Appendix 3. Genera assigned to families and their stratigraphic ranges. Data from Smith (2009).

| Clade        | Family         | First     | Last        | Included genera                               | First occur. | Last occur. |
|--------------|----------------|-----------|-------------|---|--------------|-------------|
| stem group   | Acrolusiidae   | Neocomien | Neocomien   | Acrolusia Lambert, 1920b, p. 155              | Neocomian    | Neocomian   |
| Atelostomata | Collyritidae   | Bathonian | Valanginian | Collyrites des Moulins, 1835, p. 212          | Bathonian    | Oxfordian   |
|              |                |           |             | Cyclolampas Pomel, 1883, p. 51                | Oxfordian    | Tithonian   |
|              |                |           |             | Cardiopelta Pomel, 1883, p. 50                | Oxfordian    | Valanginian |
|              |                |           |             | Proholaster Gauthier, 1896, p. 17             | Berriasian   | Berriasian  |
|              |                |           |             | Cardiolampas Pomel, 1883, p. 50               | Oxfordian    | Oxfordian   |
|              | Disasteridae   | Callovian | Hauterivian | Disaster L. Agassiz, 1835, p. 183             | Callovian    | Hauterivian |
|              | Pygorhytidae   | Toarcian  | Callovian   | Pygorhytis Pomel, 1883, p. 50                 | Toarcian     | Callovian   |
|              |                |           |             | Spatocyphus Pomel, 1883, p. 51                | Bajocian     | Bajocian    |
|              |                |           |             | Pygomalus Pomel, 1883, p. 51                  | Toarcian     | Callovian   |
|              | Tithoniidae    | Bathonian | Barremian   | Metaporinus L. Agassiz, 1844, p. 730          | Bathonian    | Valanginian |
|              |                |           |             | Tithonia Pomel, 1883, p. 49                   | Bathonian    | Berriasian  |
|              |                |           |             | Corytha Pomel, 1883, p. 51                    | Berriasian   | Albian      |
|              |                |           |             | Tetraromania Solovjev, 1971, p. 64            | Berriasian   | Barremian   |
| Camarodonta  | Echinidae      | U Miocene | Recent      | <i>Echinus</i> Linné, 1758, p. 663            | U Miocene    | Recent      |
|              |                |           |             | Polyechinus Mortensen, 1942, p. 231           | Recent       | Recent      |
|              |                |           |             | Stirechinus Desor, 1856, p. 131               | U Miocene    | Recent      |
|              |                |           |             | Demechinus Mortensen, 1942, p. 231            | Recent       | Recent      |
|              |                |           |             | Gracilechinus Fell & Pawson,                  |              |             |
|              |                |           |             | in Moore, 1966, p. U431                       | U Miocene    | Recent      |
|              |                |           |             | Sterechinus Koehler, 1901, p. 8               | Recent       | Recent      |
|              | Echinometridae | L Miocene | Recent      | Echinometra Gray, 1825, p. 426                | L Miocene    | Recent      |
|              |                |           |             | Caenocentrotus H.L. Clark, 1912, p. 348       | Recent       | Recent      |
|              |                |           |             | Pachechinus A. Agassiz, 1872, p. 55           | Recent       | Recent      |
|              |                |           |             | Heliocidaris L. Agassiz & Desor, 1846, p. 371 | L Miocene    | Recent      |
|              |                |           |             | Heterocentrotus Brandt, 1835, p. 265          | Miocene      | Recent      |
|              |                |           |             | Zenocentrotus A.H. Clark, 1932, p. 5          | Miocene      | Recent      |

|                      |             |        | Colobocentrotus Brandt, 1835, p. 266          | Recent      | Recent    |
|----------------------|-------------|--------|---|-------------|-----------|
|                      |             |        | Podophora [Podophorae]                        |             |           |
|                      |             |        | L. Agassiz, 1840a, p. 19                      | Recent      | Recent    |
|                      |             |        | Selenechinus de Meijere, 1904, p. 246         | Recent      | Recent    |
|                      |             |        | Evechinus Verrill, 1871, p. 583               | Pliocene    | Recent    |
| Parasaleniidae       | L Miocene   | Recent | Parasalenia A. Agassiz, 1863, p. 22           | L Miocene   | Recent    |
| Parechinidae         | Miocene     | Recent | Parechinus Mortensen, 1903b, p. 108           | Pleistocene | Recent    |
|                      |             |        | Psammechinus L. Agassiz &                     |             |           |
|                      |             |        | Desor, 1846, p. 368                           | Miocene     | Recent    |
|                      |             |        | Isechinus Lambert, 1903, p. 476               | Miocene     | Recent    |
|                      |             |        | Paracentrotus Morensen, 1903b, p. 124         | Pleistocene | Recent    |
| Strongylocentrotidae | L Miocene   | Recent | Strongylocentrotus Brandt, 1835, p. 263       | L Miocene   | Recent    |
|                      |             |        | Allocentrotus Mortensen, 1942, p. 232         | Recent      | Recent    |
|                      |             |        | Loxechinus Desor, 1856, p. 136                | Recent      | Recent    |
|                      |             |        | Hemicentrotus Mortensen, 1942, p. 231         | Recent      | Recent    |
|                      |             |        | Pseudocentrotus Mortensen, 1903b, p. 122      | Recent      | Recent    |
| Toxopneustidae       | U Oligocene | Recent | Toxopneustes L. Agassiz, 1841b, p. 7          | Pliocene    | Recent    |
|                      |             |        | Schizechinus Pomel, 1869, p. 42               | L Miocene   | Pliocene  |
|                      |             |        | Nudechinus H.L. Clark, 1912, p. 276           | Recent      | Recent    |
|                      |             |        | Oligophyma Pomel, 1869, p. 43                 | M Miocene   | U Miocene |
|                      |             |        | Lytechinus A. Agassiz, 1863, p. 24            | U Oligocene | Recent    |
|                      |             |        | Scoliechinus Arnold & H.L. Clark, 1927, p. 23 | M Eocene    | M Eocene  |
|                      |             |        | Tripneustes L. Agassiz, 1841b, p. 7           | L Miocene   | Recent    |
|                      |             |        | Goniopneustes Duncan, 1889, p. 113            | Recent      | Recent    |
|                      |             |        | Sphaerechinus Desor, 1856, p. 134             | Pliocene    | Recent    |
|                      |             |        | Pseudoboletia Troschel, 1869, p. 96           | Recent      | Recent    |
|                      |             |        | Gymnechinus Mortensen, 1903b, p. 115          | Recent      | Recent    |
| Temnopleuridae       | L Eocene    | Recent | Temnopleurus L. Agassiz, 1841b, p. 7          | Pliocene    | Recent    |
|                      |             |        | Coptechinus Cotteau, 1883, p. 27              | U Miocene   | Pliocene  |
|                      |             |        | Paradoxechinus Laube, 1869, p. 186            | U Eocene    | L Miocene |
|                      |             |        | Temnechinus Forbes, 1852, p. 5                | Pliocene    | Pliocene  |
|                      |             |        |   |             |           |

|                  |          |               | Temnotrema A. Agassiz, 1864, p. 358              | U Eocene    | Recent        |
|------------------|----------|---------------|--|-------------|---------------|
|                  |          |               | Erbechinus Jeannet, 1935, p. 558                 | Pliocene    | Recent        |
|                  |          |               | Opechinus Desor, 1856, p. 107                    | L Eocene    | Recent        |
|                  |          |               | Microcyphus L. Agassiz,                          |             |               |
|                  |          |               | in Agassiz & Desor, 1846, p. 358                 | Miocene     | Recent        |
|                  |          |               | Mespilia Desor, in Agassiz & Desor, 1846, p. 357 | Recent      | Recent        |
|                  |          |               | Salmaciella Mortensen, 1942, p. 226              | Recent      | Recent        |
|                  |          |               | Amblypneustes L. Agassiz, 1841b, p. 7            | Recent      | Recent        |
|                  |          |               | Salmacis L. Agassiz, 1841c, p. 8                 | Recent      | Recent        |
|                  |          |               | Holopneustes L. Agassiz, 1841c, p. 9             | Recent      | Recent        |
| Trigonocidaridae | U Eocene | Recent        | Trigonocidaris A. Agassiz, 1869, p. 263          | Recent      | Recent        |
|                  |          |               | Genocidaris A. Agassiz, 1869, p. 262             | L Miocene   | Recent        |
|                  |          |               | Scolechinus Lambert,                             |             |               |
|                  |          |               | in Lambert & Thiéry, 1925, p. 570                | U Oligocene | U Oligocene   |
|                  |          |               | Goniosigma Fell, 1964, p. 201                    | Oligocene   | Oligocene     |
|                  |          |               | Javanechinus Jeannet,                            |             |               |
|                  |          |               | in Lambert & Jeannet, 1935, p. 49                | L Miocene   | U Miocene     |
|                  |          |               | Leptopleurus Lambert & Thiéry, 1914, p. 275      | Miocene     | Miocene       |
|                  |          |               | Ortholophus Duncan, 1887, p. 414                 | U Oligocene | L Miocene     |
|                  |          |               | Cryptechinus Philip, 1969, p. 236                | L Miocene   | L Miocene     |
|                  |          |               | Asterechinus Mortensen, 1942, p. 228             | U Eocene    | Recent        |
|                  |          |               | Prionechinus A. Agassiz, 1879, p. 202            | Recent      | Recent        |
| Zeuglopleuridae  | Albian   | Maastrichtian | Zeuglopleurus Gregory, 1889, p. 494              | Cenomanian  | Turonian      |
|                  |          |               | Echinocyphus Cotteau,                            |             |               |
|                  |          |               | in Cotteau & Triger, 1860, p. 226                | U Albian    | Turonian      |
|                  |          |               | Boletechinus Cooke, 1955, p. 93                  | Santonian   | Maastrichtian |
| Glyphocyphidae   | Aptian   | M Eocene      | Glyphocyphus d'Archiac & Haime, 1853, p. 202     | L Aptian    | Turonian      |
|                  |          |               | Arachnopleurus Duncan & Sladen, 1882b, p. 42     | U Paleocene | M Eocene      |
|                  |          |               | Hemidiadema L. Agassiz,                          |             |               |
|                  |          |               | in Agassiz & Desor, 1846, p. 351                 | U Albian    | Cenomanian    |
|                  |          |               | Echinopsis L. Agassiz, 1840a, p. 9 18            | U Paleocene | M Eocene      |

|                           |                  |                |               | Ambipleurus Lambert, 1932, p. 198 Dictyopleurus Duncan & Sladen, 1882b, p. 38 Rachiosoma Pomel, 1883, p. 91 Rhabdopleurus Cotteau, 1893, p. 594 Eurysalenia Kier, 1966, p. A63 | U Eocene U Paleocene Santonian M Eocene Campanian | U Eocene<br>L Eocene<br>Santonian<br>M Eocene<br>Maastrichtian |
|---------------------------|------------------|----------------|---------------|--|---|--|
| stem group<br>Irregularia | Anorthopygidae   | Oxfordian      | Maastrichtian | Anorthopygus Cotteau,<br>in Cotteau & Triger, 1859, p. 177   | Albian  | Maastrichtian  |
| irregularia               |                  |                |               | Pileus Desor, 1857, p. 167   | Oxfordian   | Oxfordian  |
|                           | Coenholectypidae | Hauterivian    | Maastrichtian | Coenholectypus Pomel, 1883, p. 75  | Hauterivian                                       | Maastrichtian  |
|                           | 3000.000, piddo  | . iaataiiviaii | aaaanontaan   | Coptodiscus Cotteau & Gauthier, 1895, p. 76  | Cenomanian  | Campanian  |
|                           |                  |                |               | <i>Lanieria</i> Duncan, 1889, p. 158   | Campanian   | Maastrichtian  |
|                           |                  |                |               | Temnholectypus Lambert, 1918b, p. 7  | U Albian  | Maastrichtian  |
|                           | Discoididae      | Aptian         | Maastrichtian | Discoides Parkinson, 1811, p. 20   | Aptian  | Cenomanian   |
|                           |                  | ·              |               | Discholectypus Pomel, 1883, p. 75  | U Albian  | U Albian   |
|                           |                  |                |               | Camerogalerus Quenstedt, 1873, p. 411  | Aptian  | Maastrichtian  |
|                           | Holectypoidae    | Pliensbachian  | Kimmeridgian  | Holectypus Desor, 1842, p. 65  | Pliensbachian                                     | Kimmeridgian   |
|                           |                  |                |               | Philoectypus Vadet, 1997, p. 22  | Toarcian  | Callovian  |
|                           | Pygasteridae     | Bajocian       | Cenomanian    | Pygaster L. Agassiz, 1835, p. 185  | Bajocian  | Cenomanian   |
|                           | Galeropygidae    | Toarcian       | Bajocian      | Galeropygus Cotteau, 1856, p. 648  | Toarcian  | Bathonian  |
|                           | [Hyboclypids]    | Bajocian       | Oxfordian     | Hyboclypus L. Agassiz, 1839, p. 74   | Bajocian  | Oxfordian  |
|                           |                  |                |               | Aulacopygus Pomel, 1883, p. 53   | Bajocian  | Bathonian  |
|                           | Desorellidae     | Oxfordian      | Kimmeridgian  | Desorella Cotteau, 1855, p. 713  | Oxfordian   | Kimmeridgian   |
|                           | Pygorhytidae     | Toarcian       | Callovian     | Pygorhytis Pomel, 1883, p. 50  | Toarcian  | Callovian  |
|                           |                  |                |               | Spatocyphus Pomel, 1883, p. 51   | Bajocian  | Bajocian   |
|                           |                  |                |               | Pygomalus Pomel, 1883, p. 51   | Toarcian  | Callovian  |
| Cassiduloids              | Apatopygidae     | Paleocene      | Recent        | Apatopygus Hawkins, 1920, p. 393   | U Paleocene                                       | Recent   |
|                           |                  |                |               | Nucleopygus L. Agassiz, 1840a, p. 7 16   | U Albian  | Maastrichtian  |
|                           | Archiaciidae     | Cenomanian     | Turonian      | Porterpygus Baker, 1983, p. 164 Archiacia L. Agassiz,  | L Miocene   | Recent   |

