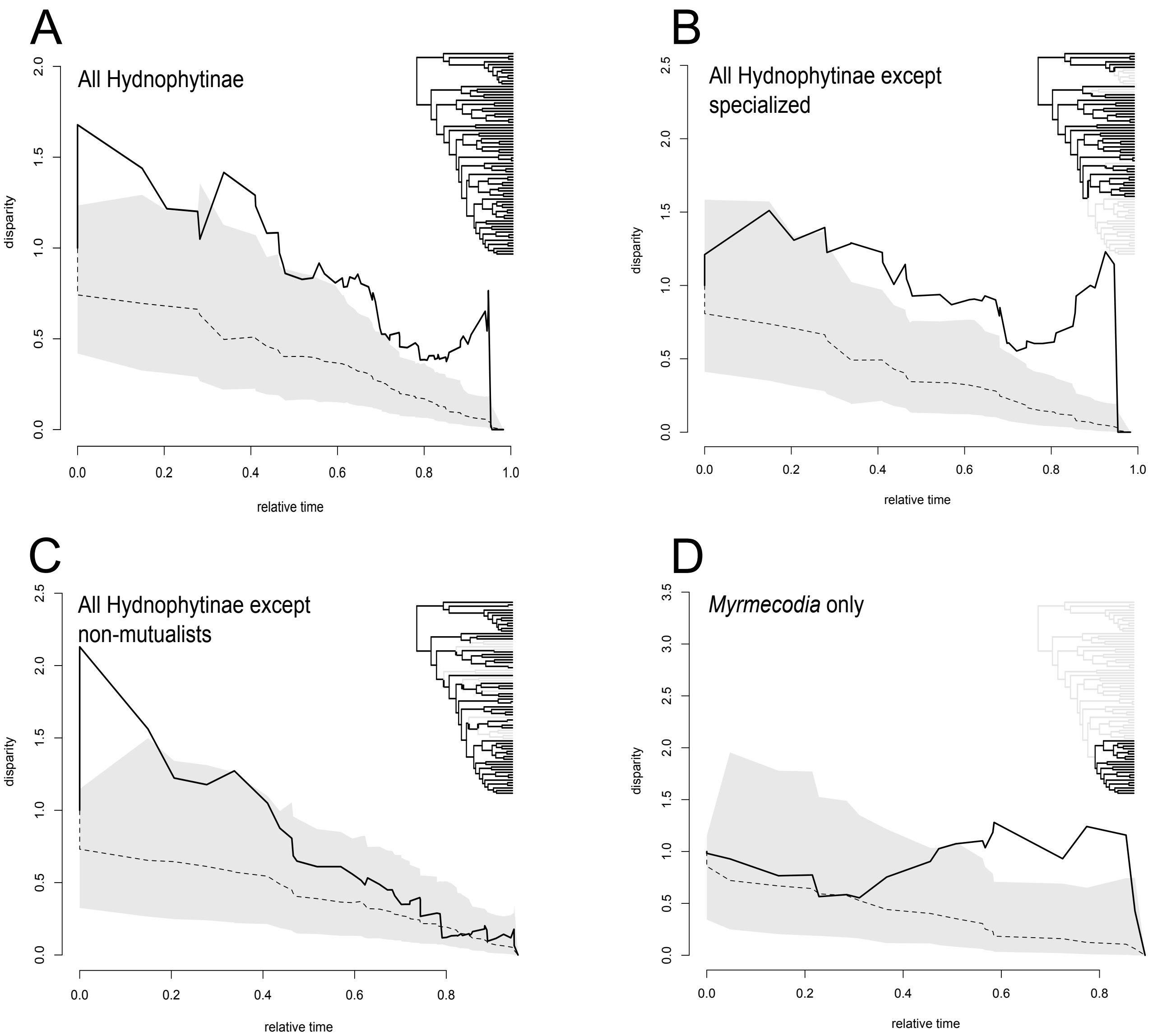

Figure S15. Entrance hole size disparity-through-time (DTT) plots inferred in the R package Geiger. (A) All Hydnophytinae. (B) All Hydnophytinae except specialized mutualists. (C) All Hydnophytinae except non-mutualists. (D) *Myrmecodia* only. The solid black line shows empirical DTT plots based on log-normalized entrance-hole diameter, while the dotted line shows a null DTT plot based on Brownian motion alone, with the grey shading representing the 95% confidence intervals.

Table S1. Mutualistic traits in the Hydnophytinae. Each species was coded based on the cited references, an ongoing revision of *Hydnophytum* from M. Jebb abd C.R. Huxley, and field data from Camilla Huxley (fieldwork in Papua New Guinea in the 1970's and 1980's), Matthew Jebb (fieldwork in Papua New Guinea and Indonesian Papua in the 1980's and 1990's), Milan Janda (Papua New Guinea 2004-2014), Eva Kaufmann (South East Asia, Borneo, Indonesia 1998-2001), the mission Santo 2006 to Vanuatu (https://fr.wikipedia.org/wiki/Expédition_Santo_2006), in particular Jérôme Orivel who collected ant-plants and their ant partners, and Guillaume Chomicki (field trips to Fiji in 2014, 2015 and 2016). The following table shows major mutualistic traits of the Hydnophytinae: (i) maximal entrance hole size, which controls partner's entry inside the domatium, andthus symbiosis with ants; (ii) post-anthetic sugar rewards for specialized ant partners (Chomicki et al., 2016); (iii) dispersal mode by birds, (Dolichoderinae) ants alone, or ants and birds (Chomicki and Renner, 2016); the presence or absence of warts, micro-structures inside the domatium that absorb ant-brought nutrients (Huxley, 1978), and (v) tuber growth that can be apical or diffuse. We here define strategy based on the tuber (domatium) inhabitants, with 'generalists' being inhabited by any unspecialized arboreal or polymorphic-nesting ants; 'specialists' being mainly inhabited by one or two Dolichoderinae ant species from the genera *Philidris* or/and *Anonychomyrma*, and 'non-mutualists', those that are not inhabited by ants, but can harbor other inhabitants. This does not exclude that some specialists (mostly *Myrmecodia*) can be occasionally occupied by a generalist ant species (typically if a bird disperses the seeds too far from Dolichoderinae-inhabited ant-plants), and conversely, that some generalist Hydophytinae are also occasionally occupied by *Philidris* and *Anonychomyrma* species. For most generalist species, there are no quantitative studies looking at the ant inhabitants, and thus we only reported 'generalist ants'. Quantitative studies in Fiji (Guillaume Chomicki), Papua New Guinea (Milan Janda), Vanuatu (Bouchet et al., 2011) and Borneo (Kaufmann, 2002) revealed that generalists Hydnophytinae can have over 10 generalist ant species as inhabitants. The important mutualistic traits given here typically show patterns of association with mutualistic strategy, but none are confounding (i.e. there are exceptions). The few nomina nuda provided next to certain specimens in this study, and the 22 Hydnophytum species in this table are from an ongoing revision available from M. Jebb (Herbarium, National Botanic Gardens, Dublin, Ireland); when available, we further provide the link to the distributed herbarium material via barcodes.

