

FLYTREE: DIPTERA MORPHOLOGICAL CHARACTER LIST

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LARVAL CHARACTERS

Larva, head

- 1) Head capsule: (0), absent; (1), present
- 2) Head capsule: (0), not cone-shaped; (1), cone-shaped
- 3) Head with internal metacephalic rods: (0), absent; (1), present
- 4) Paired, lateral metacephalic rods: (0), absent; (1), present
- 5) Single, medial metacephalic rod: (0), absent; (1), present
- 6) Metacephalic rods: (0), continuous with head capsule; (1), hinged
- 7) Metacephalic rods: (0) not spatulate at tip; (1), spatulate at tip
- 8) Posterodorsal margin of head capsule: (0), incapable of intermolt cuticle deposition; (1), capable of intermol

cuticle deposition

- 9) Postgenae: (0), forming a postgenal bridge; (1), postgenal lobes narrowly in contact or separated by a narrow membranous area; (2), widely separated
- 10) Instar I frontal sclerite: (0), contiguous with surrounding cranial sclerites; (1), separated from surrounding cranial sclerites by a band of membranous cuticle
- 11) Head: (0), not retracted into thorax; (1), retracted into thorax
- 12) Head: (0), not invaginated into thorax; (1), partially invaginated into thorax but not closed dorsally; (2), invaginated into thorax, forming complete atrium
- 13) Intermediate sclerite (hypopharyngeal sclerite) in last instar: (0), fused with vertical plate; (1), not fused with vertical plate (tentoropharyngeal sclerite)
- 14) Intermediate sclerite: (0), V-shaped; (1), H-shaped; (2), elongated, with the longitudinal bars almost completely fused due to an expanded ventral bridge
- 15) Tentorial bridge (transverse tentorium, tentorium extends transversely to form a posterior bridge): (0), present; (1), absent
- 16) Antennal segments: (0), none; (1), one; (2), two, (3), three or more
- 17) Length of first instar larval antenna: (0), short, about as long as maximum diameter; (1), long, several times longer than maximum diameter
- 18) Antenna: (0), not prehensile; (1), prehensile
- 19) Antennal structure comprised of ring and peg (0), absent (1), present
- 20) Larval stemmata: (0), more than five; (1), five; (2), four; (3), three; (4), two; (5), one; (6), none
- 21) Bolwigs organ (light sensitive cells internalised, in optical depression): (0), absent, (1), present
- 22) Pigment of adult eye: (0), appearing in the pupa, after the larval stage; (1), developing precociously, becoming conspicuous as early as the second instar and always well developed by the last instar

Larva, mouthparts

- 23) Frontoclypeal apotome: (0), present; (1), absent
- 24) Frontoclypeal apotome: (0), triangularly V-shaped; (1), broadly U-shaped
- 25) Cyclorrhaphan labral-like blade in first instar larva: (0), present; (1), absent
- 26) Cyclorrhaphan labral-like blade of final instar larva: (0), extending beyond base of mandible; (1) reduced, ending at base of mandible
- 27) Labrum: (0), dorsoventrally flattened; (1), conical
- 28) Brushes on ventral surface of labrum: (0), absent; (1), well-developed; (2), complex
- 29) Premandibles: (0), absent; (1), present
- 30) Premandible: (0), a simple unadorned sclerite; (1), with a comb-like row of evenly spaced anteriorly directed teeth
- 31) Invaginated premandible apodeme: (0), absent; (1), present
- 32) Premandible: (0), mainly external, with small, invaginated apodeme for insertion of labral retractor muscles; (1), with external portion and invaginated internal portion bearing separate insertions of two labral retractor muscles, movable in anteroposterior direction and capable of forceps-like action resulting from contraction of the labral compressors pulling the intertorma in dorsal direction; (2), mainly internal, serving almost entirely as a point of insertion of labral retractor muscles, with small remnant of external sclerite
- 33) Premandible with tongs-like or spike-like external portion: (0), absent; (1), present
- 34) Torma (Small sclerite base of labrum): (0), present, (1), absent