|                  |               |               | in Agassiz & Desor, 1847, p. 159          | Cenomanian    | Cenomanian    |
|------------------|---------------|---------------|---|---------------|---------------|
| [Claviasteridae] |               |               | <i>Claviaster</i> d'Orbigny, 1855, p. 281 | Cenomanian    | Turonian      |
| Cassidulidae     | Maastrichtian | Recent        | Cassidulus Lamarck, 1801, p. 349          | U Eocene      | Recent        |
|                  |               |               | Eurhodia Haime,                           |               |               |
|                  |               |               | in d'Archiac & Haime, 1853, p. 213        | L Eocene      | M Eocene      |
|                  |               |               | Glossaster Lambert, 1918a, p. 39          | L Eocene      | M Eocene      |
|                  |               |               | Paralampas Duncan & Sladen, 1882b, p. 72  | U Paleocene   | U Paleocene   |
|                  |               |               | Rhyncholampas A. Agassiz, 1869, p. 270    | Maastrichtian | Recent        |
| Catopygidae      | Kimmeridgian  | Maastrichtian | Catopygus L. Agassiz, 1835, p. 185        | Kimmeridgian  | Maastrichtian |
|                  |               |               | Penesticta Pomel, 1883, p. 64             | Cenomanian    | Cenomanian    |
|                  |               |               | Hemicara Schlüter, 1902, p. 332           | Cenomanian    | Cenomanian    |
| Clypeidae        | Bajocian      | Kimmeridgian  | Clypeus Leske, 1778, p. 157               | Bajocian      | Oxfordian     |
|                  |               |               | Cluniculus Pomel, 1883, p. 57             | Oxfordian     | Kimmeridgian  |
|                  |               |               | Pseudosorella Etallon, 1859, p. 415       | Bathonian     | Oxfordian     |
| Clypeolampadidae | Coniacian     | Maastrichtian | Clypeolampas Pomel, 1869, p. 25           | Campanian     | Maastrichtian |
|                  |               |               | Hungaresia Szörényi, 1955, p. 76          | Coniacian     | Maastrichtian |
| Echinolampadidae | Maastrichtian | Recent        | Echinolampas Gray, 1825, p. 429           | M Eocene      | Recent        |
|                  |               |               | Hypsoclypus Pomel, 1869, p. 25            | M Eocene      | Recent        |
|                  |               |               | Kephrenia Fourtau, 1909, p. 138           | L Eocene      | L Eocene      |
|                  |               |               | Vologesia Cotteau & Gauthier, 1895, p. 65 | Maastrichtian | Maastrichtian |
| Neolampadidae    | L Eocene      | Recent        | Neolampas A. Agassiz, 1869, p. 271        | Recent        | Recent        |
|                  |               |               | Pisolampas Philip, 1963b, p. 718          | L Eocene      | U Eocene      |
|                  |               |               | Nannolampas Mortensen, 1948a, p. 339      | Recent        | Recent        |
|                  |               |               | Aphanophora de Meijere, 1902, p. 8        | U Eocene      | Recent        |
|                  |               |               | Studeria Duncan, 1889, p. 185             | Oligocene     | Recent        |
| [Pliolampadidae] | Maastrichtian | Recent        | Pliolampas Pomel, 1888a, p. 446           | Eocene        | Recent        |
|                  |               |               | Oolopygus d'Orbigny, 1857, p. 454         | Maastrichtian | U Paleocene   |
| Nucleolitidae    | Bajocian      | Cenomanian    | Nucleolites Lamarck, 1801, p. 347         | Bathonian     | Cenomanian    |
|                  |               |               | Phyllobrissus Cotteau, 1859, p. 81        | Kimmeridgian  | Aptian        |
|                  |               |               | Clypeopygus d'Orbigny, 1856, p. 418       | Valanginian   | Hauterivian   |
|                  |               |               | Crotoclypeus Pomel, 1883, p. 60           | Bajocian      | Oxfordian     |
|                  |               |               |   |               |               |

|                |                       |             |            | Bothryopneustes Fourtau, 1924, p. 27<br>Ochetus Pomel, 1883, p. 57 | Bathonian<br>U Albian | Oxfordian<br>Cenomanian |
|----------------|-----------------------|-------------|------------|--|-----------------------|-------------------------|
|                | Pygaulidae            | Valanginian | Paleocene  | Pygaulus L. Agassiz,   |                       |                         |
|                |                       |             |            | in Agassiz & Desor, 1847, p. 158                                   | Barremian             | Barremian               |
|                |                       |             |            | Pygopistes Pomel, 1883, p. 56                                      | Cenomanian            | Cenomanian              |
|                |                       |             |            | Pygorhynchus L. Agassiz, 1839, p. 53                               | Valanginian           | Albian                  |
|                |                       |             |            | Echinogalerus Koenig, 1825, p. 171                                 | Cenomanian            | Maastrichtian           |
|                |                       |             |            | Plagiochasma Pomel, 1883, p. 59                                    | Valanginian           | U Paleocene             |
|                | Pyguridae             | Bathonian   | Cenomanian | Pygurus L. Agassiz, 1839, p. 68                                    | Oxfordian             | Cenomanian              |
|                |                       |             |            | Pyguropsis de Loriol, 1902, p. 32                                  | Cenomanian            | Cenomanian              |
|                |                       |             |            | Echinopygus d'Orbigny, 1855, p. 303                                | Valanginian           | Cenomanian              |
|                |                       |             |            | Astrolampas Pomel, 1883, p. 63                                     | Bathonian             | Cenomanian              |
|                | Gitolampadidae        | Cenomanian  | Recent     | Arnaudaster Lambert, 1920b, p. 152                                 | Cenomanian            | Maastrichtian           |
|                |                       |             |            | Ilarionia Dames, 1878, p. 34                                       | Eocene                | Eocene                  |
|                |                       |             |            | Parapygus Pomel, 1883, p. 61                                       | Turonian              | Santonian               |
|                |                       |             |            | Neocatopygus Duncan & Sladen, 1882b, p. 76                         | L Eocene              | L Eocene                |
|                |                       |             |            | Gitolampas Gauthier, 1889, p. 98                                   | Campanian             | M Miocene               |
|                |                       |             |            | Oligopodia Duncan, 1889, p. 176                                    | Eocene                | Recent                  |
|                | Cassiduloida incertae | e sedis     |            | Anochanus Grube, 1868, p. 178                                      | Recent                | Recent                  |
|                |                       |             |            | Heteronucleus Lambert, 1911b, p. 184                               | Senonian              | Senonian                |
|                |                       |             |            | Pseudonucleus Lambert, 1920b, p. 153                               | Campanian             | Campanian               |
|                |                       |             |            | Rostropygus Szörényi, 1955, p. 67                                  | Santonian             | Santonian               |
|                |                       |             |            | Gentilia Lambert, 1918a, p. 35                                     | Cenomanian            | Cenomanian              |
|                |                       |             |            | Tropholampas H.L. Clark, 1923, p. 395                              | Recent                | Recent                  |
| stem group     | Faujasiidae           | Campanian   | M Eocene   | Faujasia d'Orbigny, 1855, p. 314                                   | Campanian             | Maastrichtian           |
| clypeasteroids |                       |             |            | Zuffardia Checchia-Rispoli, 1917, p. 492                           | Maastrichtian         | Maastrichtian           |
|                |                       |             |            | Pygurostoma Cotteau & Gauthier, 1895, p. 51                        | Campanian             | Maastrichtian           |
|                |                       |             |            | Domechinus Kier, 1962, p. 141                                      | Campanian             | Maastrichtian           |
|                |                       |             |            | Lefortia Cossman, 1901, p. 58                                      | Maastrichtian         | Maastrichtian           |
|                |                       |             |            | Daradaster Tessier, 1952, p. 295                                   | M Eocene              | M Eocene                |

|                | [Stigmatopyginae] | Turonian      | L Miocene | Eurypetalum Kier, 1962, p. 140 Cardiopygus Aziz & Badve, 2001, p. 49 Gongrochanus Kier, 1962, p. 131 Tamililampus Aziz & Badve, 2001, p. 52 Actapericulum Holmes, 1995, p. 120 Australanthus Bittner, 1892, p. 350 Hardouinia Haime, | Maastrichtian<br>Maastrichtian<br>Maastrichtian<br>Maastrichtian<br>L Miocene<br>U Eocene | Maastrichtian Maastrichtian Maastrichtian Maastrichtian L Miocene U Eocene |
|----------------|-------------------|---------------|-----------|--|---|--|
|                |                   |               |           | in d'Archiac & Haime, 1853, p. 214  Petalobrissus Lambert,   | Turonian  | Maastrichtian  |
|                |                   |               |           | in Lambert & Thiéry, 1921, p. 349  | Turonian  | Maastrichtian  |
|                |                   |               |           | Procassidulus Lambert, 1918a, p. 39  | Maastrichtian   | L Paleocene  |
|                |                   |               |           | Rhynchopygus d'Orbigny, 1855, p. 323   | Maastrichtian   | U Eocene   |
|                |                   |               |           | Stigmatopygus d'Orbigny, 1855, p. 331  | Campanian   | L Oligocene  |
|                |                   |               |           | Oriolampas Munier-Chalmas, 1882, p. 369  | U Paleocene   | U Paleocene  |
|                |                   |               |           | Eolampas Duncan & Sladen, 1882b, p. 61   | L Eocene  | U Eocene   |
|                |                   |               |           | Termieria Lambert, 1931b, p. 30  | Maastrichtian   | L Paleocene  |
|                | Plesiolampadidae  | Maastrichtian | U Eocene  | Plesiolampas Duncan & Sladen, 1882a, p. 9  | U Paleocene   | L Eocene   |
|                | Oligopygidae      | M Eocene      | U Eocene  | Oligopygus de Loriol, 1887, p. 395   | M Eocene  | U Eocene   |
|                |                   |               |           | Haimea Michelin, 1851, p. 92   | M Eocene  | U Eocene   |
|                | Togocyamids       |               |           | Togocyamus Oppenheim, 1915, p. 20  | U Paleocene   | U Paleocene  |
|                | Conoclypidae      | Paleocene     | M Eocene  | Conoclypus L. Agassiz, 1839, p. 61   | U Paleocene   | M Eocene   |
|                |                   |               |           | Oviclypeus Dames, 1878, p. 44  | Eocene  | Eocene   |
| Clypeasteroida | Ammotrophinae     | L Miocene     | Recent    | Ammotrophus H.L. Clark, 1928, p. 471   | Pliocene  | Recent   |
|                |                   |               |           | Monostychia Laube, 1869, p. 118  | L Miocene   | L Miocene  |
|                | Arachnoididae     | Pliocene      | Recent    | Arachnoides Leske, 1778, p. 471  | Pliocene  | Recent   |
|                |                   |               |           | Fellaster Durham, 1955, p. 125   | Pliocene  | Recent   |
|                | Clypeasteridae    | U Eocene      | Recent    | Clypeaster Lamarck, 1801, p. 341   | U Eocene  | Recent   |
|                | Fossulasteridae   | L Miocene     | L Miocene | Fossulaster Lambert & Thiéry, 1925, p. 577   | L Miocene   | L Miocene  |
|                | Echinocyamidae    | M Eocene      | Recent    | Echinocyamus van Phelsum, 1774, p. 131   | M Eocene  | Recent   |
|                |                   |               |           | <i>Mortonia</i> Gray, 1851a, p. 38   | Recent  | Recent   |

|                  |             | _           | Leniechinus Kier, 1968a, p. 4              | M Eocene    | M Eocene    |
|------------------|-------------|-------------|--|-------------|-------------|
| Fibulariidae     | M Eocene    | Recent      | Fibularia Lamarck, 1816, p. 16             | M Eocene    | Recent      |
|                  |             |             | Tridium Tandon & Srivastava, 1980, p. 1    | M Eocene    | M Eocene    |
|                  |             |             | Lenicyamidia Brunnschweiler, 1962, p. 165  | L Eocene    | L Eocene    |
|                  |             |             | Thagastea Pomel, 1888b, p. 373             | Eocene      | Eocene      |
|                  |             |             | Fibulariella Mortensen, 1948b, p. 219      | M Eocene    | Recent      |
| Laganidae        | Miocene     | Recent      | <i>Laganum</i> Link, 1807, p. 161          | Pliocene    | Recent      |
|                  |             |             | Sismondia Desor, 1857, p. 225              | M Eocene    | L Miocene   |
|                  |             |             | Hupea Pomel, 1883, p. 69                   | Pliocene    | Recent      |
|                  |             |             | Jacksonaster Lambert,                      |             |             |
|                  |             |             | in Lambert & Thiéry, 1914, p. 313          | Miocene     | Recent      |
|                  |             |             | Peronella Gray, 1855, p. 13                | Miocene     | Recent      |
|                  |             |             | Rumphia Desor, 1857, p. 229                | U Miocene   | Recent      |
| Neolaganidae     | M Eocene    | U Oligocene | Neolaganum Durham, 1954, p. 680            | U Eocene    | U Eocene    |
|                  |             |             | Weisbordella Durham, 1954, p. 682          | U Eocene    | U Eocene    |
|                  |             |             | Pentedium Kier, 1967b, p. 989              | M Eocene    | M Eocene    |
|                  |             |             | Tetradiella Liao & Lin, 1981, p. 484       | Pliocene    | Pliocene    |
|                  |             |             | Durhamella Kier, 1968a, p. 23              | M Eocene    | U Eocene    |
|                  |             |             | Wythella Durham, 1954, p. 682              | M Eocene    | U Oligocene |
|                  |             |             | Sanchezella Durham, 1954, p. 682           | U Eocene    | U Eocene    |
|                  |             |             | Cubanaster Sanchez Roig, 1952a, p. 3       | M Eocene    | U Eocene    |
| Scutellinoididae | U Oligocene | M Miocene   | Scutellinoides Durham, 1955, p. 128        | L Miocene   | M Miocene   |
|                  | _           |             | Philipaster Wang, 1994, p. 227             | U Oligocene | L Miocene   |
|                  |             |             | Willungaster Philip & Foster, 1971, p. 687 | L Miocene   | L Miocene   |
|                  |             |             | Prowillunaster Wang, 1994, p. 229          | U Oligocene | L Miocene   |
| Astriclypeidae   | U Oligocene | Recent      | Astriclypeus Verrill, 1867, p. 311         | U Oligocene | Recent      |
| ••               | J           |             | Echinodiscus Leske, 1778, p. 195           | L Miocene   | Recent      |
|                  |             |             | Amphiope L. Agassiz, 1840a, p. 6 17        | U Oligocene | Recent      |
| Dendrasteridae   | U Miocene   | Recent      | Dendraster L. Agassiz,                     | · ·         |             |
|                  |             |             | in Agassiz & Desor, 1847, p. 135           | U Miocene   | Recent      |
| Echinarachniidae | M Eocene    | Recent      | Echinarachnius Gray, 1825, p. 428          | M Miocene   | Recent      |
|                  |             |             | · · · · · · · · · · · · · · · · · · ·      |             |             |

