**Supplementary Material**:

**Table S1**. Taxonomic and Genetic Sampling. Exemplars used from Deans et al. ([2006](#_ENREF_3)) are listed with the reference from that paper (Deans ID) beside the internal voucher number (Extract ID). Included genes for each taxon are marked with an x. Gene codes: 28S for 28S rDNA; AM2 for alpha-mannosidase II; CAD1 and CAD2 for carbamoyl-phosphate sythetase-asparate transcarbamoylase-dihydroorotase (CAD) (for amplicon regions for each segment, see Figure 1); RPS23 for Ribosomal Protein S23; COI for cytochrome oxidase I; and 16S for 16S rDNA.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Taxon** | **Extract ID** | | **Deans ID** | | **28S** | | **AM2** | | **CAD 1** | | **CAD 2** | | **RPS 23** | | **CO1** | | **16S** | | **No. Genes** | |
| **Outgroup** | | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |
|  | ***Gasteruption* Latreille** | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |
|  |  | *Gasteruption* sp.300 | 300 | |  | | x | |  | | x | | x | | x | | x | | x | | 6 | |
|  |  | *Gasteruption* sp.244 | 244 | |  | | x | |  | | x | |  | | x | | x | |  | | 4 | |
|  | ***Pristaulacus* Kieffer** | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |
|  |  | *Pristaulacus strangaliae* | 176 | |  | |  | | x | |  | |  | | x | | x | |  | | 3 | |
|  |  | *Pristaulacus fasciatus* | 299 | |  | |  | |  | |  | |  | |  | | x | |  | | 1 | |
|  |  | *Pristaulacus* sp.021 | 306 | | 021 | | x | |  | |  | |  | | x | | x | | x | | 4 | |
| **Evaniidae** | | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |
|  | ***Acanthinevania* Bradley** | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |
|  |  | *Acanthinevania* sp.240 | 240 | |  | | x | | x | | x | | x | | x | | x | |  | | 6 | |
|  |  | *Acanthinevania* sp.242 | 242 | |  | | x | | x | | x | | x | | x | |  | |  | | 5 | |
|  |  | *Acanthinevania princeps* (Westwood) | 246 | |  | | x | |  | | x | | x | | x | | x | |  | | 5 | |
|  |  | *Acanthinevania* sp.001 | 271 | | 001 | | x | | x | | x | | x | | x | | x | | x | | 7 | |
|  |  | *Acanthinevania* sp.033 | 289 | | 033 | | x | | x | | x | | x | | x | | x | | x | | 7 | |
|  |  | *Acanthinevania* sp.049 | 292 | | 049 | | x | | x | | x | | x | | x | | x | | x | | 7 | |
|  | ***Alobevania* Deans and Kawada** | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |
|  |  | *Alobevania gattiae* | 200 | | 039 | | x | | x | | x | | x | |  | | x | | x | | 6 | |
|  | ***Brachygaster* Leach** | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |
|  |  | *Brachygaster minutus* (Olivier) | 273 | | 030 | | x | |  | | x | | x | | x | | x | | x | | 6 | |
|  |  | *Brachygaster minutus* (Olivier) | 512 | |  | |  | |  | | x | | x | |  | | x | |  | | 3 | |
|  |  | *Brachygaster* sp.037 | 286 | |  | | x | |  | | x | |  | | x | |  | | x | | 4 | |
|  |  | *Brachygaster* sp.050 | 290 | |  | | x | |  | |  | |  | | x | | x | | x | | 4 | |
|  | ***Decevania* Huben, 2003** | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |
|  |  | *Decevania* sp.502 | 502 | |  | |  | |  | | x | | x | |  | |  | |  | | 2 | |
|  |  | *Decevania* sp.513 | 513 | |  | |  | | x | |  | |  | |  | | x | |  | | 2 | |
|  |  | *Decevania* sp.004 | 274 | | 004 | | x | | x | |  | | x | | x | | x | | x | | 6 | |
|  |  | *Decevania* sp.005 | 301 | | 005 | | x | |  | |  | |  | | x | |  | | x | | 3 | |
|  |  | *Decevania* sp.063 | 296 | | 063 | | x | | x | | x | | x | | x | | x | | x | | 7 | |
|  | ***Evania* Fabricius** | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |
|  |  | *Evania* sp.175 | 175 | |  | | x | |  | |  | |  | | x | | x | |  | | 3 | |
|  |  | *Evania albofacialis* Cameron | 275 | | 020 | | x | |  | | x | | x | | x | | x | | x | | 6 | |
|  |  | *Evania appendigaster* (Linnaeus) | 207 | | 046 | | x | |  | | x | | x | | x | | x | | x | | 6 | |
