**Supplementary material S3**

Tables presenting a summary of the morphometric variables (i.e., mean size, standard deviation, minimum and maximum) for all taxonomic categories used in the present study.

**Table 1.** Statistical details of the Discriminant Function Analysis. DgF = degrees of freedom. \*Analysis with the exclusion of the genera *Coccodentalium* and *Fissidentalium*.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Taxa | Wilks' Lambda | F-remove | DgF | *p* |
| Order Dentaliida | *Paradentalium* spp. | 0.11 | 31.86 | 10.162 | 0.0000 |
| *Antalis* spp. | 0.20 | 10.85 | 14.126 | 0.0000 |
| *Graptacme* spp. | 0.01 | 26.12 | 18.144 | 0.0000 |
| *Fustiaria* spp. | 0.36 | 12.53 | 3.22 | 0.0000 |
| *Episiphon* spp. | 0.06 | 78.80 | 9.46 | 0.0000 |
| Genera | 0.42 | 24.12 | 76.27 | 0.0000 |
| Genera\* | 0.74 | 12.63 | 6.09 | 0.0000 |
| Families | 0.36 | 10.71 | 47.03 | 0.0000 |
| Order Gadilida | *Polyschides* spp. | 0.00 | 46.56 | 27.225 | 0.0000 |
| *Cadulus* spp. | 0.07 | 100.20 | 6.46 | 0.0000 |
| *Gadila* spp. | 0.00 | 68.87 | 27.362 | 0.0000 |
| Genera | 0.02 | 28.10 | 66.86 | 0.0000 |
| Families | 0.38 | 8.30 | 59.61 | 0.0000 |

**Table 2.** Standardized coefficients for canonical variables from discriminant analysis of congeneric species examination of the Dentaliida. Cum. prop.: Cumulative proportion. Light shaded and dark shaded cells indicate the most representative variables with positive and negative values, respectively, in each axis.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Taxa** | **Variables** | **Discriminant Functions (DF)** | | | |
| **DF1** | **DF2** | **DF3** | |
| *Paradentalium* spp. | L | 0.91 | 1.03 | - | |
| Arc | -0.46 | -0.15 | - | |
| Ha | 0.54 | -1.05 | - | |
| Ha / Wa | -0.23 | 0.16 | - | |
| Wp | -0.54 | -0.21 | - | |
| Eigenvalues | 2.63 | 1.42 | - | |
| Cum. prop. | 0.65 | 0.35 | - | |
| *Antalis* spp. | L | 1.07 | -1.68 | - |
| Max | -0.66 | 2.86 | - |
| L / Max | 0.38 | 1.06 | - |
| Arc | -0.30 | 0.39 | - |
| Larc | 0.26 | 0.44 | - |
| Ha / Wa | -0.03 | -0.35 | - |
| Hp | -0.17 | -0.57 | - |
| Eigenvalues | 2.02 | 0.61 | - |
| Cum. prop. | 0.77 | 0.23 | - |
| *Graptacme* spp. | L | 1.87 | 0.33 | 0.38 |
| L / Max | 0.08 | -0.67 | -1.14 |
| Arc | -1.48 | 0.31 | -1.11 |
| Ha / Wa | 0.12 | -0.25 | -0.09 |
| Wp | -0.35 | -0.81 | -0.58 |
| Hp / Wp | -0.09 | -0.08 | 0.15 |
| Eigenvalues | 16.36 | 1.20 | 0.56 |
| Cum. prop. | 0.90 | 0.07 | 0.03 |
| *Fustiaria* spp. | L / Max | -0.62 | - | - |
| Arc | 0.51 | - | - |
| Larc | -0.89 | - | - |
| Eigenvalues | 16.36 | - | - |
| Cum. prop. | 0.90 | - | - |
| *Episiphon* spp. | L | 0.35 | - | - |
| L / Max | -1.42 | - | - |
| Arc | -0.43 | - | - |
| Larc | 1.19 | - | - |
| Ha | -0.99 | - | - |
| Ha / Wa | 0.34 | - | - |
| Hp | 5.49 | - | - |
| Wp | -4.91 | - | - |
| Hp / Wp | -0.82 | - | - |
| Eigenvalues | 0.38 | - | - |
| Cum. prop. | -0.30 | - | - |