|                        |             |           | Scutellaster Cragin, 1895, p. 90 Astrodapsis Conrad, 1856, p. 315 Pseudastrodapsis Durham, 1953b, p. 121 Vaguerosella Durham, 1955, p. 166 | U Miocene<br>Miocene<br>U Miocene<br>L Miocene | Pleistocene<br>Pliocene<br>Pliocene<br>M Miocene |
|------------------------|-------------|-----------|--|--|--|
|                        |             |           | Faassia Shmidt,  | 2 1/11000110                                   | W Wilderic                                       |
|                        |             |           | in Shmidt & Sinyelnikova, 1971, p. 911   | U Miocene                                      | U Miocene  |
|                        |             |           | Proescutella Pomel, 1883, p. 70  | M Eocene                                       | M Eocene   |
| Eoscutellidae          | M Eocene    | U Eocene  | Eoscutella Grant & Hertlein, 1938, p. 54   | M Eocene                                       | U Eocene   |
| Mellitidae             | L Miocene   | Recent    | Mellita L. Agassiz, 1841a, p. 34   | U Miocene                                      | Recent   |
|                        |             |           | Leodia Gray, 1851a, p. 36  | Pliocene                                       | Recent   |
|                        |             |           | Mellitella Duncan, 1889, p. 169  | Miocene  | Recent   |
|                        |             |           | Encope L. Agassiz, 1840a, p. 5 17  | L Miocene                                      | Recent   |
| Monophorasteridae      | U Oligocene | U Miocene | Monophoraster Lambert & Thiéry, 1921, p. 324   | M Miocene                                      | U Miocene  |
|                        |             |           | Amplaster Martínez, 1984, p. 506   | U Oligocene                                    | U Miocene  |
| Protoscutellidae       | M Eocene    | U Eocene  | Protoscutella Stefanini, 1924, p. 843  | M Eocene                                       | U Eocene   |
|                        |             |           | Periarchus Conrad, 1866, p. 21   | U Eocene                                       | U Eocene   |
|                        |             |           | Mortonella Pomel, 1883, p. 70  | U Eocene                                       | U Eocene   |
| Rotulidae              | Pliocene    | Recent    | Rotula Schumacher, 1817, p. 33   | Recent   | Recent   |
|                        |             |           | Rotuloidea Etheridge, 1872, p. 98  | Pliocene                                       | Pliocene   |
|                        |             |           | Heliophora L. Agassiz, 1840a, p. 17  | Pliocene                                       | Recent   |
| Scutasteridae          | M Eocene    | M Eocene  | Scutaster Pack, 1909, p. 278   | M Eocene                                       | M Eocene   |
| Scutellines stem group | M Eocene    | U Eocene  | Scutellina L. Agassiz, 1841a, p. 98  | M Eocene                                       | U Eocene   |
|                        |             |           | Eoscutum Lambert,  |  |  |
|                        |             |           | in Lambert & Thiéry, 1914, p. 293  | L Eocene                                       | M Eocene   |
|                        |             |           | Porpitella Pomel, 1883, p. 72  | M Eocene                                       | M Eocene   |
|                        |             |           | Lenita Desor, in Agassiz & Desor, 1847, p. 142   | M Eocene                                       | M Eocene   |
| Abertellidae           | L Miocene   | M Miocene | Abertella Durham, 1953a, p. 350  | L Miocene                                      | M Miocene  |
|                        |             |           | Karlaster Marchesini Santos, 1958, p. 16   | L Miocene                                      | L Miocene  |
| Scutellidae            | U Eocene    | Recent    | Scutella Lamarck, 1816, p. 7   | U Oligocene                                    | L Miocene  |
|                        |             |           | Parascutella Durham, 1953a, p. 349   | L Miocene                                      | M Miocene  |
|                        |             |           | Scutulum Tournouër, 1869, p. 981   | U Eocene                                       | L Oligocene                                      |

|              |                       |               |               | Scaphechinus A. Agassiz, 1864, p. 359 Samlandaster Lambert, | U Miocene     | Recent        |
|--------------|-----------------------|---------------|---------------|---|---------------|---------------|
|              |                       |               |               | in Lambert & Thiéry, 1914, p. 293                           | U Eocene      | U Eocene      |
|              |                       |               |               | Reymondella Durham, 1955, p. 168                            | U Miocene     | Pliocene      |
|              | Scutellina incertae s | sedis         |               | Iheringiella Berg, 1898, p. 16                              | L Miocene     | L Miocene     |
|              | Taiwanasteridae       | Oligocene     | Recent        | Taiwanaster Wang, 1984, p. 134                              | Oligocene     | Recent        |
|              |                       | -             |               | Marginoproctus Budin, 1980, p. 306                          | Recent        | Recent        |
| Echinoneoida | Conulidae             | Oxfordian     | Maastrichtian | Conulus Leske, 1778, p. 161                                 | Valanginian   | Maastrichtian |
|              |                       |               |               | Globator L. Agassiz, 1840a, p. 7 16                         | Hauterivian   | Maastrichtian |
|              |                       |               |               | Conulopyrina Hawkins, 1921, p. 420                          | Aptian        | L Albian      |
|              |                       |               |               | Pygopyrina Pomel, 1883, p. 54                               | Oxfordian     | Kimmeridgian  |
|              | Echinoneidae          | Paleocene     | Recent        | Echinoneus Leske, 1778, p. 173                              | L Miocene     | Recent        |
|              | [Échinonéides]        |               |               | Amblypygus L. Agassiz, 1840a, p. 5 17                       | Eocene        | Miocene       |
|              |                       |               |               | Paramblypygus Tessier & Roman, 1973, p. 140                 | U Paleocene   | U Paleocene   |
|              |                       |               |               | Micropetalon A. Agassiz & Clark, 1907b, p. 251              | Recent        | Recent        |
|              |                       |               |               | Duperieria Roman, 1968, p. 120                              | M Eocene      | M Eocene      |
|              |                       |               |               | Koehleraster Lambert & Thiéry, 1921, p. 331                 | U Eocene      | Recent        |
|              | Galeritidae           | Albian        | Maastrichtian | Galerites Lamarck, 1801, p. 19                              | Santonian     | Maastrichtian |
|              |                       |               |               | Rostrogalerus Lambert, 1911a, p. 30                         | U Albian      | Cenomanian    |
|              | Neoglobatoridae       | Maastrichtian | L Eocene      | Adelopneustes Gauthier, 1889, p. 52                         |               |               |
|              |                       |               |               | = [Neoglobator Endelman, 1980, p. 96]                       | Maastrichtian | L Eocene      |
| Holasteroida | Calymnidae            | Campanian     | Recent        | Calymne Thomson, 1877, p. 397                               | Recent        | Recent        |
|              |                       |               |               | Sternopatagus de Meijere, 1902, p. 10                       | U Cretaceous  | Recent        |
|              |                       |               |               | Chelonechinus Bather, 1934, p. 860                          | U Miocene     | Pliocene      |
|              |                       |               |               | Pseudoffaster Lambert,                                      |               |               |
|              |                       |               |               | in Lambert & Thiéry, 1924, p. 413                           | Campanian     | Maastrichtian |
|              | Cardiasteridae        | Cenomanian    | Maastrichtian | Cardiaster Forbes, 1850, p. 422                             | Turonian      | Maastrichtian |
|              |                       |               |               | Protocardiaster Smith & Wright, 2003, p. 476                | Cenomanian    | Turonian      |
|              |                       |               |               | Hagenowia Duncan, 1889, p. 210                              | Coniacian     | Maastrichtian |
|              |                       |               |               |   |               |               |

|                  |             |               | Infulaster Desor, 1858, p. 347              | Turonian      | Coniacian     |
|------------------|-------------|---------------|---|---------------|---------------|
| [Cardiotaxinae]  | Turonian    | Maastrichtian | Sternotaxis Lambert, 1893, p. 95            |               |               |
|                  |             |               | = [Cardiotaxis Lambert, 1917, p. 212 (22)]  | Turonian      | Maastrichtian |
|                  |             |               | Plesiocorys Pomel, 1883, p. 45              | Turonian      | Santonian     |
| Corystidae       | Paleocene   | Recent        | Corystus Pomel, 1883, p. 61                 | M Eocene      | Recent        |
|                  |             |               | Cardabia Foster & Philip, 1978, p. 798      | Paleocene     | Paleocene     |
|                  |             |               | Huttonechinus Foster & Philip, 1978, p. 799 | L Oligocene   | L Oligocene   |
| Echinocorythidae | Aptian      | Paleocene     | Echinocorys Leske, 1778, p. 175             | Turonian      | U Paleocene   |
|                  |             |               | Pseudananchys Pomel, 1883, p. 45            | Aptian        | Cenomanian    |
| Hemipneustidae   | Albian      | M Miocene     | Hemipneustes L. Agassiz, 1835, p. 183       | Campanian     | Maastrichtian |
|                  |             |               | Medjesia Jeffery, 1997, p. 244              | Campanian     | Campanian     |
|                  |             |               | Plesiohemipneustes Smith &                  |               |               |
|                  |             |               | Wright, 2003, p. 483                        | U Albian      | Cenomanian    |
|                  |             |               | Opisopneustes Gauthier, 1889, p. 2          | Campanian     | Maastrichtian |
|                  |             |               | Toxopatagus Pomel, 1883, p. 30              | M Miocene     | M Miocene     |
| Holasteridae     | Hauterivian | Maastrichtian | Holaster L. Agassiz, 1835, p. 183           | Hauterivian   | Cenomanian    |
|                  |             |               | Offaster Desor, 1858, p. 333                | Campanian     | Maastrichtian |
|                  |             |               | Cibaster Pomel, 1883, p. 48                 | Santonian     | Maastrichtian |
|                  |             |               | Messaoudia Lambert, 1917, p. 194            | Cenomanian    | Cenomanian    |
|                  |             |               | Scagliaster Munier-Chalmas, 1891, p. 11     | Turonian      | U Cretaceous  |
|                  |             |               | Galeola Quenstedt, 1874, p. 595             | Santonian     | Campanian     |
|                  |             |               | Crassiholaster Smith & Wright, 2003, p. 556 | Albian        | Cenomanian    |
|                  |             |               | Lampadocorys Pomel, 1883, p. 46             | Cenomanian    | L Paleocene   |
| Incertae sedis   |             |               | Pilematechinus A. Agassiz, 1904, p. 163     | Recent        | Recent        |
|                  |             |               | Ganbirretia Gauthier, 1903, p. 19           | L Paleocene   | L Paleocene   |
| Plexechinidae    | Recent      | Recent        | Plexechinus A. Agassiz, 1898, p. 78         | Recent        | Recent        |
| Pourtalesiidae   | M Miocene   | Recent        | Pourtalesia A. Agassiz, 1869, p. 272        | M Miocene     | Recent        |
|                  |             |               | Galeaster Seunes, 1889, p. 821              | Maastrichtian | U Paleocene   |
|                  |             |               | Echinocrepis A. Agassiz, 1879, p. 206       | Recent        | Recent        |
|                  |             |               | Spatagocystis A. Agassiz, 1879, p. 206      | Recent        | Recent        |
|                  |             |               | Cystocrepis Mortensen, 1907, p. 84          | Recent        | Recent        |

