

1 **Umenocoleidae (Insecta: Dictyoptera) from Turonian sediments of Kzyl-Zhar,**  
2 **Kazakhstan and Cenomanian northern Myanmar amber**

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25 **Phylogenetically annotated character list (numbers 1-58 modified after Bai et al. (2016), numbers**  
26 **59-130 from Vršanský et al. (2018); numbers 131-206 from Vršanský et al. (2021), others originals**  
27 **based on referenced sources; none of the character is weighted in the present analysis – weight**  
28 **refer to original character definitions by Bai et al. (2016)). 0- plesiomorphy, 1- apomorphy)**

29

30 **1. Orientation of head** (0) hypognathous; (1) orthognathous ((0) orthognathous; (1) prognathous or  
31 subprognathous (slightly inclined) according to Bai et al. (2016)). Hypognathous is an original state in  
32 Blattaria including some Umenocoleidae in all lineages, *Vitisma*, *Cratovitisma*, *Jantaropterix*, and also  
33 some Umenocoleinae s.str. specimens of *Ponopterix* (Lee 2016 fig. 3m); orthognathous in  
34 *Alienopterix* like in living cockroach *Melyroidea*, Mantodea (Grimaldi 2003; Wieland 2013), most  
35 *Ponopterix* (Lee 2016), *Manipulator* (Vršanský and Bechly 2015); homoplastically in  
36 Mantophasmatodea (Baum et al. 2007), and most other groups of Polyneoptera (Wipfler et al. 2011).  
37 Derived prognathous state in some other orders but also in predatory Raphidiomimidae (Vishniakova  
38 1973) is not present in the present lineage and is disregarded herein.

39 **2. Parietal ridge s.str.** (0) absent, (1) present. Such a ridge is present in certain Umenocoleoidea,  
40 extant Mantodea (Leverault 1936; Wipfler et al. 2011, 2012), and Grylloblattodea (Walker 1931; KDK  
41 pers. Observation in Bai et al. (2016)). It does not occur in other groups of Polyneoptera (Wipfler et  
42 al. 2011) such as *Manipulator*. The condition in *Santanmantis* (although new specimens seems to  
43 possess it – Hörning et al. in press) and most extinct mantises (e.g., Grimaldi 2003; Vršanský 2003;  
44 Wieland 2013; Vršanský and Bechly 2015) is uncertain.

45 **3. Ocelli** (0) present, (1) absent ((0) absent, (1) present according to Bai et al. (2016)). Ocelli are  
46 present in stem cockroaches (Vršanský 2008; Anisyutkin and Gorokhov 2008) including all sufficiently  
47 studied Umenocoleidae and also in the most primitive mantodeans (Vršanský 2002; Delclós et al.  
48 (2016); Grimaldi 2003: Fig. 3), but not in other known predatory cockroaches. The reverse polarity  
49 would be correct regarding the more distant derivation (from Palaeozoic cockroaches), which is not  
50 the case (*Alienopteridae* were derived in the Mesozoic).

51 **4. Number of ocelli** (0) three, (1) two. See above (3). *Vitisma*, *Jantaropterix* and *Ponopterix* preserved  
52 in Myanmar amber possess central ocellus (unpublished).

53 **5. Interantennal ridge** (0) present, (1) absent ((0) absent, (1) present according to Bai et al. (2016)).  
54 The interantennal ridge connects the antennal sockets of the two sides. It is present in certain  
55 *Alienopteridae*, in extant Mantodea (Wieland 2013; see also Leverault 1936; Grimaldi 2003; Wipfler  
56 et al. 2011, 2012), in *Ambermantis* (Grimaldi 2003), in *Jantaromantis* (Vršanský 2002), and in  
57 Odonata (Blanke et al. 2012). The reverse polarity is due to the plesiomorphic presence in  
58 Umenocoleoidea and stem *Liberiblattinidae* and in higher level it would be correct.

59 **6. X-shaped median apodeme of frontal region** (0) absent, (1) present. Absent in Mantodea (Wipfler  
60 et al. 2012; Wieland 2013: Figs. 68-70, 74-77) and also in most other groups of Polyneoptera (Wipfler  
61 et al. 2011). Present in Mantophasmatodea (Baum et al. 2007). Disregarded due to absence in adult  
62 fossils, although an alienopterid immature (Fig. SI6a) seem to have it indicated. All other unpublished  
63 adults of *Alienopteridae* and Umenocoleidae (including the most primitive *Vitisma* and *Jantaropterix*)  
64 do not have it.

65 7. **Gula** (0) absent, (1) present. Absent in *Alienopterus* like in extinct and extant Mantodea (Wipfler et  
66 al. 2012; Wieland 2013) and most other groups of Polyneoptera (Wipfler et al. 2011). Present in  
67 Embioptera, Dermaptera and Zoraptera (Rähle 1970; Beutel and Gorb 2006; Matsumura et al. 2015).  
68 Disregarded due to absence of evidence and presence on all Blattaria.