Species	Origin	Sampled in tree	Maximal entrance hole size (mm)	Post-anthetic sugar rewards	Dispersal mode	Warts	Tuber growth	Tuber inhabitants	Mutualism strategy	References
Anthorrhiza aerolata Huxley & Jebb	Papua New Guinea, Normanby island	Yes	30	Absent	Birds	Present	Diffuse	Cockroaches, occasionally gecko	Non-mutualist	Jebb (1985); Huxley and Jebb (1991a)
Anthorrhiza bracteosa Huxley & Jebb	Papua New Guinea, D'Entrecasteaux archipelago	Yes	5	Absent	Birds	Present	Diffuse	Cockroaches, beetles, a range of invertebrates	Non-mutualist	Jebb (1985); Huxley and Jebb (1991a)
Anthorrhiza caerulea Huxley & Jebb	Papua New Guinea, Morobe Province	Yes	20	Present	Ants	Present	Apical	Plant-ants (*Anonychomyrma scrutator* complex)	Specialist	Jebb (1985); Huxley and Jebb (1991a)
Anthorrhiza camilla Jebb	Papua New Guinea, Morobe Province	No	2	Absent	Birds	Present	Apical	Plant-ants (*Anonychomyrma scrutator* complex)	Specialist	Jebb (1993)
Anthorrhiza chrysacantha Huxley & Jebb	Papua New Guinea, Central and Morobe provinces	Yes	10	Present	Ants	Present	Apical	Plant-ants (*Anonychomyrma scrutator* complex)	Specialist	Jebb (1985); Huxley and Jebb (1991a)
Anthorrhiza echinella Huxley & Jebb	Papua New Guinea, Morobe Province	Yes	5	Absent	Birds	Present	Diffuse	Generalist ants	Generalist	Jebb (1985); Huxley and Jebb (1991a)
Anthorrhiza mitis Huxley & Jebb	Papua New Guinea, Central and Milne Bay Province	No	10	Absent	Birds	Present	Diffuse	Generalist ants	Generalist	Jebb (1985); Huxley and Jebb (1991a)
Anthorrhiza recurvispina Huxley & Jebb	Papua New Guinea, Louisiade archipelago, Milne Bay Province	No	4	Absent	Birds	Present	Diffuse	Generalist ants, also *Philidris cordata*	Generalist	Jebb (1985); Huxley and Jebb (1991a)
Anthorrhiza stevensii Huxley & Jebb	Papua New Guinea, Milne Bay Province	No	Unknown	Absent	Birds	Present	Diffuse	Generalist ants and *Anonychomyrma sp.*	Generalist	Huxley and Jebb (1991a)
Hydnophytum acuminicalyx Jebb & C. R. Huxley **[nomen nudum]**	Papua New Guinea, Eastern Highlands Province	Yes	20	Absent	Birds	Present	Diffuse	Generalist ants, including *Anonychomyrma spp.*	Generalist	Jebb (1985); Chomicki (2016)
Hydnophytum albertisii Becc.	Papua New Guinea, Western province	No	10	Absent	Birds	Absent	Diffuse	Generalist ants	Generalist	Jebb (1985); Chomicki (2016)
Hydnophytum alboviride Merr. & L. M. Perry	Indonesian New Guinea	Yes	30	Absent	Birds	Absent	Diffuse	-	Non-mutualist	Jebb (1985); Chomicki (2016)
Hydnophytum archboldianum Merr. & L. M. Perry	Indonesian New Guinea	Yes	10	Absent	Birds	Absent	Diffuse	-	Non-mutualist	Jebb (1985); Chomicki (2016)
Hydnophytum bracteatum Valeton	Indonesian New Guinea, Papua New Guinea	Yes	10	Absent	Birds	Absent	Diffuse	-	Non-mutualist	Jebb (1985); Chomicki (2016)

Hydnophytum buxifolium Merr. & L. M. Perry	Indonesian New Guinea	No	10	Absent	Birds	Absent	Diffuse	-	Non-mutualist	Jebb (1985); Chomicki (2016)
Hydnophytum caminiferum Wistuba, U.Zimm., Gronem. & Marwinski	Indonesian New Guinea	Yes	30	Absent	Birds	Absent	Diffuse	Arthropods other than ants (in water)	Non-mutualist	Jebb (1985); Chomicki (2016)
Hydnophytum confertifolium Merr. & L. M. Perry	Indonesian New Guinea	Yes	10	Absent	Birds	Absent	Diffuse	-	Non-mutualist	Jebb (1985); Chomicki (2016)
Hydnophytum contortum Merr. & L. M. Perry	Papua New Guinea, Western, Central and Morobe provinces	Yes	10	10	Birds	Present	Diffuse	Generalist ants	Generalist	Jebb (1985); Chomicki (2016)
Hydnophytum cordifolium Valeton	Papua New Guinea, Madang and Morobe provinces	No	Unknown	Absent	Birds	Present	Diffuse	Generalist ants	Generalist	Jebb (1985); Chomicki (2016)
Hydnophytum dauloense Jebb & C. R. Huxley **[nomen nudum] http://plants.jstor.org/stable/10.5555/al.ap.specimen.l0843017**	Papua New Guinea, Eastern Highlands Province	Yes	50	Absent	Birds	Absent	Diffuse	A range of arthropods (excluding ants), including cockroaches, centipedes, spiders; frogs (*Cophixalus riparius*)	Non-mutualist	Jebb (1985); Chomicki (2016)
Hydnophytum davisii Jebb & C. R. Huxley **[nomen nudum] http://plants.jstor.org/stable/10.5555/al.ap.specimen.k000761943**	Indonesian New Guinea	No	13	Absent	Birds	Present	Diffuse	-	Non-mutualist	Jebb (1985); Chomicki (2016)
Hydnophytum decipiens Merr. & L. M. Perry	Indonesian New Guinea	No	Unknown	Absent	Birds	Present	Diffuse	-	Non-mutualist	Jebb (1985); Chomicki (2016)
Hydnophytum dentrecastense Jebb & C. R. Huxley **[nomen nudum] https://www.idigbio.org/portal/records/fb9f00f5-657d-4d88-9db6-96735563bd26**	Papua New Guinea, Normanby island	Yes	10	Absent	Birds	Present	Diffuse	-	Non-mutualist	Jebb (1985); Chomicki (2016)
Hydnophytum ellipticum Merr. & L. M. Perry	Indonesian New Guinea, Papua New Guinea	No	20	Absent	Birds	Absent	Diffuse	-	Non-mutualist	Jebb (1985); Chomicki (2016)
Hydnophytum ferrugineum P. I. Forst.	Australia, North Queensland	No	10	Absent	Birds	Present	Diffuse	Generalist ants	Generalist	Jebb (1985); Chomicki (2016)
Hydnophytum formicarum Jack	Indonesia, New Guinea, Borneo, Thailand, Cambodia, Philippines	Yes	10	Present	Ants and birds	Present	Diffuse	Generalist ants including *Camponotus spp.*, *Crematogaster difformis, C. spp. Pheidole sp.* and plant-ant *Philidris cordata*	Generalist	Huxley (1982); Jebb (1985); Kaufmann (2002); Chomicki (2016)