|             |                         |              |              | Echinosigra Mortensen, 1907, p. 82                | Recent        | Recent        |
|-------------|-------------------------|--------------|--------------|---|---------------|---------------|
|             |                         |              |              | Ceratophysa Pomel, 1883, p. 40                    | Recent        | Recent        |
|             |                         |              |              | Helgocystis Mortensen, 1907, p. 82                | Recent        | Recent        |
|             |                         |              |              | Solenocystis Mironov, 2008, p. 13                 | Recent        | Recent        |
|             | Pseudholasterinae       | Berriasian   | U Oligocene  | Pseudholaster Pomel, 1883, p. 45                  | Valanginian   | Paleocene     |
|             |                         |              |              | Eoholaster Solovjev, 1989, p. 150                 | Berriasian    | Berriasian    |
|             |                         |              |              | Taphraster Pomel, 1883, p. 46                     | Hauterivian   | Hauterivian   |
|             |                         |              |              | Giraliaster Foster & Philip, 1978, p. 804         | Maastrichtian | U Oligocene   |
|             | Stegasteridae           | Campanian    | Paleocene    | Stegaster Pomel, 1883, p. 48                      | U Cretaceous  | U Cretaceous  |
|             |                         |              |              | Jeronia Seunes, 1888, p. 809                      | L Paleocene   | L Paleocene   |
|             |                         |              |              | Guettaria Gauthier, 1888, p. 532                  | Campanian     | Maastrichtian |
|             |                         |              |              | Lampadaster Cotteau, 1889b, p. 88                 | Campanian     | Maastrichtian |
|             |                         |              |              | Tholaster Seunes, 1891, p. 23                     | Maastrichtian | Maastrichtian |
|             |                         |              |              | Entomaster Gauthier, 1888, p. 532                 | Campanian     | Campanian     |
|             |                         |              |              | Seunaster Lambert, 1912, p. 385                   | Maastrichtian | Maastrichtian |
|             | Stenonasteridae         | U Cretaceous | U Cretaceous | Stenonaster Lambert, 1922, p. 114                 | U Cretaceous  | U Cretaceous  |
|             | Urechinidae             | Recent       | Recent       | Urechinus A. Agassiz, 1879, p. 207                | Recent        | Recent        |
|             |                         |              |              | Cystechinus A. Agassiz, 1879, p. 207              | Recent        | Recent        |
|             |                         |              |              | Antrechinus Mooi & David, 1996, p. 946            | Recent        | Recent        |
|             | (Carnarechininae)       | Recent       | Recent       | Carnarechinus Mironov, 1978, p. 209               | Recent        | Recent        |
|             | Urechinina incertae sed | dis          |              | Basseaster Lambert, 1936a, p. 25                  | Maastrichtian | L Paleocene   |
| spatangoida | Aeropsidae [Aeropidae   | ] Paleocene  | Recent       | Aeropsis Mortensen, 1907, p. 90                   | Recent        | Recent        |
|             |                         |              |              | Sphenaster Jeffery, in Smith et al., 1999, p. 131 | L Paleocene   | L Paleocene   |
|             | Antillasterinae         | M Eocene     | M Miocene    | Antillaster Lambert, 1909a, p. 168                | M Eocene      | M Miocene     |
|             |                         |              |              | Moronaster Sanchez Roig, 1952b, p. 13             | Eocene        | Eocene        |
|             | Asterostomatidae        | Eocene       | Eocene       | Asterostoma L. Agassiz,                           |               |               |
|             |                         |              |              | in Agassiz & Desor, 1847, p. 168                  | Eocene        | Eocene        |
|             |                         |              |              | Stomaporus Cotteau, 1888, p. 977                  | Eocene        | Eocene        |
|             | Brissidae [Brissina]    | M Eocene     | Recent       | <i>Brissus</i> Gray, 1825, p. 431                 | M Eocene      | Recent        |
|             |                         |              |              | Anabrissus Mortensen, 1950b, p. 161               | Recent        | Recent        |
|             |                         |              |              | , , , , ,   |               |               |

|                  |               |           | Taimanawa Henderson & Fell, 1969, p. 3      | Oligocene     | Recent        |
|------------------|---------------|-----------|---|---------------|---------------|
|                  |               |           | Schizobrissus Pomel, 1869, p. 13            | Eocene        | U Miocene     |
|                  |               |           | Idiobryssus H.L. Clark, 1939, p. 173        | Recent        | Recent        |
|                  |               |           | Metalia Gray, 1855, p. 51                   | Miocene       | Recent        |
|                  |               |           | Rhynobrissus A. Agassiz, 1872, p. 58        | Recent        | Recent        |
|                  |               |           | Rhabdobrissus Cotteau, 1889a, p. 281        | U Miocene     | Recent        |
|                  |               |           | Meoma Gray, 1851b, p. 131                   | M Eocene      | Recent        |
|                  |               |           | Plagiobrissus Pomel, 1883, p. 29            | U Eocene      | Recent        |
|                  |               |           | Anametalia Mortensen, 1950b, p. 161         | Recent        | Recent        |
|                  |               |           | Neopneustes Duncan, 1889, p. 258            | Recent        | Recent        |
|                  |               |           | Peraspatangus Philip & Foster, 1971, p. 689 | L Miocene     | M Miocene     |
| Brissopsidae     | U Eocene      | Recent    | Brissopsis L. Agassiz,                      |               |               |
|                  |               |           | in Agassiz & Desor, 1847, p. 14             | U Eocene      | Recent        |
|                  |               |           | Kleinia Gray, 1851b, p. 133                 | L Oligocene   | Recent        |
| Corasterinae     | Coniacian     | Paleocene | Coraster Cotteau, 1886, p. 69               | Campanian     | U Paleocene   |
|                  |               |           | Lambertiaster Gauthier, 1892, p. 28         | Camp./Maast.  | Maastrichtian |
|                  |               |           | Cordastrum Nisiyama, 1968, p. 175           | U Cretaceous  | U Cretaceous  |
|                  |               |           | Cottreaucorys Lambert, 1920b, p. 168        | Coniacian     | L Paleocene   |
|                  |               |           | Physaster Pomel, 1883, p. 47                | Cenomanian    | Cenomanian    |
|                  |               |           | Homoeaster Pomel, 1883, p. 44               | Coniacian     | L Paleocene   |
|                  |               |           | Orthaster Moskvin, 1982, p. 103             | Campanian     | U Paleocene   |
| Cyclasterinae    | Maastrichtian | Recent    | Cyclaster Cotteau,                          |               |               |
|                  |               |           | in Leymerie & Cotteau, 1856, p. 345         | Maastrichtian | Recent        |
|                  |               |           | Isaster Desor, 1858, p. 359                 | Maastrichtian | Paleocene     |
|                  |               |           | Isopatagus Mortensen, 1948c, p. 113         | Recent        | Recent        |
| Echinocardiidae  | L Miocene     | Recent    | Echinocardium Gray, 1825, p. 430            | L Miocene     | Recent        |
| Enichasterinae   | Oligocene     | Oligocene | Enichaster de Loriol, 1882, p. 30           | Oligocene     | Oligocene     |
| Eupatangidae     | L Eocene      | Recent    | Eupatagus L. Agassiz,                       |               |               |
| [Brissoidesinae] |               |           | in Agassiz & Desor, 1847, p. 9              | L Eocene      | Recent        |
| Eurypataginae    | Miocene       | Recent    | Eurypatagus Mortensen, 1948c, p. 133        | Recent        | Recent        |
|                  |               |           | Platybrissus Grube, 1866, p. 61             | Miocene       | Recent        |
|                  |               |           |   |               |               |

|                  |          |          | Elipneustes Koehler, 1914, p. 213 Linopneustes A. Agassiz, 1881, p. 167 Paramaretia Mortensen, 1950b, p. 160 | Recent<br>Recent<br>Recent | Recent<br>Recent<br>Recent |
|------------------|----------|----------|--|----------------------------|----------------------------|
| Hemiasteridae    | Aptian   | Recent   | Hemiaster Desor,   |                            |                            |
|                  |          |          | in Agassiz & Desor, 1847, p. 16  | Albian                     | Paleocene                  |
|                  |          |          | Leymeriaster Lambert & Thiéry, 1924, p. 500  | Cenomanian                 | Maastrichtian              |
|                  |          |          | Palhemiaster Lambert, 1915, p. 155   | Aptian                     | U Albian                   |
|                  |          |          | Jordaniaster Neumann, 1999, p. 176   | Cenomanian                 | Cenomanian                 |
|                  |          |          | Heterolampas Cotteau, 1862, p. 72  | Campanian                  | Campanian                  |
|                  |          |          | Mecaster Pomel, 1883, p. 42  | Cenomanian                 | Maastrichtian              |
|                  |          |          | Kupeia McKnight, 1974, p. 37   | Recent                     | Recent                     |
|                  |          |          | Bolbaster Pomel, 1869, p. 15   | Turonian                   | U Miocene                  |
|                  |          |          | Proraster Lambert, 1895, p. 256  | Campanian                  | Maastrichtian              |
|                  |          |          | Holanthus Lambert & Thiéry, 1924, p. 505   | Maastrichtian              | Recent                     |
|                  |          |          | Leiostomaster Lambert, 1920b, p. 162   | Campanian                  | Recent                     |
| Lovéniidae       | M Eocene | Recent   | Lovénia Desor, in Agassiz & Desor, 1847, p. 10   | U Oligocene                | Recent                     |
|                  |          |          | Laevipatagus Noetling, 1885, p. 211  | U Eocene                   | U Eocene                   |
|                  |          |          | Gualtieria Desor,  |                            |                            |
|                  |          |          | in Agassiz & Desor, 1847, p. 10  | M Eocene                   | L Oligocene                |
|                  |          |          | PseudoLovénia A. Agassiz &   |                            |                            |
|                  |          |          | Clark, 1907b, p. 255   | Recent                     | Recent                     |
|                  |          |          | Hemipatagus Desor, 1858, p. 416  | M Eocene                   | L Miocene                  |
|                  |          |          | Semipetalon Szörényi, 1963, p. 193   | U Eocene                   | U Eocene                   |
|                  |          |          | Atelospatangus Koch, 1885, p. 115  | M Eocene                   | U Eocene                   |
| [Breyninae]      |          |          | Breynia Desor, in Agassiz & Desor, 1847, p. 12   | Oligocene                  | Recent                     |
| Macropneustidae  | L Eocene | Recent   | Macropneustes L. Agassiz,  |                            |                            |
|                  |          |          | in Agassiz & Desor, 1847, p. 8   | M Eocene                   | Miocene                    |
|                  |          |          | Archaechinus Kier, 1957, p. 891  | L Eocene                   | L Eocene                   |
|                  |          |          | Argopatagus A. Agassiz, 1879, p. 209   | Recent                     | Recent                     |
|                  |          |          | Hypsopatagus Pomel, 1883, p. 31  | U Eocene                   | Oligocene                  |
| [Megapneustinae] | L Eocene | Pliocene | Megapneustes Gauthier,   |                            |                            |

|                  |           |           | in Fourtau, 1900, p. 678                      | L Eocene    | Oligocene   |
|------------------|-----------|-----------|---|-------------|-------------|
|                  |           |           | Trachypatagus Pomel, 1869, p. 11              | U Eocene    | Pliocene    |
|                  |           |           | Pharaonaster Lambert, 1920b, p. 168           | L Eocene    | L Eocene    |
| Maretiidae       | M Eocene  | Recent    | Maretia Gray, 1855, p. 48                     | M Eocene    | Recent      |
|                  |           |           | Mariania Airaghi, 1901, p. 211                | L Miocene   | L Miocene   |
|                  |           |           | Pycnolampas A. Agassiz & Clark, 1907b, p. 252 | Recent      | Recent      |
|                  |           |           | Gymnopatagus Döderlein, 1901, p. 22           | Recent      | Recent      |
|                  |           |           | Mazettia Lambert & Thiéry,                    |             |             |
|                  |           |           | in Lambert, 1915, p. 192                      | M Miocene   | U Miocene   |
|                  |           |           | Spatagobrissus H.L. Clark, 1923, p. 402       | M Miocene   | Recent      |
|                  |           |           | Granobrissoides Lambert, 1920b, p. 168        | U Oligocene | Recent      |
|                  |           |           | Homolampas A. Agassiz, 1874, p. 137           | Recent      | Recent      |
|                  |           |           | Hemimaretia Mortensen, 1950b, p. 160          | Recent      | Recent      |
|                  |           |           | Nacospatangus A. Agassiz, 1873, p. 189        | Recent      | Recent      |
| Micrasteridae    | Barremian | U Eocene  | Micraster L. Agassiz, 1835, p. 184            | Turonian    | L Paleocene |
|                  |           |           | Diplodetus Schlueter, 1900, p. 364            | Campanian   | L Paleocene |
|                  |           |           | Plesiaster Pomel, 1883, p. 42                 | Santonian   | L Paleocene |
|                  |           |           | Gibbaster Gauthier, 1887, p. 381              | Turonian    | Campanian   |
|                  |           |           | Pseudogibbaster Moskvin, 1983, p. 111         | L Paleocene | U Paleocene |
|                  |           |           | Habanaster Lambert,                           |             |             |
|                  |           |           | in Sánchez Roig, 1924, p. 11                  | U Eocene    | U Eocene    |
|                  |           |           | Turanglaster Solovjev & Melikov, 1963, p. 44  | Campanian   | Campanian   |
|                  |           |           | Epiaster d'Orbigny, 1853, p. 186              | Barremian   | Cenomanian  |
|                  |           |           | Sogdiaster Egorov, 1972, p. 59                | Senonian    | Senonian    |
| Ovulasteridae    | Senonian  | Paleocene | Ovulaster Cotteau, 1884, p. 37                | Senonian    | L Paleocene |
| Palaeostomatidae | L Eocene  | Recent    | Palaeostoma Lovén,                            |             |             |
|                  |           |           | in A. Agassiz, 1872, p. 147                   | Eocene      | Recent      |
|                  |           |           | Sarsiaster Mortensen, 1950b, p. 157           | Recent      | Recent      |
|                  |           |           | Ditremaster Munier-Chalmas, 1885, p. 1076     | L Eocene    | Pliocene    |
|                  |           |           | Trachyaster Pomel, 1869, p. 14                | Pliocene    | Pliocene    |
| Palaeotropidae   | M Miocene | Recent    | Palaeotropus Lovén, 1874, p. 17               | Recent      | Recent      |