69 8. **Antennal flagellum** (0) not separated into basi- and distiflagellum, (1) separated in basi- and  
70 distiflagellum. Unlike in Mantophasmatodea (Drilling and Klass 2010; Hockmann et al. 2009) a  
71 distinct differentiation between a basi- and distiflagellum is absent in other groups of Polyneoptera;  
72 ambiguous in *Alienopterus*. Disregarded – the state is absent in cockroaches.

73 9. **Antennal length** (0) of comparable length than body, (1) shorter than body ((0) distinctly longer  
74 than head, (1) shorter than head (bristle-like) according to Bai et al. (2016)). Long in all cockroaches  
75 including Umenocoleidae, *Alienopterus* and *Vcelesvab*, like in most other groups of Polyneoptera  
76 (e.g., Wipfler et al. 2011; Beutel et al. 2014). The original length consideration (very short in  
77 Ephemeroptera and Odonata) is modified here as the stem group Umenocoleidae has already a very  
78 long antenna identically as in primitive alienopterids *Alienopterus* and *Vcelesvab*.

79 10. **Secondary (anterior) mandibular joint** (0) gliding device, (1) ball-and-socket joint. A secondary  
80 mandibular articulation is present as a ball-and socket joint in Odonata and neopteran groups with  
81 normally developed mandibles. This condition is invisible in *Alienopterus*

82 11. **Number of maxillary palpomeres** (0) five, (1) less than five ((0) more than five, (1) five, (2) less  
83 than five according to Bai et al. (2016)). Four are present in *Alienopterus* (see Fig. 4a, Bai et al.  
84 (2016)), unlike in other groups of Polyneoptera (e.g., Wipfler et al. 2011, 2012) including extant  
85 Mantodea (Wieland 2013), *Manipulator* (Vršanský and Bechly 2015) and *Ambermantis* (Grimaldi  
86 2003; condition in *Ambermantis* unclear; in *Burmantis* 5-state was validated in Delclós et al. (2016)).  
87 Palps are four-segmented in *Ponopterix* (clearly visible in a single specimen, which might be a  
88 developmental error or incomplete regeneration after damage) and *Jantaropterix* (Vršanský 2003 –  
89 and in many unpublished amber records of this genus). Five-segmented palp is present in stem  
90 cockroaches.

91 12. **Angle between submentum and mentum** (0) less than 60° or absent, (1) more than 60°. Very  
92 small or absent in *Alienopterus* like in most other groups of Polyneoptera (e.g., Walker 1931; Klass  
93 and Ehrmann 2003). More than 60° in Mantophasmatodea and Grylloblattodea (Wipfler et al. 2011).  
94 Unknown in †*Ponopterix* and other fossil taxa included here (scored as ?). Disregarded because of  
95 traced origin within Blattaria

96 13. **Glossa** (0) present, (1) partly or completely reduced. Even though the glossae and paraglossae  
97 cannot be very clearly distinguished, it is obvious that the endite lobes of *Alienopterus* are well-  
98 developed like in most other groups of Polyneoptera (e.g., Leverault 1936; Rähle 1970; Wipfler et al.  
99 2011; Friedemann et al. 2012). The glossa is reduced in Dermaptera (Wipfler et al. 2011) and  
100 *Macroxyela* (Beutel and Vilhelmsen 2007). Disregarded due to absence of evidence.

101 14. **Origin of Musculus tentorioparaglossalis** Disregarded herein due to absence of evidence in the  
102 presently analysed taxa (and condition in fossil taxa is unknown according to Bai et. al (2016)  
103 confirmed.

104 15. **Accessory anterior tentorial bridge** (leading to “perforated corpotentorium”) (0) absent, (1)  
105 present. The presence of an accessory anterior tentorial bridge is a characteristic feature of  
106 Dictyoptera (Hudson 1945; Klass and Eulitz 2007). Disregarded due to absence of evidence on fossils.

107 16. **Paired lateral cervical sclerites** (0) absent, (1) present. These sclerites are distinctly developed in  
108 *Alienopterus* like in most other groups of Polyneoptera (e.g., Walker 1931; Klass and Ehrmann 2003;  
109 Wieland 2006).

110 17. **Length of prothorax** (Grimaldi, 2003: char. 23) (0) less than 2x as long as wide; (1) at least 2x as  
111 long as wide. At most slightly longer than wide in *Alienopterus* and other fossils considered here  
112 (Grimaldi et al. 2003; Vršanský 2003; Vršanský and Bechly 2015). State (0) in Mantophasmatodea  
113 (Klass et al. 2003: table 2; Wipfler et al. 2014). It is a derived state of some of the modern (Cenozoic-  
114 living, not Mesozoic) Mantodea and homoplasically for generally elongated *Teyia* (as autpomorphy  
115 in the present matrix).

