

## APPENDIX 2. Character list of phreatoicidean taxa analysed in this paper.

Character states marked with a “\*” were used as ancestral states (ANCSTATES assumptions in PAUP or hypothetical ancestor, “hypanc”, coded in MacClade). All other ancestral states were coded as unknown.

- Char. 1. Head length: (1) length shorter than width in dorsal view; (2) length subequal to width in dorsal view; (3) length greater than width in dorsal view.
- Char. 2. Cervical groove length: (1) extending just above the anterolateral margin of pereonite 1; (2) extending nearly to the dorsal margin of head; (3) extending over the dorsal margin of head and connecting medially.
- Char. 3. Mandibular notch: (1) present; (2) absent.
- Char. 4. Clypeal notch: (1) present; (2) absent.
- Char. 5. Antennal notch: (1) present; (2) absent.
- Char. 6. Pereonites 2-7 in dorsal view: (1) longer than wide; (2) wider than long; (3) anteriorly longer than wide decreasing posteriorly to wider than long.
- Char. 7. Coxal articulation of pereonites 2-4: (1)\* free; (2) nearly fused; (3) fused.
- Char. 8. Pleonites 2-5 relative lengths: (1) pleonites 2-4 respective lengths less than half the length of pleonite 5; (2) pleonites 2-4 respective lengths equal to or more than half the length of pleonite 5; (3) pleonites 2-3 respective lengths less than half the length of pleonite 5, pleonite 4 length equal to half the length of pleonite 5.
- Char. 9. Pleonites 1-4 relative lengths: (1) subequal; (2) unequal, pleonite 4 greater than pleonites 1-3.
- Char. 10. Pleotelson lateral length: (1) less than depth; (2) subequal to depth; (3) greater than depth.
- Char. 11. Telsonic region or tailpiece: (1) not distinct, terminal area concave in dorsal view; (2)\* not distinct, dorsal margin smoothly curved to distal tip, terminal area truncate in dorsal view; (3) distinct, reflexed dorsally, trilobed in dorsal or ventral view; (4) distinct, reflexed dorsally, not trilobed, forming medial lobe only.
- Char. 12. Dorsal uropodal cleft of pleotelson: (1) present; (2) absent.
- Char. 13. Dorsal uropodal cleft of pleotelson: (1) with several fine setae; (2) without setae.
- Char. 14. Antennula terminal article shape: (1)\* tubular [sides approximately parallel, length greater than width]; (2) conical; (3) inflated and bulbous [sides curved, width distinctly greater than previous article]; (4) globular [sides curved, length approximates width, subequal or narrower than previous article]; (5) tiny, vestigial.
- Char. 15. Antennula penultimate article width: (1)\* width subequal to proximal article; (2) inflated, width much greater than proximal article; (3) broad and flattened.
- Char. 16. Antenna propodal article 1: (2)\* present, forming thin ring; (3) absent.
- Char. 17. Mandible incisor processes shape: (1)\* broad, width greater than thickness; (2) thin, resembling denticulate spines, width near thickness.
- Char. 18. Mandible right lacinia mobilis: (1)\* present; (2) absent.
- Char. 19. Mandible spine row overall shape: (1)\* in smooth low arc between incisor and molar process; (2) on projecting ridge between incisor and molar processes; (3) on pedunculate projection between incisor and molar processes.
- Char. 20. Mandible shape of spine row ridge: (1)\* distal part in line with proximal parts; (2) distal part on projection raised above proximal part; (3) strongly convex arc, medial part projecting.

- Char. 21. Mandible right spine row with: (1) first spine separated from remaining members; (2) first spine not separated from remainder of spine row.
- Char. 22. Mandible molar process length compared to width: (1) wider than long; (2) length subequal to width; (3) longer than wide.
- Char. 23. Mandible molar process triturating surface: (1) ridged; (2) lightly lineated; (3) smooth.
- Char. 24. Mandible molar process triturating surface with: (1) several teeth; (2) 1 tooth; (3) no teeth.
- Char. 25. Maxilla lateral lobes with bidenticulate setae: (1) only on distal tips; (2) on distal tips and on medial margin.
- Char. 26. Maxilla outer lateral lobe width: (1) wider than inner lateral lobe; (2) width subequal to that of inner lateral lobe; (3) narrower than inner lateral lobe.
- Char. 27. Maxilla medial lobe proximal and distal setal rows: (1) continuous; (2) separated by gap.
- Char. 28. Maxilla medial lobe proximal portion: (1) distinctly angled to distal portion; (2) smoothly continuous with distal portion.
- Char. 29. Maxilliped epipod distal tip shape: (1) rounded; (2) truncate; (3) pointed; (4) medially concave.
- Char. 30. Pereopod I dactylus length measured along inner margin of dactylus: (1) projecting beyond palm in male; (2) subequal to palm in male; (3) shorter than palm in male.
- Char. 31. Pereopod I dactylus ventral margin distal cuticular fringe: (1) present; (2) absent.
- Char. 32. Pereopod I dactylus distal accessory spines: (1) present; (2) absent.
- Char. 33. Pereopod I propodus dorsal margin proximal region in male: (1) protruding to or beyond distodorsal margin of ischium; (2) protruding beyond distodorsal margin of carpus; (3) not protruding.
- Char. 34. Pereopod I propodus dorsal margin proximal region in female: (1) protruding to or beyond distodorsal margin of ischium; (2) protruding beyond distodorsal margin of carpus; (3) not protruding.
- Char. 35. Pereopod I propodal palm in male: (1) concave; (2) convex to straight.
- Char. 36. Pereopod I palm in male stout denticulate setae: (1) present, serrate, multiple denticulations; (2) present, bifid two spinules only; (3) absent.
- Char. 37. Pereopod I propodal palm in male stout simple setae not on ridge: (1) present, conical; (2) present, basally inflated; (3) present, tooth-like; (4) absent.
- Char. 38. Pereopod I propodal palm in male low conical setae on ridge (= keratinised teeth in Wilson and Ho, 1996): (1) present; (2) absent, ridge absent.
- Char. 39. Pereopod I propodal palm in female: (1) concave; (2) convex; (3) straight.
- Char. 40. Pereopod I propodal palm in female stout denticulate setae: (1) present, serrate multiple denticulations; (2) present, bifid two spinules only; (3) absent.
- Char. 41. Pereopod I propodal palm in female stout simple setae: (1) present, conical; (2) present, basally inflated; (3) present, tooth-like; (4) absent.
- Char. 42. Pereopods II-III dactylus spines on ventral margin: (1) present; (2) absent.
- Char. 43. Pereopods II-III propodus articular plate found distally on posterior side: (1)\* present; (2) absent.