|               |  | Paleotrema Koehler, 1914, p. 45<br>Scrippsechinus Allison, Durham &  | Recent  | Recent  |
|---------------|--|--|---|---|
|               |  | Mintz, 1967, p. 16   | Recent  | Recent  |
|               |  | Palaeobrissus A. Agassiz, 1883, p. 56                                | M Miocene   | Recent  |
| Miocene       | Recent   | Paleopneustes A. Agassiz, 1873, p. 223                               | Miocene   | Recent  |
|               |  | Plesiozonus de Meijere, 1902, p. 12                                  | Recent  | Recent  |
| Cenomanian    | Cenomanian   | Periaster d'Orbigny, 1854, p. 269                                    | Cenomanian  | Cenomanian  |
| L Eocene      | Recent   | Pericosmus L. Agassiz,   |   |   |
|               |  | in Agassiz & Desor, 1847, p. 19                                      | L Eocene  | Recent  |
|               |  | Faorina Gray, 1851b, p. 132  | Recent  | Recent  |
| Santonian     | Paleocene  | Plesiaster Pomel, 1883, p. 42  | Santonian   | Paleocene   |
| Maastrichtian | Recent   | Prenaster Desor, 1853, p. 279  | L Eocene  | Recent  |
|               |  | Tripylus Philippi, 1845, p. 344                                      | Paleocene   | Recent  |
|               |  | Holcopneustes Cotteau, 1889c, p. 33                                  | Maastrichtian   | Oligocene   |
|               |  | Anisaster Pomel, 1886, p. 612  | U Eocene  | L Miocene   |
|               |  | Agassizia Valenciennes, 1846 pl. 1 fig. 2                            | M Eocene  | Recent  |
|               |  | Peribrissus Pomel, 1869, p. 13                                       | L Miocene   | M Miocene   |
|               |  | Antiquobrissus Szörényi, 1955, p. 126                                | U Cretaceous  | U Cretaceous  |
| Maastrichtian | Recent   | Schizaster L. Agassiz, 1835, p. 185                                  | L Eocene  | Recent  |
|               |  | Hemifaorina Jeannet & Martin, 1937, p. 289                           | U Miocene   | U Miocene   |
|               |  | Opissaster Pomel, 1883, p. 37  | L Eocene  | Pliocene  |
|               |  | Ova Gray, 1825, p. 431   | Eocene  | Recent  |
|               |  | Caribbaster Kier, 1984b, p. 67                                       | M Eocene  | U Eocene  |
|               |  | Protenaster Pomel, 1883, p. 36                                       | U Eocene  | Recent  |
|               |  | Diploporaster Mortensen, 1950b, p. 160                               | U Eocene  | Recent  |
|               |  | Schizopneustes Thiéry, 1907, p. 64                                   | L Paleocene   | L Paleocene   |
|               |  | Gregoryaster Lambert, 1907, p. 59                                    | Maastrichtian   | L Miocene   |
|               |  | Abatus Troschel, 1851, p. 72   | L Eocene  | Recent  |
|               |  | Tripylaster Mortensen, 1907, p. 122                                  | Recent  | Recent  |
|               |  | Aceste Thomson, 1877, p. 376   | Recent  | Recent  |
|               |  | Moiropsis A. Agassiz, 1881, p. 205                                   | Miocene   | Recent  |
|               | Cenomanian<br>L Eocene<br>Santonian<br>Maastrichtian | Cenomanian L Eocene Recent  Santonian Paleocene Maastrichtian Recent | Scrippsechinus Allison, Durham & Mintz, 1967, p. 16 Palaeobrissus A. Agassiz, 1883, p. 56 Miocene Recent Paleopneustes A. Agassiz, 1873, p. 223 Plesiozonus de Meijere, 1902, p. 12 Cenomanian L Eocene Recent Periosmus L. Agassiz, In Agassiz & Desor, 1847, p. 19 Faorina Gray, 1851b, p. 132 Santonian Paleocene Plesiaster Pomel, 1883, p. 42 Maastrichtian Recent Prenaster Desor, 1853, p. 279 Tripylus Philippi, 1845, p. 344 Holcopneustes Cotteau, 1889c, p. 33 Anisaster Pomel, 1886, p. 612 Agassizia Valenciennes, 1846 pl. 1 fig. 2 Peribrissus Pomel, 1869, p. 13 Antiquobrissus Szörényi, 1955, p. 126 Maastrichtian Recent Schizaster L. Agassiz, 1835, p. 185 Hemifaorina Jeannet & Martin, 1937, p. 289 Opissaster Pomel, 1883, p. 37 Ova Gray, 1825, p. 431 Caribbaster Kier, 1984b, p. 67 Protenaster Pomel, 1883, p. 36 Diploporaster Mortensen, 1950b, p. 160 Schizopneustes Thiéry, 1907, p. 64 Gregoryaster Lambert, 1907, p. 59 Abatus Troschel, 1851, p. 72 Tripylaster Mortensen, 1907, p. 122 Aceste Thomson, 1877, p. 376 | Mintz, 1967, p. 16 Palaeobrissus A. Agassiz, 1883, p. 56 Miocene Recent Paleopneustes A. Agassiz, 1873, p. 223 Miocene Plesiozonus de Meijere, 1902, p. 12 Recent Pericosmus L. Agassiz, 1874, p. 269 Cenomanian L Eocene Recent Pericosmus L. Agassiz, in Agassiz & Desor, 1847, p. 19 Pericosmus L. Agassiz, in Agassiz & Desor, 1847, p. 19 Paleocene Pericosmus L. Agassiz, in Agassiz & Desor, 1847, p. 19 Paleocene Pericosmus L. Agassiz, In Agassiz & Desor, 1847, p. 19 Paleocene Pericosmus L. Agassiz, In Agassiz & Desor, 1847, p. 19 Paleocene Pericosmus L. Agassiz, In Agassiz & Desor, 1847, p. 19 Paleocene Pericosmus L. Agassiz, In Agassiz & Desor, 1847, p. 19 Paleocene Pericosmus L. Agassiz, p. 279 Pericosmus L. Agassiz, p. 279 Paleocene Paleocene Pericosmus L. Agassiz, 1886, p. 612 Peribrissus Pomel, 1886, p. 612 V Eocene Peribrissus Pomel, 1869, p. 13 Antiquobrissus Szörényi, 1955, p. 126 V Cretaceous Pericosmus L. Agassiz, 1835, p. 185 Peribrissus Pomel, 1883, p. 37 Voa Gray, 1825, p. 431 Caribbaster Kier, 1984b, p. 67 Protenaster Pomel, 1883, p. 36 V Eocene Protenaster Thiéry, 1907, p. 64 Pericosmus Abatus Troschel, 1851, p. 72 Pripylaster Mortensen, 1907, p. 59 Maastrichtian Paleocene Plesiazorus A. Agassiz, 1873, p. 122 Aceste Thomson, 1877, p. 376 Recent |

|                  |               |           | Moira A. Agassiz, 1872, p. 146              | Miocene       | Recent        |
|------------------|---------------|-----------|---|---------------|---------------|
|                  |               |           | Aguayoaster Sanchez Roig, 1952b, p. 10      | M Eocene      | U Eocene      |
|                  |               |           | Hypselaster H.L. Clark, 1917, p. 185        | Eocene        | Recent        |
| [Brisasterinae]  | Maastrichtian | Recent    | Brisaster Gray, 1855, p. 61                 | Maastrichtian | Recent        |
|                  |               |           | Linthia Desor, 1853, p. 278                 | Campanian     | Pliocene      |
| Somaliasteridae  | Campanian     | Paleocene | Somaliaster Hawkins, 1935, p. 53            | Camp./Maast.  | Camp./Maast.  |
|                  |               |           | Iraniaster Cotteau & Gauthier, 1895, p. 26  | Camp./Maast.  | Camp./Maast.  |
|                  |               |           | Brightonia Kier, 1957, p. 871               | U Paleocene   | U Paleocene   |
|                  |               |           | Leviechinus Kier, 1957, p. 873              | U Paleocene   | U Paleocene   |
| Spatangidae      | Eocene        | Recent    | Spatangus Gray, 1825, p. 430                | L Oligocene   | Recent        |
|                  |               |           | Plethotaenia H.L. Clark, 1917, p. 233       | Recent        | Recent        |
|                  |               |           | Granopatagus Lambert, 1915, p. 193          | Eocene        | Recent        |
| Toxasteridae     | Valanginian   | Turonian  | Toxaster L. Agassiz, 1840a, p. 15           | Valanginian   | Aptian        |
|                  |               |           | Washitaster Lambert, 1927, p. 271           | Albian        | Albian        |
|                  |               |           | Miotoxaster Pomel, 1883, p. 44              | Hauterivian   | Albian        |
|                  |               |           | Pliotoxaster Fourtau, 1908, p. 140          | Aptian        | Cenomanian    |
|                  |               |           | Macraster Roemer, 1888, p. 191              | Albian        | Turonian      |
|                  |               |           | Niponaster Lambert, 1920b, p. 168           | Senonian      | Maastrichtian |
|                  |               |           | Aphelaster Lambert, 1920b, p. 156           | Berriasian    | Hauterivian   |
|                  |               |           | Somalechinus Checchia-Rispoli, 1945, p. 85  | Cenomanian    | Cenomanian    |
| Paleopneustina   | Eocene        | Recent    | Heterobrissus Manzoni &                     |               |               |
| Incertae sedis B |               |           | Mazzetti, 1878, p. 354                      | Oligocene     | Recent        |
|                  |               |           | Pygospatangus Cotteau, 1888, p. 977         | Eocene        | Eocene        |
|                  |               |           | Genopatagus A. Agassiz, 1879, p. 210        | Recent        | Recent        |
|                  |               |           | Megapetalus H.L. Clark, 1929, p. 257        | U Miocene     | Pliocene      |
|                  |               |           | Brachysternaster Larrain, 1985, p. 121      | Recent        | Recent        |
|                  |               |           | Amphipneustes Koehler, 1900, p. 817         | Recent        | Recent        |
| Paleopneustina   |               |           |   |               |               |
| Incertae sedis A | Paleocene     | Recent    | Hemigymnia Arnaud, 1898, p. 118             | L Paleocene   | U Paleocene   |
|                  |               |           | Schizocosmus Markov, 1990, p. 54            | Recent        | Recent        |
|                  |               |           | Eopericosmus Markov & Solovjev, 2001, p. 16 | Paleocene     | Oligocene     |

|            | Incertae sedis     |            |               | Adetaster Lambert, 1895, p. 162                | Eocene        | Eocene        |
|------------|--------------------|------------|---------------|--|---------------|---------------|
|            |                    |            |               | Cheopsia Fourtau, 1909, p. 149                 | Eocene        | Eocene        |
|            |                    |            |               | Mauritanaster Lambert, 1920b, p. 164           | L Eocene      | L Eocene      |
|            |                    |            |               | Polydesmaster Lambert, 1920b, p. 164           | Cenomanian    | Turonian      |
|            | Unifasciidae       | M Eocene   | M Eocene      | Unifascia Cooke, 1959, p. 79                   | M Eocene      | M Eocene      |
| Arbacioida | Acropeltinae       | Callovian  | Paleocene     | Acropeltis L. Agassiz, 1838, p. 4              | Callovian     | Tithonian     |
|            |                    |            |               | Goniopygus L. Agassiz, 1838, p. 19             | Tithonian     | L Paleocene   |
|            |                    |            |               | Mimiosalenia Smith, 1995, p. 147               | Maastrichtian | Maastrichtian |
|            | [Glyphopneustidae] | Cenomanian | Maastrichtian | Glyphopneustes Pomel, 1869, p. 40              | Cenomanian    | Maastrichtian |
|            | Arbaciidae         | Barremian  | Recent        | <i>Arbacia</i> Gray, 1835, p. 58               | Miocene       | Recent        |
|            |                    |            |               | Arbaciella Mortensen, 1910a, p. 327            | L Paleocene   | Recent        |
|            |                    |            |               | Podocidaris A. Agassiz, 1869, p. 258           | U Eocene      | Recent        |
|            |                    |            |               | Dialithocidaris A. Agassiz, 1898, p. 75        | Recent        | Recent        |
|            |                    |            |               | Habrocidaris A. Agassiz & Clark, 1907b, p. 234 | Recent        | Recent        |
|            |                    |            |               | Pygmaeocidaris Döderlein, 1905, p. 621         | Recent        | Recent        |
|            |                    |            |               | Codiopsis L. Agassiz,                          |               |               |
|            |                    |            |               | in Agassiz & Desor, 1846, p. 357               | Barremian     | L Paleocene   |
|            |                    |            |               | Coelopleurus L. Agassiz, 1840a, p. 12 19       | M Eocene      | Recent        |
|            |                    |            |               | Tetrapygus L. Agassiz, 1841b, p. 7             | Recent        | Recent        |
|            |                    |            |               | <i>Arbia</i> Cooke, 1948, p. 606               | U Oligocene   | L Miocene     |
|            |                    |            |               | Baueria Noetling, 1885, p. 184                 | L Paleocene   | Eocene        |
|            | Glypticidae        | Toarcian   | Kimmeridgian  | Glypticus L. Agassiz, 1840b, p. 95             | Callovian     | Kimmeridgian  |
|            |                    |            | _             | Atopechinus Thiéry, in Thiéry,                 |               | _             |
|            |                    |            |               | Lambert & Collignon, 1928, p. 100              | Toarcian      | Bathonian     |
|            |                    |            |               | Pleiocyphus Pomel, 1883, p. 82                 | Oxfordian     | Oxfordian     |
|            |                    |            |               | Pleurodiadema de Loriol,                       |               |               |
|            |                    |            |               | in Desor & de Loriol, 1870, p. 196             | Bathonian     | Kimmeridgian  |
|            |                    |            |               | Acrosaster Lambert, 1910b, p. 6                | Callovian     | Callovian     |
|            |                    |            |               | Brochechinus Lambert & Thiéry, 1908, p. 21     | Oxfordian     | Kimmeridgian  |

