**Supplementary material I**

List of morphological characters for Sialidae (Megaloptera) (after Liu *et al*. 2015a). https://doi.org/10.5852/ejt.2021.782.1587.5539

**ADULT HEAD**

1. Male head with compound eyes: (0) strongly prominent; (1) feebly prominent (CI=100; RI=100)
2. Male labrum with posterior margin: (0) feebly concave; (1) deeply concave; (2) bilobed. (CI=100; RI=100)
3. Male mandibles with inner fossa: (0) absent; (1) present. (CI=100; RI=100)
4. Male mandibles: (0) equal in length; (1) with left mandible longer than right mandible. (CI=100; RI=100)
5. Male left mandible with additional tooth anterior to terminal tooth: (0) absent; (1) present. (CI=50; RI=83)
6. Number of small teeth on inner margin of male left mandible: (0) 1; (1) 2; (2) 0. (CI=100; RI=100)
7. Ocelli: (0) present; (1) absent. (UNINF)

**WINGS**

1. Forewing with apex of RP: (0) two-branched; (1) three branched or more. (CI=50; RI=94)
2. Forewing with MA: (0) distally bifurcate; (1) simple. (CI=33; RI=60)
3. Forewing with MP: (0) distally bifurcate; (1) simple. (CI=33; RI=50)
4. Forewing proximally with crossvein between C and Sc: (0) present; (1) absent. (CI=50; RI=75)
5. Hindwing with MA: (0) distally bifurcate; (1) simple. (CI=33; RI=60)
6. Hindwing with MP: (0) distally bifurcate; (1) simple. (CI=33; RI=0)
7. Forewing with stem of M: (0) strong; (1) weak. (CI=100; RI=100)
8. Forewing with costal region: (0) feebly broadened proximally; (1) strongly broadened proximally. (CI=100; RI=100)
9. Forewing proximally with distinctly oblique costal crossveins: (0) absent; (1) present. (CI=100; RI=100)
10. Wings with nygmata: (0) present; (1) absent. (UNINF)
11. Prothorax: (0) longer than wide; (1) wider than long. (CI=100; RI=100)
12. Legs with bilobed fourth tarsomere: (0) absent; (1) present. (CI=100; RI=100)