|  |  | *Evania* sp.496 | 496 | |  | | x | |  | |  | | x | | x | | x | |  | | 4 | |
|  |  | *Evania* sp.002 | 189 | | 002 | | x | |  | | x | | x | |  | | x | | x | | 5 | |
|  | ***Evaniella* Bradley** | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |
|  |  | *Evaniella* sp.230 | 230 | |  | | x | | x | | x | | x | | x | | x | |  | | 6 | |
|  |  | *Evaniella* sp.234 | 234 | |  | | x | | x | |  | | x | | x | | x | |  | | 5 | |
|  |  | *Evaniella* sp.237 | 237 | |  | |  | | x | | x | |  | |  | | x | |  | | 3 | |
|  |  | *Evaniella* sp.485 | 485 | |  | |  | | x | | x | | x | | x | |  | |  | | 4 | |
|  |  | *Evaniella* sp.486 | 486 | |  | |  | | x | | x | |  | | x | |  | |  | | 3 | |
|  |  | *Evaniella* sp.493 | 493 | |  | |  | |  | | x | |  | | x | | x | |  | | 3 | |
|  |  | *Evaniella semaeoda* Bradley | 220 | | 058 | | x | |  | |  | |  | | x | | x | | x | | 4 | |
|  |  | *Evaniella* sp.019 | 192 | | 019 | | x | | x | | x | |  | | x | | x | |  | | 5 | |
|  |  | *Evaniella* sp.025 | 307 | | 025 | | x | |  | | x | |  | | x | | x | | x | | 5 | |
|  |  | *Evaniella* sp.045 | 206 | | 045 | | x | | x | | x | |  | | x | |  | | x | | 5 | |
|  | ***Evaniscus* Sze´pligeti** | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |
|  |  | *Evaniscus marginatus* (Cameron) | 213 | | 052 | | x | |  | |  | |  | | x | |  | | x | | 3 | |
|  |  | *Evaniscus rufithorax* Enderlein | 287 | |  | | x | |  | |  | | x | | x | | x | | x | | 5 | |
|  | ***Hyptia* Illiger** | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |
|  |  | *Hyptia* sp.232 | 232 | |  | |  | | x | | x | | x | | x | | x | |  | | 5 | |
|  |  | *Hyptia* sp.487 | 487 | |  | |  | | x | |  | |  | |  | | x | |  | | 2 | |
|  |  | *Hyptia* sp.501 | 501 | |  | |  | | x | | x | |  | |  | | x | |  | | 3 | |
|  |  | *Hyptia* sp.511 | 511 | |  | |  | | x | | x | |  | |  | | x | |  | | 3 | |
|  |  | *Hyptia amazonica* (Schletterer) | 235 | |  | |  | |  | | x | | x | |  | | x | |  | | 3 | |
|  |  | *Hyptia floridana* Ashmead | 291 | | 009 | | x | | x | | x | | x | |  | | x | | x | | 6 | |
|  |  | *Hyptia* sp.007 | 302 | | 007 | | x | |  | | x | |  | | x | | x | | x | | 5 | |
|  |  | *Hyptia* sp.008 | 303 | | 008 | | x | |  | |  | |  | | x | | x | | x | | 4 | |
|  | ***Micrevania* Benoit** | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |
|  |  | *Micrevania difficilis* Benoit | 283 | | 006 | | x | |  | | x | | x | |  | | x | | x | | 5 | |
|  |  | *Micrevania* sp.061 | 288 | | 061 | | x | | x | |  | | x | |  | | x | | x | | 5 | |
|  |  | *Micrevania* sp.066 | 298 | | 066 | | x | |  | |  | | x | |  | | x | | x | | 4 | |
|  |  | *Micrevania* sp.026 | 308 | | 026 | | x | |  | |  | | x | |  | | x | | x | | 4 | |
|  | ***Papatuka* Deans** | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |
|  |  | *Papatuka capensis* (Schletterer) | 227 | | 065 | | x | |  | | x | | x | | x | | x | | x | | 6 | |
|  | ***Parevania* Kieffer** | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |
|  |  | *Parevania* sp.172 | 172 | |  | | x | | x | | x | |  | | x | |  | |  | | 4 | |
|  |  | *Parevania* sp.174 | 174 | |  | | x | | x | |  | |  | | x | | x | |  | | 4 | |
|  |  | *Parevania* sp.041 | 295 | | 041 | | x | | x | | x | | x | | x | | x | | x | | 7 | |
|  |  | *Parevania* sp.057 | 219 | | 057 | | x | | x | | x | | x | | x | |  | | x | | 6 | |
|  |  | *Parevania* sp.064 | 276 | | 064 | | x | |  | | x | | x | | x | | x | | x | | 6 | |
|  | ***Prosevania* Kieffer** | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |
|  |  | *Prosevania fuscipes* (Illiger) | 224 | | 062 | | x | |  | |  | | x | |  | | x | | x | | 4 | |
|  |  | *Prosevania* sp.497 | 497 | |  | | x | | x | | x | | x | |  | | x | |  | | 5 | |
|  |  | *Prosevania* sp.498 | | 498 | |  | |  | |  | | x | |  | |  | | x | |  | | 2 | |
|  |  | *Prosevania* sp.508 | | 508 | |  | |  | |  | |  | |  | |  | | x | |  | | 1 | |