Hydnophytum fusiforme Jebb & C. R. Huxley	Papua New Guinea, Southern Highlands Province	Yes	20	Absent	Birds	Absent	Diffuse	-	Non-mutualist	Jebb (1985); Chomicki (2016)
Hydnophytum grandifolium Valeton	Indonesian New Guinea	No	Unknown	Absent	Birds	Present	Diffuse	Generalist ants	Generalist	Jebb (1985); Chomicki (2016)
Hydnophytum hailans Jebb & C. R. Huxley **[nomen nudum] http://plants.jstor.org/stable/10.5555/al.ap.specimen.k000761971**	Papua New Guinea, Western Highlands province	Yes	20	Absent	Birds	Absent	Diffuse	-	Non-mutualist	Jebb (1985); Chomicki (2016)
Hydnophytum hellwigii Warb.	Papua New Guinea incl. New Ireland, Solomon islands	Yes	6	Absent	Birds	Present	Diffuse	Generalist ants	Generalist	Jebb (1985); Chomicki (2016)
Hydnophytum heterophyllum Merr. & L. M. Perry	Indonesian Papua New Guinea	No	Unknown	Absent	Birds	Present	Diffuse	Generalist ants	Generalist	Jebb (1985); Chomicki (2016)
Hydnophytum kebarense Jebb & C. R. Huxley **[nomen nudum]**	Indonesian New Guinea	No	10	Absent	Birds	Present	Diffuse	Generalist ants	Generalist	Jebb (1985); Chomicki (2016)
Hydnophytum lauterbachii Valeton	Indonesian New Guinea, Papua New Guinea	No	10	Absent	Birds	Present	Diffuse	Generalist ants	Generalist	Jebb (1985); Chomicki (2016)
Hydnophytum linearifolium Valeton	Papua New Guinea, Sepik province	No	Unknown	Absent	Birds	Present	Diffuse	Generalist ants	Generalist	Jebb (1985); Chomicki (2016)
Hydnophytum lucidulum Valeton	Papua New Guinea, Morobe and Central provinces	No	Unknown	Absent	Birds	Present	Diffuse	Generalist ants	Generalist	Jebb (1985); Chomicki (2016)
Hydnophytum magnifolium Merr. & L. M. Perry	Indonesian New Guinea, Papua New Guinea	No	6	Absent	Birds	Present	Diffuse	Generalist ants	Generalist	Jebb (1985); Chomicki (2016)
Hydnophytum magnirubrum Jebb & C. R. Huxley **[nomen nudum]**	Papua New Guinea, Enga and Southern Highlands provinces	Yes	40	Absent	Birds	Absent	Diffuse	Spiders, myriapods, orthopterans, dipteran larvae, planarians, anelids, cockroaches, centipedes, molluscs and crustaceans	Non-mutualist	Jebb (1985); Chomicki (2016)
Hydnophytum mamberamoense Jebb & C. R. Huxley **[nomen nudum] http://plants.jstor.org/stable/10.5555/al.ap.specimen.k000761965**	Indonesian Papua New Guinea	No	6	Absent	Birds	Present	Diffuse	-	Non-mutualist	Jebb (1985); Chomicki (2016)
Hydnophytum mayuense Jebb & C. R. Huxley **[nomen nudum]**	Papua New Guinea, Milne Bay province	No	Unknown	Absent	Birds	Present	Diffuse	Generalist ants	Generalist	Jebb (1985); Chomicki (2016)
Hydnophytum microphyllum Becc.	Indonesian New Guinea	Yes	10	Absent	Birds	Present	Diffuse	Generalist ants	Generalist	Jebb (1985); Chomicki

										(2016)
Hydnophytum minirubrum Jebb & C. R. Huxley **[nomen nudum]**	Papua New Guinea, Western Highlands and Southern Highlands provinces	Yes	20	Absent	Birds	Absent	Diffuse	Spiders, myriapods, orthopterans, dipteran larvae, planarians, anelids, cockroaches, centipedes, molluscs and crustaceans	Non-mutualist	Jebb (1985); Chomicki (2016)
Hydnophytum montis-kani Valeton	Papua New Guinea	Yes	10	Absent	Birds	Present	Diffuse	Generalist ants	Generalist	Jebb (1985); Chomicki (2016)
Hydnophytum morotaiense Jebb & C. R. Huxley **[nomen nudum] (http://plants.jstor.org/stable/10.5555/al.ap.specimen.a00071986)**	Moluccas, Morotai island	No	Unknown	Absent	Birds	Present	Diffuse	Generalist ants	Generalist	Jebb (1985); Chomicki (2016)
Hydnophytum moseleyanum Becc.	Philippines, Solomon islands, Indonesia New Guinea, Papua New Guinea	Yes	10	Present	Ants and birds	Present	Diffuse	Generalist ants including *Tapinoma sp., Camponotus sp., Anoplolepis gracilipes, Opisthopsis maurus, Opisthopsis sp., Paratrechina sp., Colobopsis sp., Crematogaster sp., Monomorium sp., Tetraponera sp.* and plant-ant *Philidris cordata and Philidris sp.*	Generalist	Jebb (1985); Chomicki (2016)
Hydnophytum multituberosum Jebb & C. R. Huxley	Indonesian New Guinea, Waigeo island	Yes	5	Absent	Birds	Present	Diffuse	Generalist ants	Generalist	Jebb (1985); Chomicki (2016)
Hydnophytum myrtifolium Merr. & L. M.	Papua New Guinea, Morobe, Central and Northern provinces	No	80	Absent	Birds	Absent	Diffuse	Cockroaches, myriapods and frogs (*Cophixalus riparius*)	Non-mutualist	Jebb (1985); Chomicki (2016)
Hydnophytum orichalcum Jebb & C. R. Huxley **[nomen nudum] http://plants.jstor.org/stable/10.5555/al.ap.specimen.k000761957**	Papua New Guinea, Louisiade archipelago	No	Unknown	Absent	Birds	Present	Diffuse	Generalist ants	Generalist	Jebb (1985); Chomicki (2016)
Hydnophytum ovatum Miq.	Moluccas, Ternate island	No	15	Absent	Birds	Present	Diffuse	Generalist ants	Generalist	Jebb (1985); Chomicki (2016)
Hydnophytum pauper Valeton ex Jebb & C. R. Huxley **[nomen nudum]**	Indonesian New Guinea	No	8	Absent	Birds	Absent	Diffuse	Frogs and *Peripatus* worms	Non-mutualist	Jebb (1985); Chomicki (2016)
Hydnophytum petiolatum Becc **var. *argentatum*** Jebb & C.R. Huxley **[nomen nudum] http://plants.jstor.org/stable/10.5555/al.ap.specimen.l0843016**	Papua New Guinea, Normanby island	Yes	25	Absent	Birds	Present	Diffuse	Cockroaches	Non-mutualist	Jebb (1985); Chomicki (2016)
Hydnophytum petiolatum Becc **var. *auridemens*** Jebb & C.R. Huxley **[nomen nudum]**	Papua New Guinea, Missima island	Yes	9	Absent	Birds	Present	Diffuse	Generalist ants	Generalist	Jebb (1985); Chomicki (2016)

http://plants.jstor.org/stable/10.5555/al.ap.specimen.k000761977										
Hydnophytum puffii Low, Sugau & Wong	Borneo	Yes	10	Absent	Birds	Present	Diffuse	Generalist ants including *Camponotus spp.* and *Crematogaster spp.*	Generalist	Jebb (1985); Chomicki (2016)
Hydnophytum punamense Lauterb.	Papua New Guinea	Yes	6	Absent	Birds	Present	Diffuse	Generalist ants	Generalist	Jebb (1985); Chomicki (2016)
Hydnophytum radicans Becc.	Moluccas, Indonesian New Guinea, Papua New Guinea	Yes	10	Absent	Birds	Present	Diffuse	Generalist ants	Generalist	Jebb (1985); Chomicki (2016)
Hydnophytum ramispinum Merr. & L. M. Perry	Indonesian New Guinea	Yes	20	Absent	Birds	Absent	Diffuse	Generalist ants	Generalist	Jebb (1985); Chomicki (2016)
Hydnophytum reevii Jebb & C. R. Huxley **[nomen nudum]**	Papua New Guinea, Enga province	No	6	Absent	Birds	Absent	Diffuse	-	Non-mutualist	Jebb (1985); Chomicki (2016)
Hydnophytum simplex Becc.	Papua New Guinea	Yes	10	Absent	Birds	Present	Diffuse	Generalist ants	Generalist	Jebb (1985); Chomicki (2016)
Hydnophytum spathulatum Valeton	Moluccas	No	15	Absent	Birds	Present	Diffuse	Generalist ants	Generalist	Jebb (1985); Chomicki (2016)
Hydnophytum terrestris Jebb & C. R. Huxley **[nomen nudum]**	Papua New Guinea, Eastern Highlands province	Yes	10	Absent	Birds	Present	Diffuse	Generalist ants, including *Vollenhovia* sp.	Generalist	Jebb (1985); Chomicki (2016)
Hydnophytum tetrapterum Becc.	Indonesian New Guinea, West Papua and Waigeo island	Yes	10	Absent	Birds	Present	Diffuse	Generalist ants	Generalist	Jebb (1985); Chomicki (2016)
Hydnophytum tortuosum Becc.	Indonesian New Guinea, West Papua	Yes	10	Absent	Birds	Present	Diffuse	Generalist ants, including *Anoplolepis gracilipes*	Generalist	Jebb (1985); Chomicki (2016)
Hydnophytum trichomanes Jebb & C. R. Huxley **[nomen nudum] http://plants.jstor.org/stable/history/10.5555/al.ap.specimen.a00096758**	Indonesian New Guinea, including Japen island	Yes	10	Absent	Birds	Absent	Diffuse	Cockroaches	Non-mutualist	Jebb (1985); Chomicki (2016)
Hydnophytum vaccinifolium P.Royen	Indonesian New Guinea	Yes	30	Absent	Birds	Absent	Diffuse	-	Non-mutualist	Jebb (1985); Chomicki (2016)
Hydnophytum valetonii Jebb & C. R. Huxley **[nomen nudum]**	Indonesian New Guinea	No	10	Absent	Birds	Absent	Diffuse	Spiders	Non-mutualist	Jebb (1985); Chomicki (2016)
Hydnophytum vitis-idaea Merr. & L.	Indonesian New Guinea	Yes	6	Absent	Birds	Absent	Diffuse	-	Non-	Jebb (1985);