- 35) Torma: (0), fused with the dorsal labral sclerite; (1), articulated
- 36) Mandibular rotation: (0), horizontal; (1), oblique or vertical
- 37) Mandible: (0), dicondylous; (1), Cyclorrhaphan “monocondylous”
- 38) Mandibular epicondyle: (0), near junction of genae and frontoclypeal apotome; (1), on tentorial phragma
- 39) Mandible: (0), uniformly sclerotised; (1), apex and base separated by a zone of membranous cuticle; 2) separated into two distinct articles; (3), subdivided into more than two articles
- 40) Basal mandibular sclerite from posterior view: (0), epicondyle and hypocondyle widely separated forming, broadly inverted U; (1), epicondyle and hypocondyle juxtaposed
- 41) Subapical aboral surface of mandible: (0), bare; (1), with comb-like row of long curved setae
- 42) Apex of mandible: (0), without comb; (1), with multi-toothed comb
- 43) Mandibular brush: (0), absent; (1), present
- 44) Mandibular brush position: (0) on membrane along lateral arm of basal sclerite; (1) on horizontal rod; (2), on vertical rod
- 45) Mandibular chela: (0), absent; (1), present
- 46) Mandible: (0), without poison canal; (1), with poison canal, a groove or canal in anterodorsal position
- 47) Inner face of mandibular hook: (0), without groove; (1), with a groove that forms canal when mandibular hooks adpressed
- 48) Egg-burster on frontal sclerite: (0), present; (1), absent
- 49) Mandibular protheca: (0), present; (1), absent
- 50) Mandibular protheca: (0), on articulated lobe; (1), arising directly from adoral surface of mandible
- 51) Cardo: (0), free from anterior margin of head capsule; (1), fused with, or closely adpressed to, anterior margin of head capsule
- 52) Antennal and maxillary lobes: (0), separate; (1), fused
- 53) Maxillary palpus: (0), palpiform; (1), flush with the surface of the maxilla and recognizable only by a ring surrounding the sensilla
- 54) Maxillary palpus: (0), separate from mandible; (1), weakly fused to basal mandibular sclerite (dorsal hook absent); (2) completely fused to basal mandibular sclerite
- 55) Salivary pump: (0), small, slightly larger than duct; (1), greatly enlarged, sac-like chamber
- 56) Cibarial filter ‘pharyngeal filter’: (0), absent; (1), present
- 57) Cibarium: (0) simple, unmodified; (1), funnel-shaped filter: comb-like, transverse filaments; (2), series of transverse folds with "comb"-like projection used to filter particles from waters; (3), T-shaped ridges; (4), cibarial filter in basal sclerite without t-ridges
- 58) Pharyngeal grinding mill: (0), absent; (1), present
- 59) Prementohypopharyngeal apparatus: (0), absent; (1), present
- 60) Prementohypopharyngeal apparatus: (0), not connected to paraclypeal phragma; (1), dorsolateral corner connected via cibarial bar to paraclypeal phragma
- 61) Sclerotised postmentum: (0), present; (1); absent
- 62) Postmentum (hypostoma): (0), a simple, unadorned sclerite; (1), with serrate anterior margin
- 63) Postmentum (hypostoma): (0), a separate plate; (1), fused to postgenae
- 64) Parastomal bars (last instar): (0), present; (1), absent
- Larva, thorax and abdomen**
- 65) Thoracic segments: (0), not enlarged; (1), swollen, distinctly broader than head and abdomen
- 66) Thoracic legs: (0), articulated appendages in at least one larval instar; (1), vestigial, never articulated, represented in at least one larval instar by Keilin’s organ; (2), absent in all larval instars
- 67) First instar prothoracic prolegs: (0), absent; (1), present
- 68) Cuticle with warts of calcium carbonate: (0), absent; (1), present
- 69) Free abdominal segments (excluding anal division): (0), 9 segments; (1), 8 segments; (2), 7 segments; (3), 6 segments; (4), 5 or fewer segments
- 70) Body segments: (0), without secondary divisions into annuli or intercalary rings; (1), with

complete secondary divisions

71) Elongate, eversible, crochet-tipped prolegs on abdominal segments I-VII: (0), absent; (1), one pair; (1), two or more pairs

72) Abdomen with single, elongate, crochet-tipped proleg on segment: (0), absent; (1), present

73) First instar larvae with a terminal pair of sac-like vesicles on anal division: (0), absent; (1), present

74) Crochet tipped proleg(s) on anal division: (0), absent; (1), present

75) Anal division with fan-like row of long midventral: (0), absent; (1), present

76) Base of midventral setae on anal division: (0), simple; (1), transverse, T-shaped

77) Anal division with sclerotised dorsal plates surrounding the spiracles and ending in a pair of hook-like processes: (0), absent; (1), present

78) Anal papillae: (0), present; (1), absent

79) Number of Malpighian tubules: (0), six; (1), five; (2), four; (3), three or less

Larva, respiratory system

80) Respiratory system of full grown larva: (0), polypneustic (holo-, peri- or hemipneustic); (1), oligopneustic (amphi- or metapneustic); (2), apneustic

81) Anterior spiracles: (0), single opening; (1), multiple openings

82) Arrangement of multiple papilla in anterior: (0), in a row; (1), arranged along a stalk; (2) arranged on a bulb