**Table 3.** Percentage of correct classifications (% correct) and frequency of classification (n: number of specimens classified as a specific taxon) in each group of the congeneric species comparisons resulted from the discriminant analysis for the taxa of Dentaliida.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Taxa** | **% correct** | **Classification (n)** | | | |
| **I** | **II** | **III** | **IV** |
| *Paradentalium* | *P. infractum* (I) | 90.0 | 27 | 3 | 0 | - |
| *P. disparile* (II) | 92.5 | 3 | 37 | 0 | - |
| *P. gouldii* (III) | 100 | 0 | 0 | 18 | - |
| Total | 93.2 |  |  |  |  |
| *Antalis* | *A. circumcincta* (I) | 61.5 % | 16 | 9 | 1 | - |
| *A. cerata* (II) | 95.8 % | 0 | 23 | 1 | - |
| *A.* *taphria* (III) | 95.5 % | 0 | 1 | 21 | - |
| Total | 83.3 % |  |  |  |  |
| *Graptacme* | *G. calamus* (I) | 100 % | 26 | 0 | 0 | 0 |
| *G. semistriolata* (II) | 100 % | 0 | 17 | 0 | 0 |
| *G. eborea* (III) | 55.6 % | 2 | 2 | 5 | 0 |
| *G. perlonga* (IV) | 100 % | 0 | 0 | 0 | 8 |
| Total | 93.3 % |  |  |  |  |
| *Fustiaria* | *F. liodon* (I) | 94.4 % | 17 | 1 | - | - |
| *F. stenoschiza* (II) | 87.5 % | 1 | 7 | - | - |
| Total | 92.3 % |  |  |  |  |
| *Episiphon* | *E. didymium* (I) | 100 % | 30 | 0 | - | - |
| *E. sowerbyi* (II) | 100 % | 0 | 26 | - | - |
| Total | 100 % |  |  |  |  |

**Table 4.** Percentage of correct classifications (% correct) and frequency of classification (n: number of specimens classified as a specific taxon) in each group of the congeneric species comparisons resulted from the discriminant analysis for the taxa of Gadilida.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Taxa | % correct | Classification (n) | | | |
| I | II | III | IV |
| *Polyschides* | *P. xavante* (I) | 100 | 29 | 0 | 0 | 0 |
| *P. portoricensis* (II) | 100 | 0 | 24 | 0 | 0 |
| *P. tetraschistus* (III) | 100 | 0 | 0 | 30 | 0 |
| *P. noronhensis* (IV) | 100 | 0 | 0 | 0 | 6 |
| Total | 100 % |  |  |  |  |
| *Cadulus* | *C. nerta* (I) | 100 % | 29 | 0 | - | - |
| *C. parvus* (II) | 100 % | 0 | 24 | - | - |
| Total | 100 % |  |  |  |  |
| *Gadila* | *G. braziliensis* (I) | 100 % | 50 | 0 | 0 | 0 |
| *G. dominguensis* (II) | 98.0 % | 1 | 49 | 0 | 0 |
| *G. simpsoni* (III) | 100 % | 0 | 0 | 18 | 0 |
| *G. pandionis* (IV) | 77.8 % | 4 | 0 | 0 | 14 |
| Total | 96.3 % |  |  |  |  |