M. Perry									mutualist	Chomicki (2016)
***Myrmecodia alata* Becc.**	Indonesian New Guinea	Yes	4	Present	Ants and birds	Present	Apical	Plant-ants (*Philidris cordatus* and *Anonychomyrma scrutator* complex)	Specialist	Jebb (1985); Huxley and Jebb (1993)
***Myrmecodia albertisii* Becc. subsp. *incompta* Huxley & Jebb**	Islands of Milne Bay, Papua New Guinea	No	4	Present	Ants and birds	Present	Apical	Plant-ants (*Philidris cordatus* and *Anonychomyrma scrutator* complex)	Specialist	Jebb (1985); Huxley and Jebb (1993)
***Myrmecodia albertisii* subsp. *albertisii* (Becc.) Huxley & Jebb**	Papua New Guinea, Western Province	No	4	Present	Ants and birds	Present	Apical	Plant ants (*Philidris cordatus*)	Specialist	Jebb (1985); Huxley and Jebb (1993)
***Myrmecodia albertisii* subsp. *valida* (Becc.) Huxley & Jebb**	Papua New Guinea, Central Province	Yes	4	Present	Ants and birds	Present	Apical	Plant-ants (*Philidris cordatus* and *Anonychomyrma scrutator* complex)	Specialist	Jebb (1985)
***Myrmecodia angustifolia* Valeton**	Indonesian New Guinea	No	8	Present	Ants and birds	Present	Apical	Plant-ants (*Anonychomyrma scrutator* complex)	Specialist	Jebb (1985); Huxley and Jebb (1993)
***Myrmecodia archboldiana* Merr. & Perry**	Indonesian New Guinea	No	Unknown	Present	Ants and birds	Present	Apical	Plant-ants (*Anonychomyrma scrutator* complex)	Specialist	Jebb (1985); Huxley and Jebb (1993)
***Myrmecodia aureospina* Huxley & Jebb**	Indonesian New Guinea, Papua New Guinea	Yes	4	Present	Ants and birds	Present	Apical	Plant-ants (*Philidris cordatus* and *Anonychomyrma scrutator* complex)	Specialist	Jebb (1985); Huxley and Jebb (1993)
***Myrmecodia beccarii* J.D. Hooker**	North Queensland, Australia	Yes	8	Present	Ants and birds	Present	Apical	Plant ants (*Philidris cordata*)	Specialist	Jebb (1985); Huxley and Jebb (1993)
***Myrmecodia brassii* Merr. & Perry**	Indonesian New Guinea	Yes	6	Present	Ants and birds	Present	Apical	Plant-ants (*Anonychomyrma scrutator* complex)	Specialist	Jebb (1985); Huxley and Jebb (1993)
***Myrmecodia dahlii* K.Schum.**	Papua New Guinea, New Ireland	Yes	7	Present	Ants and birds	Present	Apical	Plant-ants (*Philidris myrmecodiae*)	Specialist	Jebb (1985); Huxley and Jebb (1993)
***Myrmecodia erinacea* Becc.**	Indonesian New Guinea, Papua New Guinea	No	8	Present	Ants and birds	Present	Apical	Plant-ants (*Philidris cordatus* and *Anonychomyrma scrutator* complex)	Specialist	Jebb (1985); Huxley and Jebb (1993)
***Myrmecodia ferox* Huxley & Jebb**	Papua New Guinea	Yes	8	Present	Ants and birds	Present	Apical	Plant-ants (*Anonychomyrma scrutator* complex)	Specialist	Jebb (1985); Huxley and Jebb (1993)
***Myrmecodia gracilispina* Huxley & Jebb**	Papua New Guinea	Yes	8	Present	Ants and birds	Present	Apical	Plant-ants (*Anonychomyrma scrutator* complex)	Specialist	Jebb (1985); Huxley and Jebb (1993)
***Myrmecodia horrida* Huxley & Jebb**	Papua New Guinea	Yes	8	Present	Ants and birds	Present	Apical	Plant-ants (*Anonychomyrma scrutator* complex)	Specialist	Jebb (1985); Huxley and Jebb (1993)

***Myrmecodia jobiensis* Becc.**	Indonesian New Guinea	Yes	6	Present	Ants and birds	Present	Apical	Plant-ants (*Anonychomyrma scrutator* complex)	Specialist	Jebb (1985); Huxley and Jebb (1993)
***Myrmecodia kutubuensis* Huxley & Jebb**	Papua New Guinea, southern highlands	No	7	Present	Ants and birds	Present	Apical	Plant ants (*Philidris cordata*)	Specialist	Jebb (1985); Huxley and Jebb (1993)
***Myrmecodia lamii* Merr. & Perry**	Indonesian New Guinea	Yes	8	Present	Ants and birds	Present	Apical	Plant-ants (*Anonychomyrma scrutator* complex)	Specialist	Jebb (1985); Huxley and Jebb (1993)
***Myrmecodia longifolia* Valeton**	Indonesian New Guinea Papua New Guinea	Yes	6	Present	Ants and birds	Present	Apical	Plant-ants (*Philidris cordatus* and *Anonychomyrma scrutator* complex)	Specialist	Jebb (1985); Huxley and Jebb (1993)
***Myrmecodia longissima* Valeton**	Indonesian New Guinea, Papua New Guinea	No	8	Present	Ants and birds	Present	Apical	Plant ants (*Philidris cordata*)	Specialist	Jebb (1985); Huxley and Jebb (1993)
***Myrmecodia melanacantha* Huxley & Jebb**	Papua New Guinea	Yes	5	Present	Ants and birds	Present	Apical	Plant-ants (*Anonychomyrma scrutator* complex)	Specialist	Jebb (1985); Huxley and Jebb (1993)
***Myrmecodia oblongata* Valeton**	Papua New Guinea	No	6	Present	Ants and birds	Present	Apical	Plant-ants (*Anonychomyrma scrutator* complex)	Specialist	Jebb (1985); Huxley and Jebb (1993)
***Myrmecodia oksapminensis* Huxley & Jebb**	Papua New Guinea	No	8	Present	Ants and birds	Present	Apical	Plant-ants (*Anonychomyrma scrutator* complex)	Specialist	Jebb (1985); Huxley and Jebb (1993)
***Myrmecodia paradoxa* Huxley & Jebb**	Papua New Guinea	No	7	Present	Ants and birds	Present	Apical	Plant-ants (*Anonychomyrma scrutator* complex)	Specialist	Jebb (1985); Huxley and Jebb (1993)
***Myrmecodia pendens* Merr. & perry**	Papua New Guinea	Yes	5	Present	Ants and birds	Present	Apical	Plant-ants (*Philidris cordatus* and *Anonychomyrma scrutator* complex)	Specialist	Jebb (1985); Huxley and Jebb (1993)
***Myrmecodia platytyrea subsp. antoinii* (Becc.) C.R.Huxley & Jebb**	Papua New Guinea, Australia (North Queensland)	Yes	6	Present	Ants and birds	Present	Apical	Plant ants (*Philidris cordata*)	Specialist	Jebb (1985); Huxley and Jebb (1993)
***Myrmecodia platytyrea subsp. platytyrea* (Becc.) C.R.Huxley & Jebb**	Mollucas, Indonesian New Guinea, Papua New Guinea	Yes	6	Present	Ants and birds	Present	Apical	Plant-ants (*Anonychomyrma scrutator* complex)	Specialist	Jebb (1985); Huxley and Jebb (1993)
***Myrmecodia pteroaspida* Huxley & Jebb**	Papua New Guinea	Yes	6	Present	Ants and birds	Present	Apical	Plant-ants (*Anonychomyrma scrutator* complex)	Specialist	Jebb (1985); Huxley and Jebb (1993)
***Myrmecodia rumphii* Becc**	Moluccas, Eastern Indonesia, Lesser Sunda islands	Yes	7	Present	Ants and birds	Present	Apical	Plant-ants (*Philidris* sp.)	Specialist	Jebb (1985); Huxley and Jebb (1993)
Myrmecodia salomonensis Becc.	Papua New Guinea, New Ireland, Bougainville; Solomon	Yes	5	Present	Ants and birds	Present	Apical	Plant-ants (*Philidris cordata* and *P. myrmecodiae*)	Specialist	Jebb (1985); Huxley and

