**Appendix 6 – Synapomorphies**

List of common synapomorphies of the clades of interest mentioned in the text. Synapomorphies are indicated for the three most representatives topologies (implied weighted searches with k=11, 32, and 45).

Clade 1 (Cyclocardida)

Mean size near 17 mm (c. 2: 17.7 to 18 mm 🡪 17 mm) (k=11)

Subrounded outline in juvenile shells (c. 4: 1 🡪 3) (k=11, 32, 45)

Absence of elongation of outline in anterior-posterior direction (c. 5: 0 🡪 1) (k=11, 32, 45)

Lunule sculptured only by comarginal lines (c. 38: 0 🡪 1) (k=11, 32, 45)

Fifth or sixth posterior radial rib equally developed than previous ones (c. 120: 0 🡪 1) (k=11, 32, 45)

Clade 2 (*C. moniliata* + ((Miodomeridinae + *Pleuromeris*) + Scalaricarditinae))

Mean size near 5 to 6 mm (c. 2: 11 mm 🡪 5 to 6 mm) (k=11, 32, 45)

Umbones subcentrally placed (c. 25: 1 🡪 2) (k=11, 32)

Not very wide radial ribs in adult shells (c. 100: 0 🡪 1) (k=11, 32)

Clade 3 (Miodomeridinae + *Pleuromeris*)

15 to 17 radial ribs (c. 1: 22 🡪 15 to 17) (k=11, 32, 45)

Subtrigonal outline in juvenile shells (c. 4: 3 🡪 2) (k=11, 32, 45)

Softly marked angle between posterior and dorsal margins (c. 13: 2 🡪 0) (l=11, 32)

Very deep lunule (c. 36: 0 🡪 1) (k=11, 32, 45)

Left anterior tooth higher towards dorsal (c. 79: 3 🡪 1) (k=11, 32, 45)

Left posterior tooth higher towards ventral (c. 84: 2 🡪 0) (k=11, 32, 45)

Posterior area absent (c. 119: 1 🡪 3) (k=11, 32, 45)

Equally developed comarginal nodes in post-juvenile shells throughout ontogeny (c. 128: 2 🡪 0) (k=11, 32, 45)

Clade 4 (*C. chamaeformis* + *C. kickxi*)

18 to 20 radial ribs (c. 1: 25 🡪 18 to 20) (k=11, 32, 45)

Clade 5 (Scalaricarditinae)

25 radial ribs (c. 1: 22 🡪 25) (k=11, 32, 45)

Slightly truncated posterior margin (c. 10: 0 🡪 2) (k=11, 32, 45)

Slightly marked lunule (c. 37: 0 🡪 1) (k=11, 32, 45)

Radial ribs wider towards posterior (c. 101: 1 🡪 0) (k=11, 32, 45)

Small-sized comarginal nodes (c. 125: 0 🡪 1) (k=11, 32, 45)

Subtriangular-shaped crenulations (c. 144: 0 🡪 1) (k=11, 32, 45)

Clade 6 (Miodomeridinae + *Pleuromeris*) + Scalaricarditinae))

Subtrigonal outline in adult shells (c. 3: 5 🡪 3) (k=11, 32)

Dorsal margin descended (c. 14: 2 🡪 1) (l=45)

Pointed umbones outline in dorsal view (c. 14: 1 🡪 0) (l=45)

Right lunule larger than left lunule (c. 42: 1 🡪 0) (k=11, 32, 45)

Right lunule edge projected as a sheet (c. 43: 1 🡪 0) (k=11, 32, 45)

Right posterior tooth with an angle of more than 35º from horizontal (c. 64: 1 🡪 0) (k=11, 32, 45)

Straight left posterior tooth (c. 85: 0 🡪 2) (k=11, 32, 45)

Radial ribs never smoothed in some region of the valve (c. 110: 2 🡪 0) (k=11, 32, 45)

V-shaped cross-section of interspaces in adult shell (c. 116: 2 🡪 0) (k=32)

Presence of cancelled aspect given by comarginal nodes and radial sculpture (c. 127: 0 🡪 1) (k=11, 32, 45)

Clade 7 (*C. calvertensis* + *C. granulata* + *C. castrana* + *C. vautrotorum*)

Right anterior tooth very little prominent (c. 52: 0 🡪 4)) (k=45)

Height of pallial line a quarter of total valve height (c. 139: 1 🡪 0) (k=45)

Clade 8 (*Oesterheldia*)

Mean size near 10 mm (c. 2: 11.6 mm 🡪 10.86 mm) (k=45)

Moderately high umbonal area convexity (c. 26: 3 🡪 0) (k=11, 32, 45)

Left anterior tooth with an angle of more than 90º from horizontal (c. 77: 4 🡪 3) (k=11, 32, 45)

Extreme tips of radial ribs extending over the shell margin on internal view (c. 148: 1 🡪 0) (k=11, 32, 45)

