**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 |  |  |