	islands									Jebb (1993)
***Myrmecodia schlechteri* subsp. *eraveensis* (Valeton) Huxley & Jebb**	Papua New Guinea, Southern Highlands	No	7	Present	Ants and birds	Present	Apical	Plant-ants (*Anonychomyrma scrutator* complex)	Specialist	Jebb (1985); Huxley and Jebb (1993)
***Myrmecodia schlechteri* subsp. *kopiagoensis* (Valeton) Huxley & Jebb**	Papua New Guinea, Western Highlands Province	No	7	Present	Ants and birds	Present	Apical	Plant-ants (*Philidris cordatus*)	Specialist	Jebb (1985); Huxley and Jebb (1993)
***Myrmecodia schlechteri* subsp. *pendula* (Merr. & Perry) Huxley & Jebb**	Papua New Guinea	No	7	Present	Ants and birds	Present	Apical	Plant-ants (*Anonychomyrma scrutator* complex)	Specialist	Jebb (1985); Huxley and Jebb (1993)
***Myrmecodia schlechteri* subsp. *schlechteri* var. *schlechteri* (Valeton) C.R.Huxley & Jebb**	Papua New Guinea	Yes	7	Present	Ants and birds	Present	Apical	Plant-ants (*Philidris cordatus* and *Anonychomyrma scrutator* complex)	Specialist	Jebb (1985); Huxley and Jebb (1993)
***Myrmecodia schlechteri* Valeton subsp. *schlechteri* var. *longispina* (Valeton) Huxley & Jebb**	Papua New Guinea, Madang province	No	7	Present	Ants and birds	Present	Apical	Plant-ants (*Anonychomyrma scrutator* complex)	Specialist	Jebb (1985); Huxley and Jebb (1993)
***Myrmecodia sterrophylla* Merr. & Perry**	Indonesian New Guinea Papua New Guinea	Yes	8	Present	Ants and birds	Present	Apical	Plant-ants (*Anonychomyrma scrutator* complex)	Specialist	Jebb (1985); Huxley and Jebb (1993)
***Myrmecodia tuberosa* Jack**	Indonesia, New Guinea, Borneo, Thailand	Yes	8	Present	Ants and birds	Present	Apical	Plant-ants (*Philidris cordata* and *P. myrmecodiae*)	Specialist	Jebb (1985); Huxley and Jebb (1993)
Myrmephytum arfakianum (Becc.) Huxley & Jebb	Indonesian New Guinea, Western part	Yes	10	Unknown	Ants and birds	Present	Apical	Plant ants (*Anonychomyrma scrutator* complex)	Specialist	Jebb (1985); Huxley and Jebb (1991b)
Myrmephytum beccarii Elmer	Philippines (Northern)	Yes	10	Absent	Birds	Present	Diffuse	Generalist ants	Generalist	Jebb (1985); Huxley and Jebb (1991b)
Myrmephytum moniliforme Huxley & Jebb	Indonesian New Guinea, most western extreme of West Papua	No	10	Absent	Birds	Present	Diffuse	Generalist ants	Generalist	Jebb (1985); Huxley and Jebb (1991b)
Myrmephytum naumannii (Warb.) Huxley & Jebb	Indonesian New Guinea, Western part	Yes	10	Absent	Birds	Present	Diffuse	Generalist ants	Generalist	Jebb (1985); Huxley and Jebb (1991b)
Myrmephytum selebicum (Becc.) Becc.	Philippines (South) and Northern Sulawesi	Yes	10	Absent	Birds	Present	Diffuse	Generalist ants	Generalist	Jebb (1985); Huxley and Jebb (1991b)
Squamellaria grayi Chomicki & Wistuba	Fiji, Taveuni and Vanua Levu	Yes	3	Absent	Ants	Present	Apical	Specialist plant-ants (*Philidris nagasau*)	Specialist	Chomicki and Renner (2016)
Squamellaria guppyana (Becc.) Chomicki	Solomon islands	Yes	4	Absent	Birds	Present	Apical	Generalist ants, including *Philidris* sp.	Generalist	Jebb (1985); Chomicki and Renner (2016)

Squamellaria huxleyana Chomicki	Fiji, Vanua Levu	Yes	3	Present	Ants	Present	Apical	Specialist plant-ants (*Philidris nagasau*)	Specialist	Chomicki and Renner (2016)
Squamellaria imberbis (A. Gray)	Fiji, Vanua Levu	Yes	3	Present	Ants	Present	Apical	Specialist plant-ants (*Philidris nagasau*)	Specialist	Chomicki and Renner (2016)
Squamellaria jebbiana Chomicki	Fiji, Taveuni	Yes	40	Absent	Birds	Present	Diffuse	Generalist ants (*Pheidole knowlesi, Anoplolepis gracilipes*)	Generalist	Chomicki and Renner (in revision)
Squamellaria kajewskii (Merr. & L.M.Perry) Chomicki	Solomon islands	Yes	25	Absent	Birds	Present	Apical	Cockroaches	Non-mutualist	Chomicki and Renner (2016)
Squamellaria major A.C. Sm.	Fiji, Taveuni	Yes	3	Present	Ants	Present	Apical	Specialist plant-ants (*Philidris nagasau*)	Specialist	Chomicki and Renner (2016)
Squamellaria tenuiflora (Becc.) Chomicki	Fiji, Viti Levu	Yes	50	Absent	Birds	Present	Diffuse	Generalist ants (*Camponotus maafui, Lordomyrma desupra, Pheidole knowlesi, P. wilsoni, Poecilomyrma myrmecodiae, Tapinoma minutum, Technomyrmex vitiensis*)	Generalist	Sarnat (2009); Chomicki and Renner (in revision);
Squamellaria thekii Jebb	Fiji, Taveuni	Yes	3	Present	Ants	Present	Apical	Specialist plant-ants (*Philidris nagasau*)	Specialist	Chomicki and Renner (2016)
Squamellaria vanuatuensis Jebb & C.R.Huxley in Chomicki & S.S. Renner	Vanuatu	Yes	4	Absent	Birds	Present	Diffuse	Generalist ants (*Iridomyrmex sp., Tetramorium sp., Pheidole sp., Polyrrhichis sp., Crematogaster sp., Amblyopone sp., Cerapachys sp., Paratrechina sp., Strumigenys spp., Turneria sp.*)	Generalist	Bouchet et al. (2011); Chomicki and Renner (2016)
Squamellaria wilkinsonii (Horne ex Baker) Chomicki	Fiji, Vanua Levu	Yes	50	Absent	Birds	Present	Diffuse	Generalist ants (*Anoplolepis gracilipes, Camponotus maafui, Colobopsis polynesica, Ochetellus sorosis, Paraparatrechina oceanica, Pheidole knowlesi, Strumigenys nidifex, Technomyrmex vitiensis, Tetramorium insolens, T. pacificum*)	Generalist	Sarnat (2009); Chomicki and Renner (in revision)
Squamellaria wilsonii (Horne ex Baker) Becc.	Fiji, Taveuni	Yes	3	Present	Ants	Present	Apical	Specialist plant-ants (*Philidris nagasau*)	Specialist	Chomicki and Renner (2016)