Clade 9 (*Hippocampocardia*)

Slightly projected posterior-dorsal margin (c. 7: 1 🡪 0) (k=11, 32, 45)

Slightly projected posterior-ventral margin (c. 8: 1 🡪 0) (k=11, 32, 45)

Softly marked angle between posterior and dorsal margins (c. 13: 2 🡪 0) (k=11, 32, 45)

Strongly rounded outline of umbones in internal view (c. 28: 0 🡪 2) (k=32)

Slightly marked lunule (c. 37: 0 🡪 1) (k=11, 32, 45)

Smooth lunule (c. 38: 1 🡪 0) (k=11, 32, 45)

Convex lunule (c. 40: 0 🡪 2) (k=11, 32, 45)

Small-sized lunule (c. 41: 2 🡪 0) (k=11, 32, 45)

Right anterior tooth very little prominent (c. 51: 0 🡪 4) (k=45)

Apex of middle tooth not reaching the dorsal extreme of hinge (c. 61: 0 🡪 1) (k=11, 32, 45)

Posterior tooth not reaching the apex of middle tooth (c. 69: 0 🡪 1) (k=11, 32, 45)

Ventral edge of right hinge invaginated to dorsal (c. 71: 0 🡪 2) (k=32)

Cross-section of radial ribs in juvenile shell subovate (c. 106: 2 🡪 0) (k=11, 32, 45)

Cross-section of interspaces in adult shell U-shaped (c. 116: 0 🡪 1) (k=32)

Absence of comarginal nodes (c. 123: 0 🡪 1) (k=11, 32, 45)

Absence of comarginal nodes in juvenile shell (c. 130: 0 🡪 1) (k=32)

Height of pallial line of less than a fifth of total valve height (c. 139: 1 🡪 0) (k=11, 32, 45)

Extreme tip of crenulations rounded (c. 145: 0 🡪 1) (k=11, 45)

Crenulations extended below posterior adductor muscle scar (c. 147: 1 🡪 2) (k=11, 32, 45)

Clade 10 (*Crassicardia*)

Shell slightly thick (c. 22: 0 🡪 1) (k=11, 45)

Subrounded lunule (c. 39: 0 🡪 1) (k=11, 45)

Ventral edge of right hinge irregular (c. 71: 3 🡪 5) (k=32)

Left anterior tooth with an angle between 50º and 80º from horizontal (c. 77: 2 🡪 3) (k=32)

Height of pallial line of a quarter of total valve height (c. 139: 1 🡪 2) (k=11, 32, 45)

Clade 11 (*Cyclocardia sensu stricto*)

Lunule very deep (c. 36: 0 🡪 1) (k=32)

Left posterior tooth strongly curved (c. 85: 0 🡪 1) (k=11, 45)

Clade 12 (*Coanicardita*)

Straight left posterior tooth (c. 85: 0 🡪 2) (k=11, 45)

Subrectangular nodes in adult shell (c. 124: 1 🡪 2) (k=11, 45)

Comarginal nodes present in whole valve in post-juvenile shell (c. 129: 3 🡪 0) (k=11, 45)

Clade 13 (*C. awamoensis + C. marama* + *C. nortensis* + *C. christiei*)

Lunule very deep (c. 36: 0 🡪 1) (k=32)

Small-sized lunule (c. 41: 2 🡪 0) (k=11)

Right anterior tooth elongated rectangular (c. 53: 1 🡪 0) (k=11)

Right middle tooth with narrow base (c. 57: 1 🡪 0) (k=11, 32)

Right middle tooth with an angle between 30º and 35º from horizontal (c. 59: 3 🡪 2) (k=11)

Left anterior tooth subrectangular (c. 81: 2 🡪 1) (k=11)

Not very wide radial ribs in adult shells (c. 100: 0 🡪 1) (k=11)

Cross-section of radial ribs in juvenile shell subovate (c. 106: 2 🡪 0) (k=11, 32)

Absence of comarginal nodes in juvenile shell (c. 130: 0 🡪 1) (k=11)

Clade 14 (*Hippocampocardia* + *Crassicardia*)

Left posterior tooth with an angle between 35º and 45º from horizontal (c. 83: 2 🡪 3) (k=45)

Left posterior tooth straight (c. 85: 0 🡪 2) (k=45)

Absence of comarginal nodes in juvenile shell (c. 130: 0 🡪 1) (k=11, 45)

Clade 15 (*Cyclocardia* *sensu lato* + Venericorini)

Angle between posterior and dorsal margins absent (c. 13: 0 🡪 2) (k=45)

Right anterior tooth pustular (c. 53: 0 🡪 1) (k=45)

Subrcircular nodes in adult shell (c. 124: 2 🡪 4) (k=45)

Presence of a flat zone between anterior adductor muscle scar and anterior margin (c. 134: 0 🡪 1) (k=32)