83) Spiracles on anal division: (0), Type I; (1), Type II; (2), Type III

84) Position of posterior abdominal spiracle(s): (0), on anal division; (1), on abdominal segment 8

85) Position of posterior abdominal spiracle(s): (0), lateral; (1), dorsal or terminal

86) Posterior abdominal spiracles in a cavity: (0), absent; (1), present

87) Stigmatophore (siphon bearing posterior abdominal spiracles) longer than diameter of spiracle: (0), absent; (1), present

88) Each posterior spiracle surrounded by four tufts of flattened cuticular outgrowths: (0), absent; (1), present

89) Openings of each posterior tracheal trunk of last instar: (0), single (1), two openings; (2), three or more openings

Larva

90) Reproduction: (0) eggs not incubated within female; (1) eggs incubated within female.

91) Reproduction with incubated eggs: (0) several larvae; (1) macrolarviparous, with single larva

92) Reproduction with incubated eggs: (0) eggs hatch during deposition; (1) eggs hatch in female, larvae nourished by special secretion.

93) Number of instars: (0), more than three; (1), three; (2) two

PUPAL CHARACTERS

94) Mode of pupation: (0), pupa free; (1), pupation within puparium formed from last larval cuticle.

95) Cyclorrhaphan puparium cleavage lines: (0), middorsal longitudinal; (1), transverse dorsal; (2), horizontal; (3), H-shaped, restricted to abdominal tergites 1-3; (4), H shaped through mesothoracic and abdominal tergites 1; (5), T-shaped through mesothoracic and abdominal tergites

96) Cyclorrhaphan puparium anterior spiracles: (0), anterior pupal spiracles penetrating puparium as puparial horns; (1), no puparial horns

97) Body: (0) tergites and sternites darkly sclerotized; (1), tergites darkly sclerotized and sternites lightly sclerotised; (2) tergites and sternites lightly sclerotised

98) Mandible: (0), denticous (movable); (1), adenticous (not movable)

99) Ovoid ventrolateral adhesive discs on abdominal segments: (0), absent; (1), present

100) Thoracic respiratory organ; a plastron-bearing gill: (0), absent; (1), present

101) Plastron-bearing gill: (0), a expands and hardens after the larval-pupal ecdysis; (1), acquires its final volume and shape before the larval-pupal ecdysis

102) Developing adult wing: (0), an unexpanded version of its final form, expanded only after emergence; (1), reaching its final size and shape before emergence, and unfolding and functional

immediately at emergence

103) Metathoracic leg sheath: (0), extended beyond wing sheath, parallel to sheaths of other two legs or superposed; (1), bent in an S-shape, concealed beneath wing sheath, ending beside apex of mesothoracic leg

104) Terminus of abdomen, a pair of articulated, membranous paddles, each with supporting midrib: (0), absent; (1), present

ADULT CHARACTERS

Adult body

105) Abdominal ganglia: (0), more than 6, (1), 6; (2), 5; (3), 4; (4), 3; (5), 2; (6), 1; (7), all abdominal and thoracic ganglia fused

106) Single Abdominal ganglia formation: (0), T2 fused with thorax, (1), T2 fused with abdomen

107) Head (and thorax), setae: (0), some setae feather-like; (1), all setae simple

Adult-HEAD

Eye

108) Male eyes; holoptic/dichoptic condition: (0), dichoptic; (1), holoptic, separated by no more than width of median ocellus; (2), intermediate, clearly narrower than in female but separated by more than width of median ocellus

109) Female eye condition: (0), dichoptic; (1) holoptic, separated by no more than width of medial ocellus

110) Ocelli: (0), three; (1), two; (2), one (3), vestigial or absent

111) Ocelli on raised plate: (0), absent; (1), present

Vertex

112) Vertex: (0), flat (not modified); (1), concave

113) Ocellar setae/ bristles: (0), absent; (1), present

114) Inner vertical bristles: (0), absent; (1), present

115) Outer vertical bristles: (0), absent; (1), present

116) Postocellar bristles: (0), absent; (1), present

117) Postocellar bristles: (0), divergent; (1), parallel; (1), convergent

Frons

118) Ptilinal fissure: (0), absent; (1), present

119) Frons differentiated into frontal vitta and lateral fronto-orbital plates: (0), absent; (1), present

120) Orbital bristles: (0), absent; (1), present

121) Orbital bristles: (0), reclinate; (1), proclinate; (2), mediocline; (3), laterocline

122) Anterior frontal bristles: (0), absent; (1), present

123) Anterior frontal bristles: (0), reclinate; (1), proclinate; (2), mediocline; (3), laterocline