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Table S2. Hydnophytinae material included in this study, with taxonomic authors, vouchers and their geographic origin, and GenBank accession numbers for all sequences. Herbarium acronyms follow the *Index Herbariorum* (http://sciweb.nybg.org/science2/IndexHerbariorum.asp). Fourteen names are *nomina nuda* and given only here following Matthew Jebb ongoing *Hydnophytum* revision (Herbarium, National Botanic Gardens, Dublin, Ireland).

Taxon	Voucher	Geographic origin	ITS	ETS	trnL intron	trnL-trnF spacer	ndhF	trnH-psbA
***Amaracarpus muscifer* A.C.Sm.**	L. Barrabé & M. Tuiwawa 1109 (NOU)	Fiji	KF675907	KF675790	-	-	KF675995	-
***Amaracarpus nematopodus* (F.Muell.) P.I.Forst.**	L. Barrabé et al. 1030 (NOU)	Australia	JX155060	KF675791	-	-	JX155105	-
***Anthorrhiza areolata* Huxley & Jebb**	M.P.H. Jebb 383 (FHO)	Papua New Guinea, Normanby island	-	KX944417	-	-	-	KY002583
***Anthorrhiza caerulea* Huxley & Jebb**	M.P.H. Jebb 358 (FHO)	Papua New Guinea	KU586349	KU586368	-	-	-	KY002584
***Anthorrhiza chrysacantha* Huxley & Jebb**	M.P.H. Jebb 175 (FHO)	Papua New Guinea	-	KX944418	-	-	-	KY002585
***Anthorrhiza bracteosa* Huxley & Jebb**	M.P.H. Jebb 374 (FHO)	Papua New Guinea, Normanby island	-	KX944419		-	-	KY002586
Anthorrhiza echinella	G. Chomicki 83 (M)	Cultivated Oxf. Bot Gard., origin New Guinea	KU586350	KU586369	-	-	-	
***Hedstromia latifolia* A.C.Sm.**	L. Barrabé et al 1090 (NOU)	Fiji	KF675911	KF675795	-	-	KF675999	-
***Hydnophytum formicarum* Jack**	G. Chomicki 87 (M)	Cultivated, origin Malaysian region	KU586346	KU586365	-	-	KU586397	-
***Hydnophytum formicarum* Jack**	G. Chomicki 90 (M)	Cultivated, origin Sulawesi	KX944391	KX944420	KX944446	KY002551	KY002570	KY002587
***Hydnophytum simplex* Becc.**	G. Chomicki 94 (M)	Cultivated, origin Aru Island, Papua New Guinea	KU963311	KU963332	KU963350	KU963362	KU963377	KY002588
***Hydnophytum montis-kani* Valeton**	M.J. Sudo 1193 (L)	Papua New Guinea	KX944392	-	-	-	-	KY002589
***Hydnophytum sp. 1* (=*H. dentrecastense* n. nud. in Jebb and C.R. Huxley ongoing *Hydnophytum* revision)**	L.J. Brass 2568 2 (L)	Papua New Guinea	KU963312	-	-	-	-	KY002590
***Hydnophytum sp. 3* (=*H. terrestris* n. nud. in Jebb and C.R. Huxley ongoing *Hydnophytum* revision)**	M.P.H. Jebb 315 (FHO)	Papua New Guinea	KU963314	KX944421	-	KU963376	-	KY002592

***Hydnophytum hellwigii* Warb.**	R. Schlechter 13674 (BM)	Papua New Guinea	KX944393	KX944422	-	-	-	-
***Hydnophytum radicans* Becc.**	M.H.P. Jebb 427 (FHO)	Papua New Guinea	KX944394	KX944423	-	KY002552	KY002571	KY002593
***Hydnophytum punamense* Lauterb.**	L.J. Brass 15008 (BM)	Papua New Guinea	-	KX944424	-	-	-	-
***Hydnophytum vitis-idaea* Merr. & L.M.Perry**	L.J. Brass 12046 (BM)	Papua New Guinea	KU963316	KU963337	KU963351	KU963363	-	KY002594
***Hydnophytum sp. (Hydnophytum petiolatum var. argentatum* n. nud. in Jebb and C.R. Huxley ongoing *Hydnophytum* revision)**	M.H.P. Jebb 379 (FHO)	Normanby island, Papua New Guinea	-	KX944425	-	KY002553	-	KY002595
***Hydnophytum sp. (Hydnophytum petiolatum var. auridemens* n. nud. in Jebb and C.R. Huxley ongoing *Hydnophytum* revision)**	M.H.P. Jebb 398 (FHO)	Missima island, Papua New Guinea	-	KX944426	-	KY002554	-	KY002596
***Hydnophytum sp. (Hydnophytum dauloense* n. nud. in Jebb and C.R. Huxley ongoing *Hydnophytum* revision)**	M.H.P. Jebb 337 (FHO)	Papua New Guinea	KX944395	KX944427	KX944447	KY002555	KY002572	KY002597
***Hydnophytum tortuosum* Becc.**	G. Chomicki 127 (M)	Cultivated, origin Indonesian Papua	KU963318	KU963339	KU963352	KU963364	KU963379	KY002598
***Hydnophytum archboldianum* Merr. & L.M.Perry**	G. Chomicki 95 (M)	Cultivated, origin Indonesian Papua	KX944396	-	KX944448	KY002556	KY002573	KY002599
***Hydnophytum sp. (Hydnophytum minirubrum* n. nud. in M.H.P. Jebb and C.R. Huxley's ongoing revision)**	M.H.P. Jebb 288 (FHO)	Papua New Guinea	KX944397	KX944428	-	-	-	KY002600
***Hydnophytum sp. (Hydnophytum magnirubrum* n. nud. in M.H.P. Jebb and C.R. Huxley's ongoing revision)**	M.H.P. Jebb 262 (FHO)	Papua New Guinea	KX944398	KX944429	-	-	-	KY002601
***Hydnophytum sp. (Hydnophytum multituberosum* n. nud. in M.H.P. Jebb and C.R. Huxley's ongoing revision)**	M.H.P. Jebb 998 (BO)	Waigeo Island, Indonesia	-	-	-	-	-	KY002602
***Hydnophytum tetrapterum* Becc.**	L.E. Cheesman 32 (BM)	Papua New Guinea	KU963319	KU963340	-	-	-	KY002603
***Hydnophytum ramispinum* Merr. & L.M.Perry**	Recende 13 (BM)	Papua New Guinea	KX944399	KX944430	-	KY002557	-	-
***Hydnophytum confertifolium* Merr. & L.M.Perry**	G. Chomicki 85 (M)	Cultivated, origin West Papua	KX944400	KX944431	KX944449	KY002558	KY002574	-
***Hydnophytum contortum* Merr. & L. M. Perry**	M.P.H Jebb 310 (FHO)	Papua New Guinea	KU963321	KU963342	-	KU963375	-	KY002604