|  |  | *Prosevania* sp.027 | | 309 | | 027 | | x | | x | |  | | x | |  | | x | | x | | 5 | |
|  |  | *Prosevania* sp.034 | | 277 | | 034 | | x | |  | |  | |  | |  | | x | | x | | 3 | |
|  |  | *Prosevania* sp.036 | | 284 | | 036 | | x | |  | | x | | x | |  | | x | | x | | 5 | |
|  |  | *Prosevania* sp.044 | | 205 | | 044 | | x | | x | | x | | x | | x | | x | | x | | 7 | |
|  | ***Rothevania* Huben** | | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |
|  |  | *Rothevania valdivianus* (Philippi) | | 239 | | 048 | | x | | x | | x | | x | |  | | x | | x | | 6 | |
|  | ***Semaeomyia* Bradley** | | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |
|  |  | *Semaeomyia* sp.489 | | 489 | |  | |  | |  | | x | | x | | x | | x | |  | | 4 | |
|  |  | *Semaeomyia* sp.509 | | 509 | |  | | x | |  | |  | | x | | x | | x | |  | | 4 | |
|  |  | *Semaeomyia* sp.510 | | 510 | |  | | x | |  | |  | | x | | x | | x | |  | | 4 | |
|  |  | *Semaeomyia leucomelas* (Kieffer) | | 305 | | 016 | | x | |  | |  | | x | | x | | x | | x | | 5 | |
|  |  | *Semaeomyia* sp.012 | | 197 | | 012 | | x | |  | | x | | x | |  | | x | | x | | 5 | |
|  |  | *Semaeomyia* sp.051 | | 279 | | 051 | | x | |  | |  | | x | | x | | x | | x | | 5 | |
|  |  | *Semaeomyia* sp.059 | | 293 | | 059 | | x | | x | |  | | x | | x | | x | | x | | 6 | |
|  | ***Szepligetella* Bradley** | | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |
|  |  | *Szepligetella* sp.170 | | 170 | |  | |  | |  | | x | |  | | x | | x | |  | | 3 | |
|  |  | *Szepligetella* sp.231 | | 231 | |  | | x | |  | | x | | x | | x | | x | |  | | 5 | |
|  |  | *Szepligetella* sp.233 | | 233 | |  | | x | | x | | x | | x | | x | | x | |  | | 6 | |
|  |  | *Szepligetella* sp.236 | | 236 | |  | | x | | x | | x | | x | |  | | x | |  | | 5 | |
|  |  | *Szepligetella* sp.238 | | 238 | |  | | x | | x | | x | | x | | x | | x | |  | | 6 | |
|  |  | *Szepligetella* sp.241 | | 241 | |  | |  | |  | | x | | x | | x | | x | |  | | 4 | |
|  |  | *Szepligetella* sp.243 | | 243 | |  | | x | | x | | x | |  | | x | | x | |  | | 5 | |
|  |  | *Szepligetella* sp.247 | | 247 | |  | |  | |  | | x | |  | | x | | x | |  | | 3 | |
|  |  | *Szepligetella* sp.248 | | 248 | |  | | x | |  | | x | |  | | x | | x | |  | | 4 | |
|  |  | *Szepligetella sericea* | | 297 | |  | |  | |  | |  | | x | | x | | x | |  | | 3 | |
|  |  | *Szepligetella* sp.047 | | 208 | | 047 | | x | | x | | x | |  | | x | | x | | x | | 6 | |
|  |  | *Szepligetella* sp.055 | | 280 | | 055 | |  | | x | | x | |  | | x | | x | | x | | 5 | |
|  |  | *Szepligetella* sp.056 | | 294 | | 056 | | x | | x | | x | | x | | x | | x | | x | | 7 | |
|  |  | *Szepligetella* sp.285 | | 285 | |  | |  | | x | | x | | x | | x | | x | |  | | 5 | |
|  | ***Trissevania* Kieffer** | | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |
|  |  | *Trissevania anemotis* Kieffer | | 282 | | 038 | | x | | x | |  | | x | | x | | x | | x | | 6 | |
|  |  | *Trissevania* sp.507 | | 507 | |  | |  | |  | |  | | x | |  | |  | |  | | 1 | |
|  | ***Zeuxevania* Kieffer** | | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |
|  |  | *Zeuxevania* sp.499 | | 499 | |  | |  | |  | | x | | x | |  | |  | |  | | 2 | |
|  |  | *Zeuxevania* sp.500 | | 500 | |  | |  | |  | | x | | x | |  | | x | |  | | 3 | |
|  |  | *Zeuxevania* sp.503 | | 503 | |  | |  | |  | |  | | x | |  | |  | |  | | 1 | |
|  |  | *Zeuxevania* sp.505 | | 505 | |  | | x | |  | | x | | x | | x | | x | |  | | 5 | |
|  |  | *Zeuxevania* sp.015 | | 191 | | 015 | | x | |  | | x | |  | |  | | x | | x | | 4 | |
|  |  | *Zeuxevania splendidula* (Costa) | | 312 | | 031 | | x | |  | | x | | x | | x | | x | | x | | 6 | |
|  |  | Percent Amplified | |  | |  | | 71 | | 44 | | 66 | | 64 | | 67 | | 86 | | 50 | |  | |
|  |  | Percent Parsimony Informative Sites | |  | | 40 | | 44 | | 49 | | 53 | | 35 | | 60 | | 40 | |  | |  | |