| Phymosomatoida  | Diplopodiidae          | Aalenian    | Cenomanian | Diplopodia McCoy, 1848, p. 412              | Aalenian      | Oxfordian     |
|-----------------|------------------------|-------------|------------|---|---------------|---------------|
|                 |                        |             |            | Strictotiara Lambert & Thiéry, 1925, p. 564 | Aptian        | Cenomanian    |
|                 |                        |             |            | Tetragramma L. Agassiz, 1838, p. 4          | Oxfordian     | Turonian      |
|                 |                        |             |            | Tiaromma Pomel, 1883, p. 105                | Albian        | Cenomanian    |
|                 | Emiratiidae [Emiratida | ae]Toarcian | Cenomanian | Emiratia Ali, 1990, p. 103                  | Albian        | Cenomanian    |
|                 |                        |             |            | Colpotiara Pomel, 1883, p. 105              | Oxfordian     | Oxfordian     |
|                 |                        |             |            | Polydiadema Lambert, 1888, p. 13            | Toarcian      | Cenomanian    |
|                 |                        |             |            | Loriolia Neumayr, 1881b, p. 570             | Neocomian     | Albian        |
|                 |                        |             |            | Allomma Pomel, 1883, p. 105                 | L Albian      | Cenomanian    |
|                 | Phymosomatidae         | Callovian   | U Eocene   | Phymosoma Haime,                            |               |               |
|                 |                        |             |            | in d'Archiac & Haime, 1853, p. 197          | Callovian     | L Paleocene   |
|                 |                        |             |            | Kachchhia Srivastava,                       |               |               |
|                 |                        |             |            | Gupta & Jauhri, 2008, p. 107                | M Eocene      | M Eocene      |
|                 |                        |             |            | Gauthieria Lambert, 1888, p. 7              | Cenomanian    | Paleocene     |
|                 |                        |             |            | Narindechinus Lambert, 1933, p. 30          | U Eocene      | U Eocene      |
|                 |                        |             |            | Actinophyma Cotteau & Gauthier, 1895, p. 96 | Campanian     | Maastrichtian |
|                 |                        |             |            | Acanthechinus Duncan & Sladen, 1882b, p. 34 | U Paleocene   | U Eocene      |
|                 |                        |             |            | Cosmocyphus Pomel, 1883, p. 91              | Campanian     | L Paleocene   |
|                 |                        |             |            | Diplotagma Schlüter, 1870, p. 132           | U Cretaceous  | U Cretaceous  |
|                 |                        |             |            | Pliocyphosoma Pomel, 1883, p. 90            | Santonian     | Campanian     |
|                 |                        |             |            | Trochalosoma Lambert, 1897, p. 515          | Maastrichtian | U Paleocene   |
|                 | Phymosomatids incer    | tae sedis   |            | Winkleria Engel, 1964, p. 207               | Maastrichtian | Maastrichtian |
|                 |                        |             |            | Plistophyma Péron & Gauthier, in Cotteau,   |               |               |
|                 |                        |             |            | Péron & Gauthier, 1881, p. 177              | Campanian     | Maastrichtian |
|                 |                        |             |            | Gomphechinus Pomel, 1883, p. 90             | Campanian     | Maastrichtian |
| Stomopneustoida | Stomopneustidae        | Bajocian    | Recent     | Stomopneustes L. Agassiz, 1841b, p. 7       | Recent        | Recent        |
|                 |                        |             |            | Phymotaxis Lambert & Thiéry, 1914, p. 253   | Bathonian     | Maastrichtian |
|                 |                        |             |            | Phymechinus Desor, 1856, p. 133             | Bajocian      | Maastrichtian |
|                 |                        |             |            | The device of the Object                    |               |               |
|                 |                        |             |            | Triadechinus H.L. Clark,                    |               |               |

|                                | Glyptocidaridae<br>Stomechinidae                       | Eocene<br>Toarcian                    | Recent<br>Eocene                | Glyptocidaris A. Agassiz, 1864, p. 356<br>Stomechinus Desor, 1856, p. 124<br>Tiarechinopsis Lambert, 1936b, p. 119<br>Echinotiara Pomel, 1883, p. 83<br>Thierychinus Lambert, 1910b, p. 5<br>Polycyphus L. Agassiz, | Eocene<br>Aalenian<br>Bajocian<br>Toarcian<br>Bajocian          | Recent<br>Aptian<br>Bajocian<br>Maastrichtian<br>Bajocian               |
|--------------------------------|--|---------------------------------------|---------------------------------|---|---|---|
|                                |  |                                       |                                 | in Agassiz & Desor, 1846, p. 361  Magnosia Michelin, 1853, p. 34  Eucosmechinus Lambert & Thiéry, 1914, p. 270  Diplechinus Lambert, 1931a, p. 15  Baronechinus Vadet, 2005, p. 29  Codechinus Desor, 1856, p. 111  | Bathonian Bajocian Oxfordian Pliensbachian Pliensbachian Aptian | Callovian Aptian Valanginian Pliensbachian Pliensbachian Eocene         |
| stem (Calycina<br>+ Echinacea) | Hemicidaridae<br>Pseudocidaridae<br>Pseudodiadematidae | Toarcian<br>Pliensbachian<br>Rhaetian | Valanginian<br>Aptian<br>Albian | Hemicidaris L. Agassiz, 1838, p. 3 Pseudocidaris Pomel, 1883, p. 95 Pseudodiadema McCoy, 1848, p. 412 Acrocidaris L. Agassiz, 1840b, p. 101 Hessotiara Pomel, 1883, p. 97 Stereopyga Pomel, 1883, p. 102            | Toarcian Pliensbachian Oxfordian Bathonian Bathonian Rhaetian   | Valanginian<br>Aptian<br>Aptian<br>Valanginian<br>Oxfordian<br>Toarcian |
| Echinacea incertae sedis       | Circopeltinae  | Turonian                              | Coniacian                       | Circopeltis Pomel, 1883, p. 81  | Turonian  | Coniacian   |
| Stem group<br>Echinacea        | Orthopsidae  | Bathonian                             | Maastrichtian                   | Orthopsis Cotteau, 1864, p. 550 Pseudorthopsis Sanchez Roig, 1949, p. 37  | Bathonian<br>Maastrichtian                                      | Maastrichtian<br>Maastrichtian  |
| Cidaroida                      | Cidaridae  | Bajocian                              | recent                          | Cidaris Leske, 1778, p. 74  Plegiocidaris Pomel, 1883, p. 109  Acanthocidaris Mortensen, 1903b, p. 21  Almucidaris Blake & Zinsmeister, 1991, p. 632  Calocidaris H.L. Clark, 1907, p. 211                          | Recent Bajocian Recent Maastrichtian Recent                     | Recent Aptian Recent Maastrichtian Recent                               |

|               |  | Centrocidaris A. Agassiz, 1904, p. 32                              | Recent  | Recent  |
|---------------|--|--|---|---|
|               |  | Chondrocidaris A. Agassiz, 1863, p. 18                             | U Miocene   | Recent  |
|               |  | Eucidaris Pomel, 1883, p. 109                                      | Oligocene   | Recent  |
|               |  | Hesperocidaris Mortensen, 1928b, p. 73                             | Recent  | Recent  |
|               |  | Phyllacanthus Brandt, 1835, p. 267                                 | U Oligocene   | Recent  |
|               |  | Plococidaris Mortensen, 1909, p. 51                                | Miocene   | Recent  |
|               |  | Prionocidaris A. Agassiz, 1863, p. 18                              | Albian  | Recent  |
|               |  | Stylocidaris Mortensen, 1909, p. 52                                | Miocene   | Recent  |
|               |  | Tretocidaris Mortensen, 1903b, p. 28                               | Recent  | Recent  |
|               |  | Triassicidaris Smith, 1994, p. 184                                 | Norian  | Norian  |
|               |  | Cyathocidaris Lambert, 1910a, p. 12                                | Santonian   | Paleocene   |
| Paleocene     | Recent                                       | Ctenocidaris Mortensen, 1910b, p. 3                                | Danian  | Recent  |
|               |  | Eurocidaris Mortensen, 1909, p. 3                                  | Recent  | Recent  |
|               |  | Aporocidaris A. Agassiz & Clark, 1907a, p. 36                      | Recent  | Recent  |
|               |  | Notocidaris Mortensen, 1909, p. 17                                 | Recent  | Recent  |
|               |  | Rhynchocidaris Mortensen, 1909, p. 5                               | Recent  | Recent  |
|               |  | Homalocidaris Mortensen, 1928b, p. 67                              | Recent  | Recent  |
| Pliensbachian | Valanginian                                  | Diplocidaris Desor, 1855, p. 44                                    | Pliensbachian   | Valanginian   |
|               |  | Tetracidaris Cotteau, 1872, p. 163                                 | Valanginian   | Valanginian   |
| Maastrichtian | Recent                                       | Goniocidaris Desor,  |   |   |
|               |  | in Agassiz & Desor, 1846, p. 337                                   | Maastrichtian   | Recent  |
|               |  | Austrocidaris H.L. Clark, 1907, p. 212                             | M Eocene  | Recent  |
|               |  | Ogmocidaris Mortensen, 1921, p. 151                                | Recent  | Recent  |
|               |  | Psilocidaris Mortensen, 1927, p. 282                               | Recent  | Recent  |
|               |  | Rhopalocidaris Mortensen, 1927, p. 272                             | Recent  | Recent  |
|               |  | Schizocidaris Mortensen, 1903b, p. 25                              | Recent  | Recent  |
| Cenomanian    | Recent                                       | Histocidaris Mortensen, 1903b, p. 22                               | Cenomanian  | Recent  |
| L Permian     | Bajocian                                     | Miocidaris Döderlein, 1887, p. 40                                  | Scythian  | Carnian   |
|               |  | Lenticidaris Kier, 1968b, p. 1000                                  | Spathian  | Spathian  |
|               |  | Eotiaris Lambert, 1900, p. 41                                      | L Permian   | Kazanian  |
|               |  | Couvelardicidaris Vadet, 1991, p. 97                               | Pliensbachian   | Bajocian  |
|               | Pliensbachian<br>Maastrichtian<br>Cenomanian | Pliensbachian Valanginian  Maastrichtian Recent  Cenomanian Recent | Chondrocidaris A. Agassiz, 1863, p. 18 Eucidaris Pomel, 1883, p. 109 Hesperocidaris Mortensen, 1928b, p. 73 Phyllacanthus Brandt, 1835, p. 267 Plococidaris Mortensen, 1909, p. 51 Prionocidaris Mortensen, 1909, p. 51 Prionocidaris Mortensen, 1909, p. 52 Tretocidaris Mortensen, 1903b, p. 28 Triassicidaris Smith, 1994, p. 184 Cyathocidaris Lambert, 1910a, p. 12 Paleocene Recent Ctenocidaris Mortensen, 1910b, p. 3 Eurocidaris Mortensen, 1909, p. 3 Aporocidaris A. Agassiz & Clark, 1907a, p. 36 Notocidaris Mortensen, 1909, p. 17 Rhynchocidaris Mortensen, 1909, p. 5 Homalocidaris Mortensen, 1909, p. 5 Homalocidaris Desor, 1855, p. 44 Tetracidaris Cotteau, 1872, p. 163 Maastrichtian Recent Goniocidaris Mortensen, 1921, p. 151 Psilocidaris Mortensen, 1921, p. 151 Psilocidaris Mortensen, 1927, p. 282 Rhopalocidaris Mortensen, 1903b, p. 25 Cenomanian Recent Histocidaris Mortensen, 1903b, p. 25 Cenomanian Recent Histocidaris Mortensen, 1903b, p. 22 L Permian Bajocian Miocidaris Döderlein, 1887, p. 40 Lenticidaris Kier, 1968b, p. 1000 Eotiaris Lambert, 1900, p. 41 | Chondrocidaris A. Agassiz, 1863, p. 18  Eucidaris Pomel, 1883, p. 109  Hesperocidaris Mortensen, 1928b, p. 73  Phyllacanthus Brandt, 1835, p. 267  Plococidaris Mortensen, 1909, p. 51  Prionocidaris Mortensen, 1909, p. 51  Miocene  Prionocidaris Mortensen, 1909, p. 52  Miocene  Tretocidaris Mortensen, 1909, p. 52  Tretocidaris Mortensen, 1903b, p. 28  Recent  Cyathocidaris Lambert, 1910a, p. 12  Paleocene  Recent  Ctenocidaris Mortensen, 1909, p. 3  Aporocidaris Mortensen, 1909, p. 3  Aporocidaris Mortensen, 1909, p. 3  Recent  Notocidaris Mortensen, 1909, p. 17  Recent  Notocidaris Mortensen, 1909, p. 17  Recent  Notocidaris Mortensen, 1909, p. 5  Recent  Pliensbachian  Valanginian  Diplocidaris Desor, 1855, p. 44  Pliensbachian  Tetracidaris Cotteau, 1872, p. 163  Maastrichtian  Recent  Goniocidaris Mortensen, 1921, p. 151  Recent  Psilocidaris Mortensen, 1927, p. 282  Recent  Recent  Psilocidaris Mortensen, 1927, p. 282  Recent  Recent  Recent  Histocidaris Mortensen, 1903b, p. 25  Recent  L Permian  Recent  Histocidaris Doderlein, 1887, p. 40  Lenticidaris Citeaus, 1800  Spathian  L Permian  L Permian  L Permian  L Permian |