124) Interfrontal bristles: (0), absent; (1), present

Face

125) Mystax: (0), absent; (1), present

126) Vibrissa: (0), absent; (1), present

Clypeus

127) Adult clypeus: (0), concave or flattened; (1), bulbous and projecting

128) Adult clypeus: (0), connected to face; (1), widely separated from lower margin of face by membrane

129) Clypeus: (0), not divided; (1), divided into postclypeus and anteclypeus

130) Clypeal ridge position: (0), articulated with labrofulcral articulation point; (1); distinctly removed from labrofulcral articulation point

Postcranium

131) Occipital sclerite: (0), with well developed median occipital sclerite; (1), without

132) Median occipital sclerite (Median occipital plate: (0), without reinforcement ridges; (1), with reinforcement ridges

133) Occipital internal thickenings (dorsal lateral apodemes) arising above occipital condyles: (0),

absent; (1) present

134) Occipital pockets: (0), absent; (1) present, partial or complete

135) Hypostomal bridge: (0), absent; (1), present

136) Well defined row of postocular setae: (0), absent; (1), present

137) Well defined row of postocular setae: (0), equal size or gradually decreasing in size from the vertex; (1), alternating size

Antennae

138) Antennal flagellomere 1: (0), not decumbent; (1), decumbent

139) Pedicel: (0), short, length equal to or less than twice the scape length; (1), elongate, length more than twice the scape length

140) Pedicel: (0), without seam; (1), with dorsal seam

141) Pedicel-flagellum articulation: (0), simple; (1) tip of pedicel with process into flagellum (2), base of flagellum with process into pedicel

142) Antennal pedicel of male: (0), not enlarged; (1), enlarged, globular and much wider than scape because of greatly enlarged Johnston's organ

143) Flagellum segments (not including the arista/stylus): (0), more than eight; (1), eight to five; (2), four to two; (3), one

144) Antennal flagellum of male: (0), simple; (1), plumose; (2), setae in encircling whorls

145) Antennae consisting of enlarged 1st flagellomere with apically elongated, 1-3 segmented arista: (0), absent; (1), present

146) Arista insertion: (0), dorso-apically; (1), apically

147) Arista: (0), not plumose; (1), plumose

Mouthparts

148) Mouthparts: (0), well-developed; (1), atrophied

149) Labrum: (0), simple; (1), modified for piercing, with a pair of apical epipharyngeal blades

150) Hyoid sclerite (Theca): (0), absent; (1), present

151) Adult hypopharynx: (0), a simple blade-like projection; (1), greatly elongate, thread-like; (2), robust, bearing rows of barb-like hairs

152) Galea: (0), present; (1), absent

153) Lacinia: (0), blunt apically; (1), blade-like or reduced

154) Maxillary palpus segments: (0), more than two segments; (1) two segments; (2), one segment; (3) absent

155) Anterior mandibular condyle: (0), present; (1), absent

156) Glossae and paraglossae of labium: (0), present; (1), strongly reduced

157) Labial palpal segments: (0), 3 or more; (1), 2 or fewer

158) Labellum: 140): (0), absent; (2), present

159) Labellum: (0), separate from prementum; (1), reduced and fused with prementum

160) Pseudotracheae: (0), absent; (2), present

161) Pseudotracheae: (0), opening directly into mouth; (1), opening into one or two main trunks