Hydnophytum sp. (Hydnophytum fusiforme **n. nud. in M.H.P. Jebb and C.R. Huxley's ongoing revision)**	L. Hamilton 3486 (FHO)	Papua New Guinea	KX944401	KX944432	KX944450	KY002559	-	KY002605
Hydnophytum sp. (Hydnophytum magnirubrum **n. nud. in M.H.P. Jebb and C.R. Huxley's ongoing revision)**	J. I. Menzies 5937 (FHO)	Papua New Guinea	KX944402	KX944433	KX944451	KY002560	-	KY002606
Hydnophytum sp. (Hydnophytum trichomanes **n. nud. in M.H.P. Jebb and C.R. Huxley's ongoing revision)**	R. Schlechter 18430 (BM)	Papua New Guinea	-	-	-	-	-	KY002607
Hydnophytum puffii **Low, Sugau & Wong**	G. Chomicki 93 (M)	Cultivated, origin Borneo	KU963322	KU963343	KU963354	KU963366	KU963381	KY002608
Hydnophytum sp. (Hydnophytum acuminicalyx **n. nud. in M.H.P. Jebb and C.R. Huxley's ongoing revision)**	M.H.P. Jebb 322 (L)	Papua New Guinea	KX944403	KX944434	-	-	-	KY002609
Hydnophytum caminiferum **Wistuba, U.Zimm., Gronem. & Marwinski**	A. Wistuba 2014-001 (M)	West Papua	KX944404	KX944435	-	-	-	-
Hydnophytum moseleyanum **Becc. *'agathifolium'***	C.R. Huxley 5902 (FHO)	Papua New Guinea	KU963323	KU963344	KU963355	KU963367	-	KY002610
Hydnophytum moseleyanum **Becc.**	L. Barrabé & Rigault 1041 (NOU)	Australia	KF675912	KF675798	KF676176	KF676176	KF676000	KF676266
Hydnophytum moseleyanum **Becc.**	G. Chomicki 92 (M)	Cultivated, origin Aru Island	KX944405	KX944436	KX944452	KY002561	-	KY002611
Hydnophytum bracteatum **Valeton**	H. Gay 467 (FHO)	Papua New Guinea	KX944406	KX944437	-	-	-	-
Hydnophytum sp. (Hydnophytum hailans **n. nud. in M.H.P. Jebb and C.R. Huxley's ongoing revision)**	M.H.P. Jebb 571 (L)	Papua New Guinea	KX944407	-	KX944453	KY002562	-	KY002612
Hydnophytum microphyllum **Becc.**	L0105910 (L)	Papua New Guinea	KX944408	-	-	-	-	-
Hydnophytum vaccinifolium **P.Royen**	G. Chomicki 98 (M)	Cultivated, origin Papua	KU963324	KU963345	KU963356	KU963368	KU963382	KY002613
Myrmecodia beccarii **Hook f.**	G. Chomicki 99 (M)	Cultivated, origin Australia	KU586347	KU586366	-	-	KU586398	KY002614
Myrmecodia salomonensis **Becc.**	C. R. Huxley and L. M. Turton 3442 (FHO)	Solomons	KU586351	KU586370	-	-	-	KY002615
Myrmecodia dahlii **K.Schum.**	J.I. Menzies 5947 (FHO)	Papua New Guinea	KU586348	KU586367	KU963357	KU963369	KU586399	KY002616

***Myrmecodia rumphii* Becc.**	G. Chomicki 115 (M)	Cultivated	KX944409	KX944438	KX944454	KY002563	KY002575	KY002617
***Myrmecodia alata* Becc.**	J.I. Menzies s.n. (L)	Papua	-	-	-	-	-	KY002618
***Myrmecodia jobiensis* Becc.**	G. Chomicki 101 (M)	Cultivated, origin Papua	KU963326	KU963347	KU963358	KU963370	KU963384	KY002619
***Myrmecodia albertisii* Becc. subsp. *valida* C.R.Huxley & Jebb**	H.J. Gay 901 (FHO)	Papua New Guinea	-	KU963327	-	-	-	KY002620
***Myrmecodia schlechteri* subsp. *schlechteri* var. *schlechteri* C.R.Huxley & Jebb**	H.J. Gay 488 (FHO)	Papua New Guinea	AF071988	KX944439	JN643394	JN643394	-	KY002621
***Myrmecodia pendens* Merr. & L.M.Perr.**	C.R. Huxley and J. Friday 5938 (FHO)	Papua New Guinea	-	KU963328	-	-	-	KY002622
***Myrmecodia aureospina* C.R.Huxley & Jebb**	M.P.H. Jebb 257 (FHO)	Papua New Guinea	-	KU963335	-	-	-	-
***Myrmecodia sterrophylla* Merr. & L.M. Perry**	M.P.H. Jebb 240 (L)	Papua New Guinea	KU963330	-	-	-	-	KY002623
***Myrmecodia lamii* Merr. & L.M.Perry**	G. Chomicki 102 (M)	Cultivated, origin Indonesian Papua, Doorman' top	KX944410	KX944440	KX944455	KY002564	KY002576	-
***Myrmecodia lamii* Merr. & L.M.Perry**	G. Chomicki 103 (M)	Cultivated, origin Indonesian Papua, Lake Habbema	KX944411	KX944441	KX944456	-	KY002577	KY002624
***Myrmecodia brassii* Merr. & L.M.Perry**	G. Chomicki 125 (M)	Cultivated, origin Indonesian Papua, Doorman'	KX944412	-	KX944457	KY002565	KY002578	KY002625
***Myrmecodia platytyrea subsp. platytyrea* (Becc.) C.R.Huxley & Jebb**	G. Chomicki 104 (M)	Cultivated, origin Papua New Guinea	KX944413	KX944442	KX944458	KY002566	KY002579	KY002626
***Myrmecodia platytyrea subsp. antoinii* (Becc.) C.R.Huxley & Jebb**	G. Chomicki 105 (M)	Cultivated, origin Australia	KX944414	-	KX944459	KY002567	KY002580	KY002627
***Myrmecodia ferox* C.R.Huxley & Jebb**	C.R. Huxley & Matiabe UPNG 5818 (FHO)	Papua New Guinea	-	KU963334	-	-	-	KY002628
***Myrmecodia longifolia* Valeton**	R.J. Johns 9760 (NSW)	Papua New Guinea	-	KX944443	-	-	-	KY002629
***Myrmecodia melanacantha* C.R.Huxley & Jebb**	M.P.H. Jebb 248 (L)	Papua New Guinea	KU963331	-	-	KY002568	-	KY002630
***Myrmecodia horrida* C.R.Huxley & Jebb**	G. Chomicki 100 (M)	Cultivated, origin Papua New Guinea	KU963329	KU963338	KU963359	KU963371	KU963385	KY002631