**Table 5.** Standardized coefficients for canonical variables from discriminant analysis of congeneric species examination of the Dentaliida. Cum. prop.: Cumulative proportion. Light shaded and dark shaded cells indicate the most representative variables with positive and negative values, respectively, in each axis.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Taxa** | **Variables** | **Discriminant Functions (DF)** | | | |
| **DF1** | **DF2** | **DF3** | |
| *Polyschides* spp. | L / Max | 0.82 | -0.25 | 0.62 | |
| Dmax | 0.21 | 0.76 | 0.58 | |
| Arc | -0.11 | -0.11 | 0.11 | |
| Larc | -0.36 | -0.20 | -0.90 | |
| Ha | 0.08 | 1.04 | 0.17 | |
| Ha / Wa | -0.36 | -0.03 | -0.03 | |
| Hp | -0.72 | -1.20 | 0.72 | |
| Hp / Wp | 0.56 | 0.37 | -0.20 |
| Eigenvalues | 11.49 | 6.07 | 0.80 |
| Cum. prop. | 0.63 | 0.33 | 0.04 |
| *Cadulus* spp. | L / Max | -0.03 | - | - |
| Arc | 0.35 | - | - |
| Larc | 0.15 | - | - |
| Ha | 0.80 | - | - |
| Ha / Wa | -0.77 | - | - |
| Hp / Wp | 0.10 | - | - |
| Eigenvalues | 13.07 | - | - |
| Cum. prop. | 1.00 | - | - |
| *Gadila* spp. | L / Max | -0.66 | 0.07 | 0.06 |
| Dmax | 0.88 | 0.52 | 0.10 |
| Ha | -1.07 | 0.52 | -0.93 |
| Ha / Wa | 0.57 | 0.59 | -0.50 |
| Hp | 0.51 | 0.10 | 0.53 |
| Hp / Wp | -0.41 | 0.02 | -0.03 |
| Eigenvalues | 12.04 | 6.07 | 1.68 |
| Cum. prop. | 0.69 | 0.27 | 0.04 |

**Table 6.** Standardized coefficients for canonical variables from discriminant analysis of congeneric species examination of the Dentaliida. Cum. prop.: Cumulative proportion. Light shaded and dark shaded cells indicate the most representative variables with positive and negative values, respectively, in each axis.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Taxa** | **Variables** | | **Discriminant Functions (DF)** | | | | | | | |
| **DF1** | | **DF2** | | **DF3** | | **DF4** | |
| Genera of Dentaliida | L / Max | -0.28 | | -0.87 | | -0.38 | | -0.17 | |
| Ha / Wa | -0.05 | | 0.41 | | -0.83 | | -0.36 | |
| Hp | 0.94 | | 0.30 | | -0.10 | | -0.16 | |
| Hp / Wp | -0.20 | | 0.07 | | 0.43 | | -0.89 | |
| Eigenvalues | 7.28 | | 1.72 | | 0.03 | | 0.02 | |
| Cum. prop. | 0.80 | | 0.19 | | 0.01 | | 0.00 | |
| Genera of Dentaliida\* | Max | 1.14 | | -0.09 | | 0.64 | | 1.17 | |
| L / Max | -1.08 | | -0.47 | | 0.14 | | 0.85 | |
| Arc | -0.17 | | 0.09 | | 0.61 | | -0.20 | |
| Larc | 0.73 | | 0.77 | | -0.98 | | 0.08 | |
| Wa | -2.12 | | 0.14 | | 0.26 | | -0.44 | |
| Ha / Wa | -0.04 | | 0.01 | | 0.01 | | 0.25 | |
| Hp | 0.05 | | 0.24 | | -0.28 | | -0.31 | |
| Hp / Wp | 0.05 | | 0.07 | | 0.14 | | 0.31 | |
| Eigenvalues | 7.28 | | 1.72 | | 0.03 | | 0.02 | |
| Cum. prop. | 0.80 | | 0.19 | | 0.01 | | 0.00 | |
| Genera of Gadilida | L / Max | 0.70 | | 0.52 | | 0.29 | | -0.55 | |
| Dmax | 0.79 | | 0.35 | | -0.73 | | 0.29 | |
| Arc | -0.31 | | -0.81 | | 0.18 | | -0.33 | |
| Wa | 1.00 | | -0.10 | | 0.67 | | 1.04 | |
| Ha / Wa | 0.35 | | 0.22 | | 0.61 | | -0.17 | |
| Wp | -1.16 | | 0.73 | | 0.88 | | -0.81 | |
| Hp / Wp | -0.01 | | -0.02 | | 0.23 | | -0.59 | |
| Eigenvalues | 3.61 | | 1.64 | | 1.45 | | 0.03 | |
| Cum. prop. | 0.52 | | 0.24 | | 0.20 | | 0.04 | |