|            |                    |               |            | Procidaris Pomel, 1883, p. 109              | Carnian       | Pliensbachian |
|------------|--------------------|---------------|------------|---|---------------|---------------|
|            |                    |               |            | Leurocidaris Kier, 1977b, p. 20             | Carnian       | Carnian       |
|            | Polycidaridae      | Carnian       | Albian     | Polycidaris Quenstedt, 1858, p. 644         | Carnian       | Albian        |
|            | ,                  |               |            | Zbindenicidaris Vadet, 1991, p. 133         | Rhaetian      | Bajocian      |
|            |                    |               |            | Nudicidaris Vadet, 1991, p. 113             | Bathonian     | Albian        |
|            |                    |               |            | Paracidaris Pomel, 1883, p. 109             | Oxfordian     | Kimmeridgian  |
|            |                    |               |            | Anisocidaris Thiéry, 1928, p. 180           | Bajocian      | Kimmeridgian  |
|            |                    |               |            | Alpicidaris Lambert, 1910b, p. 4            | Hauterivian   | Hauterivian   |
|            | Psychocidaridae    | Toarcian      | Recent     | Psychocidaris Ikeda, 1935, p. 386           | Recent        | Recent        |
|            | r cychicoladhadc   | i dai diaii   | . 1000111  | Sardocidaris Lambert, 1907, p. 22           | Maastrichtian | Miocene       |
|            |                    |               |            | Roseicidaris Vadet, 1991, p. 86             | Toarcian      | Toarcian      |
|            |                    |               |            | Balanocidaris Lambert, 1910a, p. 4          | Oxfordian     | Tithonian     |
|            |                    |               |            | Caenocidaris Thiéry, 1928, p. 180           | Aalenian      | Bajocian      |
|            |                    |               |            | Oedematocidaris Smith & Wright, 1989, p. 33 | Cenomanian    | Maastrichtian |
|            |                    |               |            | Tylocidaris Pomel, 1883, p. 109             | U Albian      | U Paleocene   |
|            | Rhabdocidaridae    | Aalenian      | Miocene    | Rhabdocidaris Desor, 1855, p. 39            | Aalenian      | Kimmeridgian  |
|            | Titlababblaanaab   | , tarornari   | 1111000110 | Porocidaris Desor, 1855, p. 46              | L Eocene      | M Eocene      |
|            |                    |               |            | Laurenticidaris Vadet, 1991, p. 143         | Aalenian      | Bajocian      |
|            |                    |               |            | Fellius Cutress, 1980, p. 116               | Eocene        | Miocene       |
|            | Stereocidaridae    | Aptian        | Recent     | Stereocidaris Pomel, 1883, p. 110           | Aptian        | Recent        |
|            | Cicrocoladilado    | , ipilali     | rtocom     | Hirudocidaris Smith & Wright, 1989, p. 78   | U Albian      | Campanian     |
|            |                    |               |            | Phalacrocidaris Lambert, 1902, p. 26        | Cenomanian    | Recent        |
|            |                    |               |            | Temnocidaris Cotteau, 1863, p. 355          | Campanian     | L Paleocene   |
|            |                    |               |            | Sinaecidaris Fourtau, 1921, p. 9            | Aptian        | Aptian        |
|            | [Typocidaridae]    |               |            | Typocidaris Pomel, 1883, p. 111             | Aptian        | Aptian        |
|            | Triadotiaridae     | Anisian       | Ladinian   | Triadotiaris Hagdorn, 1995, p. 250          | Anisian       | Ladinian      |
|            |                    |               |            |   |               |               |
| spido-     |                    | Dianakaski    | Dagart     | Apridadiadama A Aprilia 1070 = 100          | Dagart        | Dagant        |
| adematoida | Aspidodiadematidae | Pliensbachian | Recent     | Aspidodiadema A. Agassiz, 1878, p. 188      | Recent        | Recent        |
|            |                    |               |            | Plesiodiadema Pomel, 1883, p. 106           | Recent        | Recent        |
|            |                    |               |            | Gymnotiara Pomel, 1883, p. 101              | Pliensbachian | Oxfordian     |
|            |                    |               |            |   |               |               |

| Echinothrix Peters, 1853, p. 484  Astropyga Gray, 1825, p. 426  Recent Recent Recent  Recent Recent  Recent Recent  Recent Recent  Recent Recent  Recent Recent  Recent Recent  Recent  Recent Recent  |                 |                     |            |               | Culozoma Vadet & Slowik, 2001, p. 35       | Bajocian   | Bajocian      |
|--|-----------------|---------------------|------------|---------------|--|------------|---------------|
| Astropyga Gray, 1825, p. 426 Lissodiadema Mortensen, 1903c, p. 393 Recent Recent Recent Chaetodiadema Mortensen, 1903c, p. 393 Recent R | Diadematoida    | Diadematidae        | Santonian  | Recent        | <i>Diadema</i> Gray, 1825, p. 426          | Recent     | Recent        |
| Lissodiadema Mortensen, 1903c, p. 393 Recent Recent Chaetodiadema Mortensen, 1903c, p. 393 Recent Recent Recent Goniodiadema Mortensen, 1903a, p. 1 Recent R |                 |                     |            |               | Echinothrix Peters, 1853, p. 484           | Recent     | Recent        |
| Chaetodiadema Mortensen, 1903a, p. 1 Recent Recent Goriodiadema Mortensen, 1939, p. 549 Recent Recent Eremopyga A. Agassiz & Clark, 1908, p. 110 Recent Santonian Recent Centrostephanus Peters, 1855, p. 109 Santonian Recent Centrostephanus Peters, 1855, p. 109 Santonian Recent Deviational Peters (1908, p. 110 Recent Santonian Recent Mastrichtian Heterodiadema Duncan, 1889, p. 81 Sinemurian Toarcian Cenomanian Heterodiadema de Loriol, 1900, p. 70 Aptian Maastrichtian Heterodiadema de Loriol, 1890, p. 58 Bathonian Kimmeridgian Farquharsonia Currie, 1927, p. 416 Bathonian Callovian Micropygoida Micropygidae L Eocene Recent Micropyga A. Agassiz, 1879, p. 200 Recent Bathonian Callovian Recent Kierechinus Philip, 1963a, p. 1104 L Eocene L Eocene Pelanodiademinae Bajocian Bajocian Pelanodiadema Hess, 1972, p. 42 Bajocian Bajocian Bajocian Recent |                 |                     |            |               | Astropyga Gray, 1825, p. 426               | Recent     | Recent        |
| Goniodiadema Mortensen, 1939, p. 549 Eremopyga A. Agassiz & Clark, 1908, p. 110 Recent Recent Recent Centrostephanus Peters, 1855, p. 109 Santonian Recent Centrostephanus Peters, 1855, p. 109 Santonian Recent Retanious Philip, 1963a, p. 1104 Lecene Retanious Philip, 1963a, p. 1104 Lecene Retanious Philip, 1963a, p. 1104 Recent Retanious Pelanodiadema Hess, 1972, p. 42 Recent Retanious Philip, 1963a, p. 1104 Recent Retanious Pelanodiadema Hess, 1972, p. 42 Recent Retanious Philip, 1963a, p. 104 Recent Retanious Pelanodiadema Hess, 1972, p. 42 Recent Retanious Pelanodiadema Hess, 1972, p. 42 Recent |                 |                     |            |               | Lissodiadema Mortensen, 1903c, p. 393      | Recent     | Recent        |
| Fermopyga A. Agassiz & Clark, 1908, p. 110   Recent   Recent   Centrostephanus Peters, 1855, p. 109   Santonian   Recent   Sinemurian   Toarcian   Eodiadema Duncan, 1889, p. 81   Sinemurian   Toarcian   Cenomanian   Toarcian   Cenomanian   Toarcian   Cenomanian   Toarcian   Cenomanian   Toarcian   Cenomanian   Trochodiadema de Loriol, 1800, p. 70   Aptian   Maastrichtian   Monodiadema de Loriol, 1890, p. 58   Bathonian   Kimmeridgian   Kimmeridgian   Callovian   Micropygidae   L. Eocene   Recent   Micropyga A. Agassiz, 1879, p. 200   Recent   Recent   Kierechinus Philip, 1963a, p. 1104   L. Eocene   L. Eocene   Pelanodiademinae   Bajocian   Bajocian   Pelanodiadema Hess, 1972, p. 42   Bajocian   Bajocian   Bajocian   Bajocian   Pelanodiadema   Micropygia   Recent     |                 |                     |            |               | Chaetodiadema Mortensen, 1903a, p. 1       | Recent     | Recent        |
| Heterodiadematidae   Sinemurian   Toarcian   Eodiadema Duncan, 1889, p. 81   Sinemurian   Toarcian   Eodiadema Duncan, 1889, p. 81   Sinemurian   Toarcian   Eodiadema Duncan, 1889, p. 81   Sinemurian   Toarcian   Cenomanian   Cenomanian   Cenomanian   Cenomanian   Cenomanian   Maastrichtian   Heterodiadema de Loriol, 1900, p. 70   Aptian   Maastrichtian   Monodiadema de Loriol, 1890, p. 58   Bathonian   Callovian   Micropygidae   L. Eocene   Recent   Micropyga A. Agassiz, 1879, p. 200   Recent   Recent   Recent   Kierechinus Phillip, 1963a, p. 1104   L. Eocene   L. Eocene   L. Eocene   Delanodiademinae   Bajocian   Bajocian   Pelanodiadema Hess, 1972, p. 42   Bajocian   Bajocian   Bajocian   Bajocian   Bajocian   Pelanodiadema Hess, 1972, p. 42   Bajocian   Bajocian   Bajocian   Recent   Rec   |                 |                     |            |               | Goniodiadema Mortensen, 1939, p. 549       | Recent     | Recent        |
| Heterodiadematidae  Bathonian  Cenomanian  Aptian  Maastrichtian  Monodiadema de Loriol, 1900, p. 70  Monodiadema de Loriol, 1890, p. 58  Bathonian  Bathonian  Callovian  Bathonian  Callovian  Micropygoida  Micropygidae  L Eocene  Recent  Micropyga A. Agassiz, 1879, p. 200  Recent  Kierechinus Philip, 1963a, p. 1104  L Eocene  Bajocian  Bathonian  Cenomanian  Kimmeridgian  Cenoth  Recent  Micropyga A. Agassiz, 1879, p. 200  Recent  Recent  Recent  Recent  Recent  Recent  Recent  Hajocoma Mortensen, 1903b, p. 64  Recent  Re |                 |                     |            |               | Eremopyga A. Agassiz & Clark, 1908, p. 110 | Recent     | Recent        |
| Heterodiadematidae Bathonian Maastrichtian Heterodiadema Cotteau, 1862, p. 75 Cenomanian Cenomanian Trochodiadema de Loriol, 1900, p. 70 Aptian Maastrichtian Monodiadema de Loriol, 1890, p. 58 Bathonian Kimmeridgian Earquharsonia Currie, 1927, p. 416 Bathonian Callovian  Micropygoida Micropygidae L Eocene Recent Micropyga A. Agassiz, 1879, p. 200 Recent Recent Kierechinus Philip, 1963a, p. 1104 L Eocene L Eocene Bajocian Bajocian Pelanodiadema Hess, 1972, p. 42 Bajocian Bajocian Bajocian  Echinothurioida Echinothuriidae M Micropyga A. Agassiz, 1879, p. 200 Recent L Eocene Bajocian Bajocian Bajocian Pelanodiadema Hess, 1972, p. 42 Bajocian Araeosoma Mortensen, 1903b, p. 64 Recent Recent Recent Recent Hygrosoma Mortensen, 1903b, p. 53 Pliocene Recent Recent Kamptosoma Mortensen, 1903b, p. 59 Recent Recent Recent Recent Paraphormosoma Mortensen, 1903b, p. 60 Recent Recent Recent Paraphormosoma Mortensen, 1903b, p. 60 Recent Recent Recent Recent Paraphormosoma Mortensen, 1934, p. 162 Recent Recent Recent Paraphormosoma Mortensen, 1934, p. 162 Recent Recent Recent Paraphormosoma Mortensen, 1934, p. 162 Recent Recent Recent Recent Paraphormosoma Mortensen, 1934, p. 162 Recent Recent Recent Recent Paraphormosoma Mortensen, 1934, p. 162 Recent Recent Recent Recent Paraphormosoma Mortensen, 1934, p. 162 Recent Recent Recent Recent Paraphormosoma Mortensen, 1934, p. 162 Recent Recent Recent Recent Parap |                 |                     |            |               | Centrostephanus Peters, 1855, p. 109       | Santonian  | Recent        |
| Trochodiadema de Loriol, 1900, p. 70 Monodiadema de Loriol, 1890, p. 58 Farquharsonia Currie, 1927, p. 416  Micropygoida  Micropygidae  L Eocene Recent Micropyga A. Agassiz, 1879, p. 200 Recent Kierechinus Philip, 1963a, p. 1104 L Eocene L Eocene Pelanodiademinae Bajocian  Recent Recent Recent Micropyga A. Agassiz, 1879, p. 200 Recent L Eocene L Eocene L Eocene L Eocene L Eocene Recent Retzneiosoma Hess, 1972, p. 42  Bajocian  Echinothurioida  Echinothuriidae  M Miocene Recent Recent Retzneiosoma Kroh, 2005, p. 14 Hapalosoma Mortensen, 1903b, p. 64 Recent Recent Recent Asthenosoma Grube, 1868, p. 42 Recent Recent Recent Araeosoma Mortensen, 1903b, p. 53 Pliocene Recent Recent Recent Araeosoma Mortensen, 1903b, p. 59 Recent Rece |                 |                     | Sinemurian | Toarcian      | Eodiadema Duncan, 1889, p. 81              | Sinemurian | Toarcian      |
| Micropygoida Micropygidae L Eocene Recent Micropyga A. Agassiz, 1879, p. 200 Recent L Eocene L Eocene Pelanodiademinae Bajocian Bajocian Pelanodiadema Hess, 1972, p. 42 Bajocian Bajocian Bajocian Pelanodiadema Micropyga A. Agassiz, 1879, p. 200 Recent L Eocene L Eocene Delanodiademinae Bajocian Bajocian Pelanodiadema Hess, 1972, p. 42 Bajocian Cateria Woodward, 1863, p. 327 Santonian L Paleocene Majocene Majocian Mortensen, 1903b, p. 64 Recent Recent Recent Recent Paraphormosoma Mortensen, 1903b, p. 65 Recent Paraphormosoma Mortensen, 1903b, p. 60 Recent Recent Recent Paraphormosoma Mortensen, 1934, p. 162 Recent Recent Recent Recent Paraphormosoma Mortensen, 1934, p. 163 Recent Recent Recent Recent Recent Paraphormosoma Mortensen, 1934, p. 163 Recent Recent Recent Recent Recent Recent Paraphormosoma Mortensen, 1934, p. 163 Recent R |                 | Heterodiadematidae  | Bathonian  | Maastrichtian | Heterodiadema Cotteau, 1862, p. 75         | Cenomanian | Cenomanian    |
| Micropygoida Micropygidae L Eocene Recent Micropyga A. Agassiz, 1879, p. 200 Recent L Eocene L Eocene Pelanodiademinae Bajocian Bajocian Pelanodiadema Hess, 1972, p. 42 Bajocian Bajocian Bajocian  Echinothurioida Echinothuriidae M Micropyga A. Agassiz, 1879, p. 200 Recent L Eocene L Eocene Delanodiademinae Bajocian Bajocian Pelanodiadema Hess, 1972, p. 42 Bajocian Bajocian  Echinothurioida Echinothuriidae M Micropyga A. Agassiz, 1879, p. 200 Recent Delanodiadema Hess, 1972, p. 42 Bajocian Bajocian  Echinothurioida Echinothuriidae M Micropyga A. Agassiz, 1879, p. 42 Bajocian Bajocian  Echinothurioida Echinothuriidae M Micropyga A. Agassiz, 1879, p. 42 Bajocian Bajocian  Echinothurioida Woodward, 1863, p. 327 Santonian L Paleocene M Micropyga M Micropyga M Micropyga M Recent Recent Recent M M Micropyga M M M Micropyga M M M Micropyga M Polanodian M M Micropyga M M M M M M M M M M M M M M M M M M M   |                 |                     |            |               | Trochodiadema de Loriol, 1900, p. 70       | Aptian     | Maastrichtian |
| Micropygoida Micropygidae L Eocene Recent Micropyga A. Agassiz, 1879, p. 200 Recent L Eocene L Eocene Pelanodiademinae Bajocian Bajocian Pelanodiadema Hess, 1972, p. 42 Bajocian Bajocian Bajocian  Echinothurioida Echinothuriidae M Miocene Recent Echinothuria Woodward, 1863, p. 327 Santonian L Paleocene Retzneiosoma Kroh, 2005, p. 14 M Miocene M Miocene Hapalosoma Mortensen, 1903b, p. 64 Recent Rece |                 |                     |            |               | Monodiadema de Loriol, 1890, p. 58         | Bathonian  | Kimmeridgian  |
| Recent Re |                 |                     |            |               | Farquharsonia Currie, 1927, p. 416         | Bathonian  | Callovian     |
| Pelanodiademinae Bajocian Bajocian Pelanodiadema Hess, 1972, p. 42 Bajocian Bajocian  Echinothurioida Echinothuriidae M Miocene Recent Recent Retzneiosoma Kroh, 2005, p. 14 M Miocene M Miocene Hapalosoma Mortensen, 1903b, p. 64 Recent Recen | Micropygoida    | Micropygidae        | L Eocene   | Recent        | Micropyga A. Agassiz, 1879, p. 200         | Recent     | Recent        |
| Echinothurioida Echinothuriidae M Miocene Recent Echinothuria Woodward, 1863, p. 327 Santonian L Paleocene Retzneiosoma Kroh, 2005, p. 14 M Miocene M Miocene Hapalosoma Mortensen, 1903b, p. 64 Recent Recent Asthenosoma Grube, 1868, p. 42 Recent Recent Calveriosoma Mortensen, 1934, p. 163 Recent Recent Araeosoma Mortensen, 1903b, p. 53 Pliocene Recent Hygrosomatinae Recent Recent Hygrosoma Mortensen, 1903b, p. 59 Recent Recent Kamptosomatidae Recent Recent Recent Recent Recent Paraphormosomatinae Recent Recent Recent Paraphormosoma Mortensen, 1903b, p. 60 Recent Recent Recent Paraphormosomatinae Recent Recent Paraphormosoma Mortensen, 1934, p. 162 Recent Recent Recent Pelanechinidae Oxfordian Oxfordian Pelanechinus Keeping, 1878, p. 924 Oxfordian Oxfordian  |                 |                     |            |               | Kierechinus Philip, 1963a, p. 1104         | L Eocene   | L Eocene      |
| Retzneiosoma Kroh, 2005, p. 14 M Miocene M Miocene Hapalosoma Mortensen, 1903b, p. 64 Recent Recent Asthenosoma Grube, 1868, p. 42 Recent Recent Calveriosoma Mortensen, 1934, p. 163 Recent Recent Araeosoma Mortensen, 1903b, p. 53 Pliocene Recent Hygrosomatinae Recent Recent Hygrosoma Mortensen, 1903b, p. 59 Recent Recent Kamptosomatidae Recent Recent Kamptosoma Mortensen, 1903b, p. 60 Recent Recent Paraphormosomatinae Recent  |                 | Pelanodiademinae    | Bajocian   | Bajocian      | Pelanodiadema Hess, 1972, p. 42            | Bajocian   | Bajocian      |
| Hapalosoma Mortensen, 1903b, p. 64  Asthenosoma Grube, 1868, p. 42  Recent  Recent  Calveriosoma Mortensen, 1934, p. 163  Recent  Recent  Hygrosomatinae  Recent  Recent  Hygrosomatinae  Recent  Recent  Hygrosoma Mortensen, 1903b, p. 53  Pliocene  Recent  Recent  Hygrosoma Mortensen, 1903b, p. 59  Recent  Recent  Kamptosomatidae  Recent  Recent  Recent  Recent  Recent  Hygrosoma Mortensen, 1903b, p. 60  Recent  Recent  Paraphormosomatinae  Recent  Recent  Recent  Paraphormosoma Mortensen, 1934, p. 162  Recent  Rec | Echinothurioida | Echinothuriidae     | M Miocene  | Recent        | Echinothuria Woodward, 1863, p. 327        | Santonian  | L Paleocene   |
| Asthenosoma Grube, 1868, p. 42 Recent Calveriosoma Mortensen, 1934, p. 163 Recent Recent Araeosoma Mortensen, 1903b, p. 53 Pliocene Recent Hygrosomatinae Recent Kamptosomatidae Recent Recent Recent Kamptosomatidae Recent Recent Recent Paraphormosomatinae Recent |                 |                     |            |               | Retzneiosoma Kroh, 2005, p. 14             | M Miocene  | M Miocene     |
| Calveriosoma Mortensen, 1934, p. 163 Recent Recent Araeosoma Mortensen, 1903b, p. 53 Pliocene Recent Hygrosomatinae Recent Kamptosomatidae Recent Recent Recent Recent Paraphormosomatinae Recent Rece |                 |                     |            |               | Hapalosoma Mortensen, 1903b, p. 64         | Recent     | Recent        |
| Araeosoma Mortensen, 1903b, p. 53 Pliocene Recent Hygrosomatinae Recent Recent Hygrosoma Mortensen, 1903b, p. 59 Recent Recent Kamptosomatidae Recent Recent Kamptosoma Mortensen, 1903b, p. 60 Recent Recent Paraphormosomatinae Recent Recent Paraphormosoma Mortensen, 1934, p. 162 Recent Recent Pelanechinidae Oxfordian Oxfordian Pelanechinus Keeping, 1878, p. 924 Oxfordian Oxfordian   |                 |                     |            |               | Asthenosoma Grube, 1868, p. 42             | Recent     | Recent        |
| HygrosomatinaeRecentRecentHygrosoma Mortensen, 1903b, p. 59RecentRecentKamptosomatidaeRecentRecentKamptosoma Mortensen, 1903b, p. 60RecentRecentParaphormosomatinaeRecentRecentParaphormosoma Mortensen, 1934, p. 162RecentRecentPelanechinidaeOxfordianOxfordianPelanechinus Keeping, 1878, p. 924OxfordianOxfordian  |                 |                     |            |               | Calveriosoma Mortensen, 1934, p. 163       | Recent     | Recent        |
| Kamptosomatidae Recent Recent Kamptosoma Mortensen, 1903b, p. 60 Recent Recent Paraphormosomatinae Recent Recent Paraphormosoma Mortensen, 1934, p. 162 Recent Recent Pelanechinidae Oxfordian Oxfordian Pelanechinus Keeping, 1878, p. 924 Oxfordian Oxfordian  |                 |                     |            |               | Araeosoma Mortensen, 1903b, p. 53          | Pliocene   | Recent        |
| Paraphormosomatinae Recent Recent Paraphormosoma Mortensen, 1934, p. 162 Recent Recent Pelanechinidae Oxfordian Oxfordian Pelanechinus Keeping, 1878, p. 924 Oxfordian Oxfordian   |                 | Hygrosomatinae      | Recent     | Recent        | Hygrosoma Mortensen, 1903b, p. 59          | Recent     | Recent        |
| Pelanechinidae Oxfordian Oxfordian Pelanechinus Keeping, 1878, p. 924 Oxfordian Oxfordian  |                 | Kamptosomatidae     | Recent     | Recent        | Kamptosoma Mortensen, 1903b, p. 60         | Recent     | Recent        |
| 1 3/ /1  |                 | Paraphormosomatinae | Recent     | Recent        | Paraphormosoma Mortensen, 1934, p. 162     | Recent     | Recent        |
| Phormosomatidae Recent Recent Phormosoma Thomson, 1872b, p. 493 M Miocene Recent   |                 | Pelanechinidae      | Oxfordian  | Oxfordian     | Pelanechinus Keeping, 1878, p. 924         | Oxfordian  | Oxfordian     |
|  |                 | Phormosomatidae     | Recent     | Recent        | Phormosoma Thomson, 1872b, p. 493          | M Miocene  | Recent        |