162) Prestomal teeth: (0), absent; (1), present

Adult-THORAX

Prothorax

163) Precervicale: (0), absent; (1), present

164) Prothorax: (0), not elongate; (1), elongate

165) Postpronotal callus: (0), absent; (1), present

166) Postpronotal (humeral) setae: (0), absent; (1), present

167) Proepisternal depression (propleuron): (0), absent; (1), present

168) Proepisternum (propleuron): (0), flat; (1), with an anterior carina

169) Proepisternum (propleuron) dorsally: (0), bare; (1), setose

170) Episternal lobe: (0), absent; (1), present

171) Precoxal bridge: (0), absent; (1), present

Mesothorax

- 172) Scutum: (0), with transverse suture; (1), without transverse suture
 173) Scutum with transverse suture: (0), incomplete; (1), complete
 174) Scutal transverse suture: (0), straight; (1), V-shaped
 175) Scutum, acrostichal bristles: (0), absent; (1), present
 176) Supra-alar bristles: (0), absent; (1), present
 177) Post-alar bristles: (0), absent; (1), present
 178) Dorsocentral bristles: (0), absent; (1), present
 179) Pleural suture of mesothorax between episternum and epimeron: (0), straight or slightly sinuous; (1), bent twice at almost a right angle
 180) Posterior anepisternal bristles: (0), absent; (1), present
 181) Katepisternal bristles: (0), present ; (1), absent
 182) Katepisternal setae: (0), 1 + 1 + 1 pattern; (1), 2 + 1 + 1 pattern; (2), 2 + 1 pattern; (3), 1 + 1 pattern; (4), 1 + 2 pattern; (5) 0 + 1 pattern.
 183) Anepimeral bristle: (0), absent; (1), present
 184) Laterotergite: (0), without tubercle; (1), with a very prominent tubercle from which a bristle arises
 185) Notopleuron: (0), absent; (1), present
 186) Notopleural bristles: (0), absent; (1), two or more; (2), one anterior; (3), one posterior
 187) Posterior notopleural bristle: (0), on flat surface; (1), on notopleural callus
 188) Postalar wall: (0), absent; (1), present
 189) Postalar wall: (0), bare; (1), setose
 190) Scutellum: (0), not modified; (1), greatly enlarged
 191) Paired scutellar outgrowths: (0), absent; (1), present
 192) Scutellar bristles: (0), absent; (1), present
 193) Scutellar bristles: (0), one pair; (1), two or more pairs
 194) Lower surface of scutellum: (0), setose medially; (1), bare medially
 195) Suprasquamal ridge: (0), absent; (1), present
 196) Suprasquamal ridge: (0), bare; (1), setose
 197) Dorsal area of anatergite; setosity: (0), bare; (1), setose (infrasquamal setulae)
 198) Subscutellum: (0), not convex or weakly convex; (1), strongly convex; (2), very strongly convex, bulging
 199) Greater ampulla: (0), absent; (1), present
 200) Meron: (0), a small, triangular sclerite; (1), large, round, as fully developed behind midcoxa as katepisternum is in front of midcoxa
 201) Vertical row of setae on meron (0), absent; (1), present
 202) Coxopleural streak: (0), present; (1), absent

Metathorax

- 203) Metepisternum: (0), broad; (1), narrowed ventrally; intersegmental suture (between meso and metapleuron) converging towards metacoxal condyle; (2), dorsal and ventral sclerites of metepisternum widely separated by coming together of intersegmental suture and metapleural suture for some distance
 204) Metathoracic spiracle with fringe composed of dense hairs: (0), absent; (1), present
 205) Metathoracic spiracle: (0), posterior fringe unmodified; (1), posterior fringe operculum-shaped
 206) Postspiracular area (Metathorax): (0), unmodified; (1), a membranous fold; (2), distinct scale
 207) Metasternal area: (0), bare; (1), setose
 208) Meron of metacoxa: (0), present; (1), absent
 209) Postmetacoxal bridge; (0), absent; (1), metapleural epimera extended behind metacoxal cavities, often fused to form a distinct bridge
 210) Metasternal furca: (0), furca with anteriorly directed projection and occasionally with dorsoposterior tip also developed; (1), furca rod-shaped, lacking apical projections

WING

- 211) Wings on mesothorax: (0), present; (1), absent

- 212) Wings on metathorax: (0), present; (1), absent
213) Wings of female: (0), attached throughout life; (1), deciduous

Axillary area

- 214) Upper calypter: (0), not developed; (1), developed
215) Upper calypter: (0), posteriorly narrow, inner edge diverging from body axis; (1), strongly developed, broad posteriorly, median edge converging with body axis
216) Hair-like setae well developed in the fold between upper and lower calypter or in that region of the axillary wing membrane: (0), absent; (1), present
217) Lower calypter: (0), not developed; (1), developed
218) Lower calypter: (0), moderately developed, posteriorly narrow, inner edge diverging from body axis; (1), strongly developed, broad posteriorly, median edge converging with body axis

Stalk

- 219) Stem vein (basal section of R), upper surface: (0), bare; (1), with row of setae