**MALE GENITALIA**

1. Tergite 9: (0) more than 2.0 times as wide as long ; (1) nearly as wide as long. (CI=33; RI=90)
2. Tergite 9 with lateral projection: (0) absent; (1) angulate; (2) digitiform. (CI=66; RI=66)
3. Tergite 9 anteriorly with internal apodeme: (0) arched; (1) V-shaped. (CI=50; RI=94)
4. Sternite 9: (0) as long as or much longer than tergite 9; (1) shorter than but not fused with tergite 9. (CI=66; RI=96)
5. Sternite 9: (0) not lingulate; (1) lingulate. (CI=100; RI=100)
6. Sternite 9 with elongated median protrusion: (0) absent; (1) present. (CI=100; RI=100)
7. Sternite 9: (0) not directed posterodorsad; (1) directed posterodorsad and thoroughly associated with tergite 9. (CI=100; RI=100)
8. Sternite 9: (0) not transversely band-like; (1) transversely bandlike. (CI=33; RI=91)
9. Sternite 9 subtrapezoidal with dorsally curved apex: (0) absent; (1) present. (CI=100; RI=100)
10. Gonocoxite 9: (0) widely separated; (1) close to each other. (CI=100; RI=100)
11. Gonocoxite 9: (0) not flattened; (1) flattened or at least proximally flattened. (CI=50; RI=94)
12. Gonocoxite 9: (0) not angulate ventrally; (1) angulate ventrally. (CI=50; RI=95)
13. Gonocoxite 9 with apex: (0) not curved dorsad; (1) curved dorsad. (CI=100; RI=100)
14. Gonocoxite 9: (0) largely covered by tergite 9 in dorsal view; (1) largely protruding out of tergite 9 in dorsal view. (CI=50; RI=75)
15. Gonocoxite 9: (0) not triangular; (1) small and subtriangular with round apex. (CI=100; RI=100)
16. Gonocoxite 9 subquadrate, laterally with an obtuse and upright projection: (0) absent; (1) present. (CI=100; RI=100)
17. Gonostylus 9: (0) present (Fig. 18c); (1) absent. (CI=33; RI=0)
18. Ectoproct: (0) ring-like around anus; (1) largely paired but medially connected by feebly sclerotized region; (2) paired and completely separated. (CI=40; RI=78)
19. Ectoproct medially with an anteriorly convex area connecting to paired lateral lobes: (0) absent; (1) present. (CI=100; RI=100)
20. Ectoproct ventrally with spinous bristles: (0) absent; (1) present. (CI=100; RI=100)
21. Ectoproct: (0) not flattened distally; (1) flattened distally. (CI=50; RI=83)
22. Ectoproct with long ventral protrusions: (0) absent; (1) present, integrated with dorsal portion; (2) present, distinguished from dorsal portion. (CI=50; RI=0)
23. Ectoproct and gonocoxite 11: (0) not fused with each other; (1) partly fused with each other; (2) entirely fused with each other. (CI=50; RI=80)
24. Ectoproct with large, bulbed apex: (0) absent; (1) present. (UNINF)
25. Ectoproct largely fused with anus: (0) absent; (1) present. (CI=100; RI=100)
26. Ectoproct entirely sclerotized and darkened ventrally: (0) absent; (1) present. (CI=100; RI=100)
27. Ectoproct posteroventrally protruding as a tube-like sclerite:(0) absent; (1) present. (CI=100; RI=100)
28. Ectoproct: (0) not elongated; (1) elongated. (CI=50; RI=75)
29. Ectoproct: (0) not hexagonal; (1) hexagonal. (CI=100; RI=100)
30. Ectoproct with narrowed apex angulately bended ventrally: (0) absent; (1) present. (CI=33; RI=60)
31. Ectoproct with acutely produced apex: (0) absent; (1) present. (CI=100; RI=100)
32. Ectoproct with densely setose apex: (0) absent; (1) present. (CI=100; RI=100)
33. Ectoproct with base ventrally protruding and strongly sclerotized: (0) absent; (1) present. (CI=100; RI=100)
34. Ectoproct with thickened ventral margin: (0) absent; (1) present. (CI=100; RI=100)
35. Ectoproct with subquadrate apex: (0) absent; (1) present. (CI=100; RI=100)
36. Ectoproct: (0) not hook-like; (1) hook-like. (CI=100; RI=100)
37. Ectoproct with a slender, elongate and feebly sclerotized projection: (0) absent; (1) present. (UNINF)
38. Gonocoxite 10: (0) present; (1) absent. (CI=20; RI=55)
39. Gonocoxite 10: (0) paired; (1) unpaired. (CI=50; RI=50)
40. Gonocoxite 10: (0) well developed; (1) degenerated or absent. (CI=100; RI=100)
41. Gonocoxite 11 with proximal plate: (0) bearing no trace of median fusion; (1) bearing trace of median fusion. (CI=100; RI=100)
42. Gonocoxite 11 with median processes: (0) directed posteroventrad; (1) directed posterodorsad. (CI=50; RI=75)
43. Gonocoxite 11 with elongate and arcuately curved median processes: (0) absent; (1) present. (CI=100; RI=100)
44. Gonocoxite 11 with an additional short lobe beneath median processes: (0) absent; (1) present. (CI=25; RI=50)
45. Gonocoxite 11 with median processes: (0) attenuate; (1) broadly subquadrate. (CI=100; RI=100)
46. Gonocoxite 11 proximally with spinous setae: (0) absent; (1) present. (CI=100; RI=100)
47. Gonocoxite 11: (0) nearly as long as or longer than ectoproct; (1) shorter than ectoproct. (CI=100; RI=100)
48. Gonocoxite 11 proximally fused with specialized membrane: (0) absent; (1) present. (CI=100; RI=100)
49. Gonocoxite 11 with tube-like membranous lobes: (0) absent; (1) present. (CI=50; RI=87)
50. Gonocoxite 11 with internal sclerotization on tube-like membranous lobes: (0) absent; (1) present. (CI=100; RI=100)
51. Gonocoxite 11 with a proximal plate: (0) present; (1) absent. (CI=100; RI=100)
52. Gonocoxite 11 laterally with transparent areas: (0) absent; (1) present. (CI=33; RI=75)
53. Gonocoxite 11 with tube-like membranous lobes: (0) bald; (1) setose. (CI=50; RI=0)
54. Gonocoxite 11, width: (0) >0.29 mm; (1) <0.15 mm. (CI=100; RI=100)
55. Gonocoxite 11 medially with pterygoid lateral plate: (0) absent; (1) present. (CI=33; RI=0)
56. Gonocoxite 11 with base: (0) close to tergite 9; (1) widely apart from tergite 9. (CI=33; RI=90)
57. Membrane proximal to gonocoxite 11: (0) not posteriorly tapering; (1) posteriorly tapering. (CI=100; RI=100)
58. Membrane proximal to gonocoxite 11: (0) not transversely expanded; (1) transversely expanded and strongly ruffled. (CI=50; RI=88)
59. Gonocoxite 11: (0) broadly shield-like, without vertically protruding median processes; (1) band-like or claw-like, with vertically protruding median processes. (CI=100; RI=100)
60. Gonocoxite 11 with butterfly-shaped proximal plate: (0) absent; (1) present. (CI=100; RI=100)
61. Gonocoxite 11 with median processes being extremely thin at apex: (0) absent; (1) present. (CI=100; RI=100)
62. Gonocoxite 11 with proximal plate laterally broadened: (0) absent; (1) present. (CI=100; RI=100)
63. Gonocoxite 11 with base posterior to apex of ectoproct: (0) absent; (1) present. (CI=100; RI=100)
64. Gonocoxite 11 heart-shaped in caudal view: (0) absent; (1) present. (CI=100; RI=100)
65. Gonocoxite 11 dorsally rounded in caudal view: (0) absent; (1) present. (CI=100; RI=100)
66. Gonocoxite 11 dorsolaterally spinous in caudal view: (0) absent; (1) present. (CI=100; RI=100)
67. Gonocoxite 11 with dorsal protrusion: (0) absent; (1) present. (CI=50; RI=87)
68. Gonocoxite 11 with median processes expanded anteroventrally: (0) absent; (1) present. (CI=50; RI=50)
69. Gonocoxite 11 with median processes straightly directed ventrad and hook-like at tip: (0) absent; (1) present. (CI=100; RI=100)
70. Gonocoxite 11 transversely band-like with short median processes: (0) absent; (1) present. (CI=100; RI=100)
71. Gonocoxite 11 separated into a pair of concave plates: (0) absent; (1) present. (CI=100; RI=100)
72. Endophallus with thorny setae: (0) absent; (1) present. (CI=50; RI=80)
73. Anus ventrally with setose lobe: (0) absent; (1) present. (CI=50; RI=75)