**Table 7.** Percentage of cases correctly classified (% correct) and frequency of classification (n: number of specimens classified as a specific taxa) in generic comparisons resulted from the discriminant analysis for both orders. \*Analysis excluding the genera *Coccodentalium* and *Fissidentalium*.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Taxa** | **% correct** | **Classification (n)** | | | | | | |
|  | **I** | **II** | **III** | **IV** | **V** | **VI** | **VII** |
| Genera of Dentaliida | *Paradentalium* (I) | 59.1 % | 52 | 25 | 7 | 0 | 0 | 2 | 2 |
| *Antalis* (II) | 47.2 % | 38 | 34 | 0 | 0 | 0 | 0 | 0 |
| *Graptacme* (III) | 13.3 % | 31 | 19 | 8 | 0 | 2 | 0 | 0 |
| *Fissidentalium* (IV) | 67.7 % | 0 | 0 | 0 | 21 | 10 | 0 | 0 |
| *Coccodentalium* (V) | 62.5 % | 0 | 0 | 0 | 8 | 20 | 1 | 3 |
| *Fustiaria* (VI) | 3.8 % | 23 | 0 | 2 | 0 | 0 | 1 | 0 |
| *Episiphon* (VII) | 96.4 % | 2 | 0 | 0 | 0 | 0 | 0 | 54 |
| Total | 52.1 % |  |  |  |  |  |  |  |
| Genera of Dentaliida,\* | *Paradentalium* (I) | 68.2 % | 60 | 16 | 11 | 1 | 0 | - | - |
| *Antalis* (II) | 86.1 % | 7 | 62 | 3 | 0 | 0 | - | - |
| *Graptacme* (III) | 31.7 % | 17 | 18 | 19 | 6 | 0 | - | - |
| *Fustiaria* (IV) | 23.1 % | 13 | 1 | 6 | 6 | 0 | - | - |
| *Episiphon* (V) | 100 % | 0 | 0 | 0 | 0 | 56 | - | - |
| Total | 67.2 % |  |  |  |  |  |  |  |
| Genera of Gadilida | *Entalina* (I) | 75.0 % | 21 | 0 | 1 | 3 | 3 | - | - |
| *Striocadulus* (II) | 100 % | 0 | 5 | 0 | 0 | 0 | - | - |
| *Polyschides* (III) | 83.1 % | 0 | 0 | 74 | 5 | 10 | - | - |
| *Cadulus* (IV) | 100 % | 0 | 0 | 0 | 53 | 0 | - | - |
| *Gadila* (V) | 99.3 % | 0 | 0 | 1 | 0 | 135 | - | - |
| Total | 92.6 % |  |  |  |  |  |  |  |

**Table 8.** Standardized coefficients for canonical variables from discriminant analysis of congeneric species examination of the Dentaliida. Cum. prop.: Cumulative proportion. Light shaded and dark shaded cells indicate the most representative variables with positive and negative values, respectively, in each axis.

|  |  |  |  |
| --- | --- | --- | --- |
| **Taxa** | **Variables** | **Discriminant Functions (DF)** | |
| **DF1** | **DF2** |
| Families of Dentaliida | L / Max | 1.19 | -0.20 |
| Arc | 0.26 | -0.17 |
| Ha / Wa | -0.40 | -0.60 |
| Hp | 0.81 | -0.76 |
| Hp / Wp | -0.01 | 0.11 |
| Eigenvalues | 1.72 | 0.01 |
| Cum. prop. | 1.00 | 0.00 |
| Families of Gadilida | Max | 0.21 | - |
| L / Max | 0.52 | - |
| Dmax | 0.54 | - |
| Arc | -1.20 | - |
| Larc | 0.04 | - |
| Ha / Wa | 0.07 | - |
| Wp | 0.26 | - |
| Hp / Wp | -0.16 | - |
| Eigenvalues | 1.58 | - |
| Cum. prop. | 1.00 | - |

**Table 9.** Percentage of correct classifications (% correct) and frequency of classification (n: number of specimens classified as a specific taxon) in families comparisons resulted from the discriminant analysis for both orders.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Taxa | % correct | Classification (n) | | |
|  | I | II | III |
| Families of Dentaliida | Dentaliidae (I) | 99.6 % | 282 | 0 | 1 |
| Fustiariidae (II) | 0.0 % | 26 | 0 | 0 |
| Gadilinidae (III) | 96.4 % | 2 | 0 |  |
| Total | 92.1 % |  |  |  |
| Families of Gadilida | Entalinidae | 60.7 % | 17 | 11 | - |
| Gadilidae | 100 % | 0 | 283 | - |
| Total | 96.5 % |  |  |  |