Blade

- 220) Costa: (0), circumambient, continuous around the wing, weakened along the posterior margin; (1), abbreviated, ending at or before M2
221) Basal costal: (0), absent; (1), present
222) Basal costal bristles: (0), one; (1), more than one
223) Costal setae: (0), about same size; (1), alternating thick and thin
224) Humeral crossvein: (0), present; (1), absent
225) Humeral break: (0), absent; (1), present
226) Costal break: (0), absent; (1), present
227) Wing vein Sc; course: (0), straight at level of humeral break/ crossvein or proximal quarter of length; (1), with a convexity at level of humeral break/ crossvein or proximal quarter of length
228) Subcosta termination: (0), complete, reaching costa; (1); subcosta incomplete, ending just short of costa; (2); reduced, never longer than half length of basal cells or ending opposite branching of Rs; (3); fused apically to R1
229) Subcosta: (0), gradually curved, or faded; (1) with right angle, abruptly bent forward subapically
230) Crossvein sc-r: (0), present; (1), absent
231) Crossvein sc-r: (0), present near humeral crossvein; (1), not near humeral crossvein
232) Wing vein R1; configuration opposite end of subcosta: (0), without a knob; (1), with a knob
233) Rs: (0), present; (1), absent
234) Rs origin: (0), opposite or very near humeral crossvein; (1); distal, distant from humeral crossvein
235) Rs: (0), not branched; (1), two-branched; (2), three-branched; (3), four-branched
236) Radial vein distribution: (0), evenly distributed; (1), crowded towards costal margin, R5 ending before wing apex
237) Wing vein R2+3: (0), ending near wing apex; (1), ending near R1
238) Node at base of vein R4+5: (0), bare; (1), setose dorsally
239) Wing vein R4+5: (0), branched; (1), unbranched or fused
240) Fork of wing vein R4+5: (0), not strongly divergent, usually ending either above or below wing tip; (1), strongly divergent, encompassing wing tip, such that R5 is much closer to M1 than R4
241) Crossvein r-r between the first and second radial veins, usually named R2: (0), absent; (1), present
242) R4+5 or R5 and M1: (0), simple; (1), strongly curved at tip of wing, ending anterior to wing apex
243) R4+5 or R5 and M: (0), not convergent; (1), convergent; (2) joined
244) Vein M: (0), not upcurved at fork of discal cell or at junction with crossvein r-m; (1), upcurved at fork of discal cell or at junction with crossvein r-m
245) Vein M: (0), a straight continuation (i.e., distal part not bent and swung forwards); (1), distally with an abrupt bend and distal part swung forward

- 246) M2: (0), present; (1), absent
 247) Wing vein M3: (0), present; (1), absent
 248) Discal or discal medial: (0), present; (1), absent
 249) Discal or discal medial cell: (0), large; (1), small, short and broad
 250) Basal or basal medial cell: (0), present; (1), absent
 251) Crossvein bm-cu: (0), present; (1), incomplete or absent (i.e. cells bm and dm partially united or fused)
 252) Relative lengths of basal and discal cells: (0), basal cells greater than half length of cells d or dm, (1), basal cells shortened, less than half length of d or dm cells
 253) Spurious vein: (0), absent; (1), present
 254) Wing venation: (0), diagonal vein from br to posterior margin of wing absent; (1), diagonal vein present
 255) CuA1: (0), without kink; (1), with a baso-medial kink
 256) CuA2: (0); present; (1), absent
 257) Shape of distal margin of cup: (0); tapering; (1), truncate; (2), rounded; (3), distinctly convex; (4), angular extension
 258) Veins CuA2 and: (0), apices far apart; (1), apices close together; (2), apices fused, length of cell cup longer than apical portion of A1, (if incomplete, extend to wing margin); (3), apices fused, length of cell cup equal to or shorter than apical portion of A1 (if incomplete, extend to wing margin)
 259) First anal vein (A1 + CuA2 OR A1): (0), present; (1), absent
 260) First anal vein (A1 + CuA2 or A1): (0), reaching wing margin, even if only as a fold; (1), not reaching wing margin
 261) Vein A2 sensu Starý (2008): (0), present; (1), absent or extremely shortened
 262) Alular fold sensu Starý (2008) (=A2 MND): (0), not converging with first anal vein; (1), converging with first anal vein
 263) Vein A3: 236): (0), present; (2), absent
 264) Veins of wing: (0), posterior veins well developed, as distinct as the veins of radial, subcostal and costal sectors; (1), costalised, posterior veins indistinct

Halter

- 265) Halteres on metathorax: (0), absent; (1), present
 266) Halteres on mesothorax: (0), absent; (1), present

Legs

- 267) Mid coxal prong: (0), absent; (1), present
 268) Hind coxa: (0), simple; (1), well-developed rounded projection on anterior face
 269) Hind surface of hind coxa: (0), bare; (1), setose
 270) Femora: (0), uniformly sclerotized, undivided; (1), subdivided by apparently membranous cuticle into short, basal zone and elongate, distal zone
 271) Hind femur: (0), no rows of stout setae; (1), one row of stout setae ventrally; (2), two rows of stout setae ventrally
 272) Fore tibial spurs: (0), present; (1), absent
 273) Mid tibial spurs: (0), present; (1), absent
 274) Hind tibial spurs: (0), present; (1), absent
 275) Preapical dorsal tibial bristle: (0), absent; (1), present
 276) Male fore tarsus (or fore and hind tarsus): (0), without process; (1), with thumb-nail like process
 277) Hind tarsus: (0), tarsomere 1 longer than 2; (1), tarsomere 1 shorter than 2
 278) Last tarsomere of male: (0), not capable of being folded proximally; (1), capable of being folded forward against penultimate tarsomere
 279) Arolium: (0), present; (1), absent
 280) Mediobolus (pad like empodium): (0), absent; (1), present
 281) Setiform empodium: (0), absent; (1), present