**FEMALE GENITALIA**

1. Sternite 7 with posterior margin: (0) truncate; (1) produced. (CI=33; RI=88)
2. Sternite 7 with obtuse protrusion: (0) absent; (1) present. (CI=100; RI=100)
3. Gonocoxite 8: (0) unpaired, with median depression or incision; (1) paired. (CI=50; RI=66)
4. Gonocoxite 8 posteriorly with a U-shaped median incision: (0) absent; (1) present. (CI=100; RI=100)
5. Gonocoxite 8 with a narrow longitudinal median incision: (0) present; (1) absent. (CI=33; RI=60)
6. Gonocoxite 8: (0) well developed; (1) reduced. (CI=50; RI=50)
7. Gonocoxite 8 with broad, deep posterior incision: (0) absent; (1) present. (CI=100; RI=100)
8. Gonocoxite 8 and gonapophyses 8: (0) not fused; (1) fused (CI=100; RI=100)
9. Gonapophysis 8: (0) sclerotized (Fig. 15b); (1) membranous. (CI=50; RI=92)
10. Gonapophysis 8: (0) bald; (1) setose. (CI=100; RI=100)
11. Gonapophyses 8: (0) small and subtriangular; (1) broadly shield-like; (2) transversely arcuate. (CI=50; RI=66)
12. Tergite 9 with a distinctly prominent posterodorsally margin: (0) absent; (1) present. (CI=50; RI=50)
13. Bursa copulatrix: (0) simply ovoid, without lateral projection or sclerotized ridge; (1) irregularly shaped with lateral projection and sclerotized ridges. (CI=50; RI=87)
14. Cercus: (0) well developed with rosette trichobothria; (1) degenerated. (UNINF)

**LARVA**

1. Larva with a pair of lateral tracheal gills on abdominal segment 8: (0) present; (1) absent. (CI=100; RI=100)
2. Larva with caudal filament on abdominal segment 10: (0) absent; (1) present. (CI=100; RI=100)