***Myrmecodia gracilispina* C.R.Huxley & Jebb**	M.P.H. Jebb 35 (FHO)	Papua New Guinea	-	KU963333	-	-	-	KY002632
***Myrmecodia pteroaspida* C.R.Huxley & Jebb**	M.P.H. Jebb 804 (FHO)	Papua New Guinea	KU963325	KU963346	-	-	-	-
***Myrmephytum selebicum* (Becc.) Becc.**	G. Chomicki 120 (M)	Cultivated, origin Papua	KU963320	KU963341	KU963360	KU963372	KU963386	KY002633
***Myrmephytum beccarii* Elmer**	G. Chomicki 118 (M)	Cultivated, origin Philippines	KU586353	KU586354	KU963361	KU963373	KU586401	-
***Myrmephytum naumanii* (Warb.) Huxley & Jebb**	G. Chomicki 119 (M)	Cultivated, origin West Papua	KX944415	KX944444	KX944460	-	KY002581	KY002634
***Myrmephytum arfakianum* (Becc.) Huxley & Jebb**	M.H.P. Jebb 889 (FHO)	West Papua, Arfak Mountains	KX944416	KX944445	KX944461	KY002569	KY002582	KY002635
***Psychotria comptonii* S.Moore**	L. Barrabé & Rigault 1014 (NOU)	New Caledonia	KF675927	KF675823	-	-	KF676015	-
***Psychotria dallachiana* Benth.**	L. Barrabé & Rigault 1048 (NOU)	Australia	KF675928	KF675824	-	-	KF676016	-
***Psychotria declieuxioides* S.Moore**	L. Barrabé & Nigote 937 (NOU)	New Caledonia	KF675932	KF675828	-	-	KF676020	-
***Psychotria faguetii* (Baill.) Schltr.**	L. Barrabé et al. 820 (NOU)	New Caledonia	KF675934	KF675831	-	-	KF676023	-
***Psychotria fitzalanii* Benth.**	L. Barrabé & Rigault 1057 (NOU)	Australia	KF675935	KF675832	-	-	KF676024	-
***Psychotria goniocarpa* (Baill.) Guillaumin**	L. Barrabé 586 (NOU)	New Caledonia	KF675940	KF675838	-	-	KF676029	-
***Psychotria hawaiiensis* (A.Gray) Fosberg**	Y. Pillon 1425 (NOU)	Hawaii	KF675941	KF675840	-	-	KF676030	-
***Psychotria hivaoana* Fosberg**	J-Y. Meyer 3071 (PAP)	French Polynesia	KF675942	KF675841	-	-	KF676031	-
***Psychotria insularum* A.Gray**	Y. Pillon 909 (NOU)	Wallis & Futuna	KF675943	KF675842	-	-	KF676032	-
***Psychotria iteophylla* Stapf**	B. Axelius 303 (S)	Borneo	-	-	-	-	-	-
***Psychotria loniceroides* Sieber ex DC.**	L. Barrabé & Rigault 1042 (NOU)	Australia	KF675945	KF675846	-	-	KF676033	-
***Psychotria lorentzii* Valeton**	A. Puradyatmika 10460 (K)	Papua New Guinea	KF675946	KF675847	-	-	KF676034	-
***Psychotria micralabastra* (Lauterb. & K.Schum.) Valeton**	W. Takeuchi 16163 (K)	Papua New Guinea	KF675949	KF675851	-	-	KF676036	-

***Psychotria micrococca* (Lauterb. & K.Schum.) Valeton**	P. Drozd & K. Molem s.n. (PSF)	Papua New Guinea	KF675951	KF675853	-	-	KF676038	-
***Psychotria microglossa* (Baill.) Baill. ex Guillaumin**	L. Barrabé 585 (NOU)	New Guinea	KF675950	KF675852	-	-	KF676037	-
***Psychotria monanthos* (Baill.) Schltr.**	Y. Pillon 1370 (NOU)	New Caledonia	KF675953	KF675855	-	-	KF676040	-
***Psychotria poissoniana* (Baill.) Guillaumin**	J. Munzinger 5156 (NOU)	New Caledonia	KF675958	KF675861	-	-	KF676045	-
***Psychotria pritchardii* Seem.**	L. Barrabé et al 1124 (NOU)	Fiji	KF675992	KF675903	-	-	KF676078	-
***Psychotria raivavaensis* Fosberg**	J-Y. Meyer 3088 (PAP)	French Polynesia	KF675960	-	-	-	KF676047	-
***Psychotria submontana* Domin**	L. Barrabé et al. 1044 (NOU)	Australia	KF675988	KF675899	-	-	-	-
***Psychotria temehaniensis* J.W.Moore**	A. Mouly 403 (P)	French Polynesia	KF675989	KF675900	-	-	KF676075	-
***Psychotria trisulcata* (Baill.) Guillaumin**	L. Barrabé et al. 902 (NOU)	New Caledonia	KF675990	KF675901	-	-	KF676076	-
***Squamellaria grandiflora* (Becc.) Chomicki**	S. Vodonaivolu DA2128 (SUVA)	Fiji, Kadavu Island	-	KU963388	-	-	-	-
***Squamellaria grayi* Chomicki & Wistuba**	G. Chomicki, J. Aroles, A. Naikatini 53 (SUVA) HOLOTYPE	Taveuni, Bouma falls, Lavena	KU586339	KU586358	KU586376	KU586376	KU586388	-
***Squamellaria grayi* Chomicki & Wistuba**	G. Chomicki, J. Aroles, A. Naikatini 47 (M)	Vanua Levu, Waisali forest park	-	-	KU586372	KU586372	-	-
***Squamellaria guppyana* (Becc.) Chomicki**	G. Chomicki 123 (M)	Cultivated, origin Solomons	KU586345	-	-	-	KU586396	-
***Squamellaria huxleyana* Chomicki**	G. Chomicki, J. Aroles, A. Naikatini 48 (SUVA)	Fiji, Vanua Levu, road between Savusavu to	KU586336	KU586355	KU586373	KU586373	KU586385	-
***Squamellaria imberbis* (A. Gray) Becc.**	G. Chomicki, J. Aroles, A. Naikatini 50 (M)	Fiji, Vanua Levu, track to vodaphone tower	KU586337	KU586356	KU586374	KU586374	KU586386	-
***Squamellaria jebbiana* Chomicki,**	G. Chomicki, J. Aroles, A. Naikatini 74 (M)	Fiji, Taveuni, Mt Manuca area.	KU586342	KU586361	KU586379	KU586379	KU586391	-
***Squamellaria kajewskii* (Merr. & L.M.Perry) Chomicki**	G. Chomicki 122 (M)	Cultivated, origin Solomons	KU586335	-	-	-	KU586384	-
***Squamellaria major* A.C. Sm.**	G. Chomicki, J. Aroles, A. Naikatini 61 (M)	Fiji, Taveuni, road to DesVoeux peak.	KU586338	KU586357	KU586375	KU586375	KU586387	-
***Squamellaria tenuiflora* (Becc.) Chomicki**	G. Chomicki, J. Aroles, A. Naikatini 75 (M)	Fiji, Viti Levu, Colo-i-Suva forest park.	-	-	KU586381	KU586381	KU586393	-
***Squamellaria tenuiflora* (Becc.) Chomicki**	G. Chomicki, J. Aroles, A. Naikatini 78 (M)	Fiji, Viti Levu, Colo-i-Suva forest park.	KU586343	KU586362	KU586382	KU586382	KU586394	-

***Squamellaria thekii* Jebb**	G. Chomicki, J. Aroles, A. Naikatini 57 (M)	Fiji, Taveuni, road to DesVoeux peak.	KU586340	KU586359	KU586377	KU586377	KU586389	-
***Squamellaria vanuatuensis* (Jebb & Huxley) Chomicki**	G. McPherson 19437 (P)	Vanuatu	JX155078	-	-	-	-	-
***Squamellaria wilkinsonii* (Horne ex Baker) Chomicki**	G. Chomicki, J. Aroles, A. Naikatini 43 (M)	Fiji, Vanua Levu, Waisali forest park.	-	-	KU586380	KU586380	KU586392	-
***Squamellaria wilkinsonii* (Horne ex Baker) Chomicki**	G. Chomicki, J. Aroles, A. Naikatini 49 (M)	Fiji, Vanua Levu, Waisali forest park.	-	KU586364	-		-	-
***Squamellaria wilkinsonii* (Horne ex Baker) Chomicki**	G. Chomicki, J. Aroles, A. Naikatini 45 (M)	Fiji, Vanua Levu, Waisali forest park.	KU586344	KU586363	KU586383		KU586395	-
***Squamellaria wilsonii* (Horne ex Baker) Becc.**	G. Chomicki, J. Aroles, A. Naikatini 67 (M)	Fiji, Taveuni, road to DesVoeux peak.	KU586341	KU586360	KU586378		KU586390	-