- Char. 44. Pereopods II-III basis dorsal ridge in cross section: (1) rounded; (2) angular and produced but not forming distinct plate; (3) produced and forming distinct plate.
- Char. 45. Pereopod IV: (1) sexually dimorphic; (2)\* not sexually dimorphic.
- Char. 46. Pereopod IV dactylus: (1) shorter than propodal palm; (2) subequal to propodal palm; (3) longer than propodal palm.
- Char. 47. Pereopod IV dactylus with distal accessory claws or spines: (1) one-fourth length of primary claw in male; (2) one-third length of primary claw in male; (3) one half-length of primary claw in male.
- Char. 48. Pereopod IV dactylus with distal accessory claws or spines: (1) one-fourth length of primary claw in female; (2) one-third length of primary claw in female; (3) one half-length of primary claw in female.
- Char. 49. Pereopod IV propodus distal width: (1) dorsally expanded, greater than palm width; (2) subequal to palm width; (3) less than palm width.
- Char. 50. Pereopod IV propodus articular plate: (1) longer than dactylar claw in male; (2) length subequal to that of dactylar claw in male; (3) shorter than dactylar claw in male.
- Char. 51. Pereopod IV propodus articular plate: (1) longer than dactylar claw in female; (2) length subequal to that of dactylar claw in female; (3) shorter than dactylar claw in female.
- Char. 52. Pereopod IV basis dorsal ridge in cross section: (1) rounded; (2) angular and produced but not forming distinct plate; (3) produced and forming distinct plate.
- Char. 53. Pereopods V-VII dactylus spines: (1) present; (2) absent.
- Char. 54. Pereopods V-VII propodus articular plate on posterior side of limb: (1)\* present; (2) absent.
- Char. 55. Pereopods V-VII basis dorsal ridge: (1) distinctly separated from basis shaft; (2) not distinctly separated from basis shaft.
- Char. 56. Pereopods V-VII basis dorsal ridge in cross section: (1) rounded; (2) angular; (3) produced but not forming distinct plate; (4) produced and forming distinct plate.
- Char. 57. Penes form: (1) straight; (2) curved posteriorly.
- Char. 58. Penes extending: (1) near midline; (2) to midline; (3) past midline and onto pleonite 1.
- Char. 59. Penes shaft armature: (1) smooth lacking setae; (2) denticulate; (3) with setae.
- Char. 60. Penes shaft distally overall shape: (1) tapering; (2) broadening; (3) tubular.
- Char. 61. Penes distal tip shape: (1) rounded; (2) pointed; (3) flattened; (4) truncate.
- Char. 62. Pleopod exopods I-V lateral proximal lobes: (1) present on exopods II-V; (2) present on exopods I and III-V; (3) absent.
- Char. 63. Pleopod exopods I-V medial proximal lobes: (1) present on exopods II-V; (2) present on exopods III-V; (3) absent.
- Char. 64. Pleopod protopod medial epipods: (1) protopods II-V with medial epipods; (2) protopods without medial epipods; (3) protopods II-V with small medial projections.
- Char. 65. Male pleopod I exopod distal margin: (1) pointed; (2) rounded.
- Char. 66. Male pleopod I exopod lateral margin: (1) rounded; (2) forming obtuse angle.
- Char. 67. Male pleopod I exopod dorsal surface setae: (1) with setae; (2) lacking setae.

- Char. 68. Male pleopod II endopod appendix masculina stylet - distal article distal tip: (1) truncate; (2)\*acutely rounded; (3) sharply pointed and spine-like; (4) pointed and spatulate; (5) broadly rounded.
- Char. 69. Male pleopod II endopod appendix masculina stylet - distal article marginal setae: (1) only occurring distally; (2) only occurring along lateral margin; (3) only occurring along medial margin; (4) occurring along lateral and medial margins; (5) absent.
- Char. 70. Male pleopod II exopod distal segment lateral margin: (1) proximally rounded; (2) proximally linear.
- Char. 71. Uropod protopod dorsomedial ridge: (1) plate-like, not serrate; (2) projecting and spur-like (e.g. 'third ramus' in *Uramphisopus*); (3) plate-like, serrate; (4) not produced; (5) with subdistal bump bearing several robust setae.
- Char. 72. Uropod protopod robust spinose setae (heavy setae with fan of distal spinules) on distoventral margin: (1) present; (2)\* absent.
- Char. 73. Uropod rami distal tips: (1) pointed; (2) rounded.
- Char. 74. Uropod rami cross-sectional shape: (1) round; (2) flattened; (3) oval or flattened on dorsal surface; (4) round exopod and dorsally flattened endopod.
- Char. 75. Uropod endopod: (1) shorter than protopod; (2) subequal to protopod length; (3) longer than protopod.