Adult- ABDOMEN, non-genitalic

- 282) Abdominal spiracles: (0), some present; (1), all absent
283) Abdominal spiracles in segments 1-5: (0), all or some in membrane; (1), all in tergite margin
284) Female spiracles: (0), present on segments 1-7; (1), absent on segments 6 and 7 (5 pairs); (3), absent on segments 5-7, only 4 pairs present
285) T1-2: (0), separate; (1), fused into syntergum
286) First abdominal tergite: (0), without adventitious suture; (1), with adventitious suture
287) Abdominal tergite 1: (0), simple; (1), divided longitudinally in midline
288) Abdominal Tergite 2: (0), simple; (1), with an area of modified setae
289) Sternite 2, degree of exposition: (0), freely exposed but only separated from margins of T1-2 by a narrow strip of unfolded membrane; (1), contiguous with or slightly overlapped by margins of T1-2; (2), completely overlapped by margins of T1-2; (3), overlapping margins of T1-2; (4), freely exposed and widely separated from tergal margins by more or less folded membrane
290) Abdominal plaques: (0), present; (1), absent
291) Abdominal spiracle 8 in males: (0), present (1), absent
292) Rectal papillae: (0), three; (1), four; (2), five; (2), six; (4), supernumerary (12-80)

Adult- female genitalia

- 293) Female abdominal segments 5-8, directed: (0), posteriorly; (1), anteroventrally
294) Apical female abdominal segments: (0), all segments exposed, gradually telescopic; (1), segment 8-10 retracted; (2), segments 7-10 retracted; (3), segments 6-10 retracted; (4), segments 5-10 retracted
295) Female T6 and ST6: (0), fused; (1), free
296) Female T7, ST7: (0), free; (1), fused
297) Female segment 7: (0), complete; (1), divided into broad thickened anterior and narrowed posterior region
298) Ovipositor, shape: (0), unmodified; (1), lance-like; (2) sickle shaped
299) Alpha setae (sensilla trichodea) on ovipositor sternites: (0), present; (1), absent
300) T8: (0), not divided longitudinally; (1), divided longitudinally
301) ST8 of ovipositor: (0), undivided; (1), plate-like, partly divided posteriorly, forming hypogynial valves; (2), completely divided longitudinally
302) Sclerites of segment 8 of female: (0), separated; (1); articulated anteriorly or fused
303) Female abdominal tergite 9: (0), present; (1), absent
304) ST9: (0), present; (1), absent
305) ST9: (0), external; (1), partially or fully invaginated
306) Female T10: (0), present as separate sclerite (1), not a separate sclerite
307) T10: (0), simple; (1), completely divided medially
308) T10: (0), spines absent, (1), bearing large, stout spines (referred to as acanthophorite spines), often appearing in one or more rows
309) ST10: (0), present; (1), absent
310) Segment 10: (0), tergite and sternite 10 separate; (1), T10 articulated anteriorly with S10
311) Hypoproct: (0), without lingulae; (1), with lingulae, lobe-like lateral extensions
312) Female Cerci: (0), absent; (1), present
313) Female Cerci: (0), two-segmented; (1), one-segmented, free from each other
314) Female cercus: (0), first segment not expanded ventrolaterally; (1), first segment expanded ventrolaterally
315) Terminal segment of cerci: (0), not distinctly flattened; (1), distinctly flattened (dorsal and ventral faces flat in cross-section)
316) Female cerci: (0), simple; (1), separated by abdominal tergite 10
317) Cercus: (0), lightly sclerotized; (1); heavily sclerotized
318) Spermathecae: (0), absent; (1), 1; (2), 2; (3), 3; (4), 4
319) Spermathecal ducts: (0) of moderate length, at most less than the length of the abdomen; (1), very long, at least much longer than the abdomen