|            | Sperosomatinae   | Recent     | Recent        | Sperosoma Koehler, 1897, p. 304           | Recent        | Recent        |
|------------|------------------|------------|---------------|---|---------------|---------------|
| Pedinoida  | Pedinidae        | Rhaetian   | Recent        | Pedina L. Agassiz, 1838, p. 4             | Bajocian      | Kimmeridgian  |
|            |                  |            |               | Caenopedina A. Agassiz, 1869, p. 256      | Bajocian      | Recent        |
|            |                  |            |               | Diademopsis Desor, 1855, p. 79            | Rhaetian      | Sinemurian    |
|            |                  |            |               | Echinopedina Cotteau, 1866, p. 117        | L Eocene      | U Eocene      |
|            |                  |            |               | Hemipedina Wright, 1855, p. 95            | Pliensbachian | Bathonian     |
|            |                  |            |               | Leiopedina Cotteau, 1866, p. 114          | Eocene        | Eocene        |
|            |                  |            |               | Leptocidaris Quenstedt, 1858, p. 644      | Oxfordian     | Oxfordian     |
|            |                  |            |               | Palaeopedina Lambert, 1900, p. 22         | Hettangian    | Sinemurian    |
|            |                  |            |               | Phymopedina Pomel, 1883, p. 100           | Bathonian     | Tithonian     |
|            |                  |            |               | Pseudopedina Cotteau, 1858, p. 9          | Bajocian      | Oxfordian     |
|            |                  |            |               | Thieulinipedina Vadet et al., 1996, p. 43 | Callovian     | Callovian     |
| stem group |                  |            |               |   |               |               |
| Cidaroida  | Paurocidaridae   | Carnian    | Carnian       | Paurocidaris Kier, 1977b, p. 18           | Carnian       | Carnian       |
|            | Serpianotiaridae | Anisian    | Carnian       | Serpianotiaris Jeannet, 1933, p. 1        | Anisian       | Carnian       |
|            | Tiarechinidae    | Carnian    | Carnian       | Tiarechinus Neumayr, 1881a, p. 169        | Carnian       | Carnian       |
|            | Triadocidaridae  | Carnian    | Nornian       | Triadocidaris Döderlein, 1887, p. 39      | Carnian       | Carnian       |
|            |                  |            |               | Levicidaris Kier, 1977b, p. 21            | Carnian       | Carnian       |
|            |                  |            |               | Megaporocidaris Kier, 1977b, p. 22        | Carnian       | Carnian       |
|            |                  |            |               | Mikrocidaris Döderlein, 1887, p. 39       | Carnian       | Carnian       |
|            |                  |            |               | Parvicidaris Smith, 1994, p. 194          | U Triassic    | U Triassic    |
|            |                  |            |               | Vinchuscanchaia Smith, 1994, p. 193       | U/L Triassic  | U/L Jurassic  |
|            |                  |            |               | Zardinechinus Kier, 1977b, p. 16          | Carnian       | Nornian       |
| Salenioida | Acrosaleniidae   | Hettangian | Maastrichtian | Acrosalenia L. Agassiz, 1840b, p. 38      | Hettangian    | Tithonian     |
|            |                  |            |               | Metacrosalenia Currie, 1925, p. 55        | Bathonian     | Callovian     |
|            |                  |            |               | <i>Milnia</i> Haime, 1849, p. 217         | Callovian     | Valanginian   |
|            |                  |            |               | Heterosalenia Cotteau, 1861, p. 96        | Bathonian     | Maastrichtian |
|            |                  |            |               | Polysalenia Mortensen, 1932, p. 490       | Campanian     | Campanian     |

| stem Echinoidea | Archaeocidaridae | _ : :::30000 |            | Archaeocidaris McCoy, 1844, p. 173        | Tournasian  | Missourian  |
|-----------------|------------------|--------------|------------|---|-------------|-------------|
|                 | Salenocidarini   | L Paleocene  | Recent     | Salenocidaris A. Agassiz, 1869, p. 254    | L Paleocene | Recent      |
|                 |                  |              |            | Platysalenia Smith & Wright, 1990, p. 167 | Albian      | Albian      |
|                 |                  |              |            | Pleurosalenia Pomel, 1883, p. 94          | Campanian   | U Eocene    |
|                 |                  |              |            | Leptosalenia Smith & Wright, 1990, p. 134 | Aptian      | Cenomanian  |
|                 |                  |              |            | Bathysalenia Pomel, 1883, p. 94           | Albian      | Recent      |
|                 |                  |              |            | Novasalenia Zítt & Geys, 2003, p. 24      | Cenomanian  | Cenomanian  |
|                 |                  |              |            | Salenidia Pomel, 1883, p. 94              | U Albian    | Santonian   |
|                 | Saleniidae       | Barremian    | Recent     | Salenia Gray, 1835, p. 58                 | Barremian   | Recent      |
|                 | Pseudosaleniidae | Oxfordian    | Cenomanian | Pseudosalenia Cotteau, 1859, p. 22        | Oxfordian   | Cenomanian  |
|                 |                  |              |            | Poropeltaris Quenstedt, 1875, p. 242      | Oxfordian   | Oxfordian   |
|                 |                  |              |            | Goniophorus L. Agassiz, 1838, p. 30       | U Albian    | Cenomanian  |
|                 | Hyposaleniinae   | Oxfordian    | Cenomanian | Hyposalenia Desor, 1856, p. 147           | Tithonian   | L Paleocene |
|                 | Holosaleniini    | Cenomanian   | Campanian  | Holosalenia Smith & Wright, 1990, p. 130  | Cenomanian  | Campanian   |
|                 |                  |              |            | Prosalenia Vadet et al., 1996, p. 84      | Callovian   | Callovian   |