- 320) Branching of spermathecal ducts: (0), 1 + 1 + 1; (1), 2 + 1
- 321) Female sperm pump: (0), absent; (1), present, well-developed musculature and sclerotised collars
- 322) Female accessory glands: (0), pair; (1), one; (2), absent
- 323) Ventral receptacle: (0), absent; (1), present
- Adult-male genitalia**
- 324) Male tergite 6: (0), at least half length tergite 5 and grading into the terminalia, usually exposed; (1), at most half length tergite 5 and part of a well-defined unit "terminalia", rarely exposed
- 325) Syntergosternite comprised of at least fusion of sternite and tergite of segment 8: (0), absent; (1), present
- 326) Syntergosternite: (0), comprised of fusion of sternite and tergite of segment 8; (1), comprised of fusion of sternites and tergites of segment 7 and 8
- 327) Vasa deferentia configuration: (0), extended caudally, not arching back anteriorly; (1), U-shaped, apically approximated
- 328) Accessory gland: (0), separate or not continuous with vasa deferentia; (1) continuous with vasa deferentia
- 329) Epididymis: (0), absent; (1), present
- 330) Male terminalia; flexion: (0), unflexed, projecting posteriorly; (1), deflexed ventrally; (2), dorsoflexed
- 331) Hypopygium: (0), unrotated or not permanently rotated (1), rotated permanently between 45-90°; (2), rotated permanently between 90-180°; (3), circumversion, rotated permanently through 360°
- 332) Position of hypopygium: (0), symmetrical, in medial line of abdomen; (1), asymmetrical, on right side of abdomen
- 333) Epandrium articulation: (0), fused to or lying flat on hypandrium; (1), articulated on gonocoxites or hypandrium
- 334) Epandrium: (0), shallowly notched or posterior margin straight; (1), posterior margin deeply emarginate, forming U-shape with basal connection; (2), completely divided, separated along midline
- 335) Epandrium and hypandrium: (0), fused ring; (1), separate
- 336) Hypandrium and gonocoxites: (0), separate; (1), completely fused, no seams
- 337) Gonocoxal apodemes: (0), confined to anterior margin of hypandrium, not extended as narrow process; (1), project little beyond margin of hypandrium; (2), elongate, extending well beyond anterior margin of hypandrium
- 338) Postgonites: (0), absent; (1), present
- 339) Postgonal apodeme: (0) absent; (1) present
- 340) Gonostyli: (0), present; (1), absent
- 341) Gonostyli: (0), apical; (1), subapical
- 342) Gonostyli articulation: (0), transverse or oblique; (1), dorsoventral
- 343) Aedeagus: (0), surrounded by parameres; (1), fused to parameres at apex, forming phallus
- 344) Parameres: (0), paired and separate; (1), fused
- 345) Aedeagus or phallus; (0), at least partly sclerotised; (1), entirely membranous
- 346) Aedeagus or phallus: (0), single tube, terminal opening, apically; (1), two tubes at the apex; (2), with three slender filaments, each with separate opening
- 347) Phallus: (0), undivided; (1), subdivided into a dorsal guide and a ventral needle-like component
- 348) Phallus; dorsal wall of distiphallic tube: (0), not modified; (1), sclerotized and forming the dorsal plate
- 349) Phallus; dorsal plate: (0), divided middorsally; (1), not divided middorsally
- 350) Phallus; apical part of dorsolateral processes: (0), tips confluent with (i.e., part of) the wall of the phallic tube; (1), free tips

- 351) Phallus; armature (small sclerotized teeth) on distalmost ventral and ventrolateral surfaces: (0), absent; (1), present
- 352) Phallus: (0), no division; (1), divided into basi-phallus + distiphallus
- 353) Phallus: (0), without epiphallus; (1), with epiphallus
- 354) Mesohypophallic sclerotisation mid-ventrally along distiphallus: (0), absent or not developed; (1), present
- 355) Phallapodeme: (0), absent; (1), present
- 356) Phallapodeme: (0), ingrowth of the hypandrium; (1), lever-like
- 357) Ejaculatory apodeme: (0), present; (1), absent
- 358) Ejaculatory apodeme: (0), simple, without posterior projection; (1), with a posterior extension into the sperm sac (endoaedeagal guide, endoaedeagal process)
- 359) Ejaculatory apodeme: (0), fused medially to basiphallus; (1), articulated with phallus; (2) loosely attached to phallus
- 360) Lateral ejaculatory processes: (0), present; (1), absent
- 361) Lateral ejaculatory processes: (0), large, external; (1), small, retracted within base of phallus; (2), small, not retracted within base of phallus, closely associated with base of aedeagal tines
- 362) Ventral plate: (0), absent; (1), present
- 363) Aedeagal tines: (0), absent; (1), present
- 364) Male tergite 10: (0), present; (1), absent
- 365) Male sternite 10: (0), present; (1), absent
- 366) Surstyli composed of epandrium dorsally and bacilliform sclerites: (0), absent; (1), present
- 367) Surstyliar position: (0), apical; (1), subapical on inner margin of epandrium
- 368) Subepandrial sclerite: (0), absent (membraneous, at least in part of length); (1), sclerotised along its entire length from base of phallus to hypoproct, forming subepandrial sclerite; (2), sclerotised, divided into bacilliform sclerites (processus longi) laterally
- 369) Male cerci: (0), present; (1), absent
- 370) Cerci: (0), not modified as clasping structure; (1), modified as clasping structure
- 371) Cerci: (0), separate (i.e., not fused); (1), fused