116 18. **Prothoracic paracoxal process** (0) absent, (1) present. This complex prothoracic configuration is  
117 present in Mantophasmatodea and Grylloblattodea, but missing in other extant groups of insects  
118 (Wipfler et al. 2015). Disregarded due to absence of evidence in fossil Dictyoptera.

119 19. **Prothoracic defensive glands** (0) absent, (1) present. Prothoracic defensive glands are present in  
120 Phasmatodea (e.g., Bradler 2009) but absent in other groups of Polyneoptera (Beutel et al. 2014).  
121 Disregarded to to absence in Dictyoptera and obscure identification in fossils.

122 20. **Mesoscutellum** (0) not present as a defined part of the mesonotum, (1) present as a defined part  
123 of the mesonotum. Present as all Aienopteridae but missing in Mantophasmatodea and  
124 Grylloblattodea (Beutel and Gorb 2006).

125 21. **Profemoral brush** (Grimaldi 2003: char. 12): (0) absent, (1) present. Present in extant and extinct  
126 Mantodea (except *Jersimantis*) and also visible in *Alienopterus*. Data for sedimentary fossils are not  
127 available, although the forelegs of *Ponopterix axelrodi* are cursorial and similar to those of early  
128 mantises (Vršanský 2003).

129 22. **Shape of distal half of dorsal edge of protibia** (0) straight or concave, (1) at least slightly convex.  
130 In most Mantodea, including *Chaeteessa* and *Mantoida* (and thus most likely in the ground plan of  
131 the group), the distal half is at least slightly convex throughout (e.g., Wieland 2013); the lack of this  
132 tibial curvature in some Mantodea (e.g., Toxoderinae) is likely an apomorphic condition developed  
133 within the order. The curvature is also absent in Alienopteridae, predaceous roaches (e.g., Grimaldi  
134 and Ross 2004: fig. 3; Vršanský 2003; Vršanský and Bechly 2015) and their stem Liberiblattinidae  
135 (with already achieved raptorial forelegs), and in representatives of other polyneopteran orders  
136 examined.

137 23. **Size of anterior terminal tibial spine of protibia (Tt1) relative to Tt1 spine of mesotibia** (Grimaldi  
138 2003: char. 17) (1) subequal, (0) distinctly smaller ((0) subequal, (1) distinctly larger, (2) distinctly  
139 smaller according to Bai et al. (2016)). The spines are subequal in size in most Polyneoptera including  
140 Blattodea, *Manipulator* (Vršanský and Bechly 2015: Fig. 1D) and *Alienopterus*. In the known  
141 Mantodea, including most fossil taxa (Grimaldi 2003), the protibial Tt1 is larger, only in *Chaeteessa* it  
142 is distinctly smaller (Wieland 2013: Fig. 278, arrow in Figs. 418–422). The character is unclear in  
143 *Santanmantis* (Grimaldi 2003; Hörnig et al. 2013). Also subequal in Mantophasmatodea and

144 Grylloblattodea. The reverse polarity is used due to early derivation of *Vitisma* and *Jantaropterix*  
145 (visible in new samples) and ancestral (outgroup) Liberiblattina (with shorter protibial Tt1).

146 24. **Orientation of ultimate tarsomere** (0) not distinctly bent upwards, (1) distinctly bent upwards.  
147 Distinctly bent upwards in most Alienopteridae like in Mantophasmatodea (Beutel and Gorb 2008).  
148 Unclear in *Santanmantis* (reconstructed as bent by Horning et al. in press).

149 25. **Number of tarsomeres** (0) five, (1) less than five. Character disregarded herein due to standard  
150 occurrence of 5-segmented tarsi in all cockroaches including aleinopterids and standard occurrence  
151 of 4-segmented tarsi in damaged individuals (Vršanský 2002).

152 26. **Euplantulae** (0) absent, (1) present. Tarsal euplantulae are present in all studied Umenocoleoidea  
153 and also stem Liberiblattinidae, like in most groups of Polyneoptera (Beutel and Gorb 2006), but it is  
154 unclear whether they are present in *Manipulator* with slender tarsomeres (Vršanský and Bechly  
155 2015: Fig. 1d and unpublished). Unclear in *Santanmantis*, *Jersimantis*, *Burmantis* and *Ambermantis*,  
156 but present in *Jantarimantidae* (Vršanský 2002) and Juramantidae.

157 27. **Arolium** (0) absent, (1) present. Present in most cockroaches (absent only in some extremely  
158 derived Mesozoic and living cockroaches), in Mantophasmatodea (Beutel and Gorb 2008) and most  
159 other polyneopteran groups (e.g., Beutel and Gorb 2006). Absent in extant Mantodea (Beutel and  
160 Gorb 2006; Wieland 2013), Jantarimantis (Vršanský 2002) and *Santanmantis* (Grimaldi 2003; Grimaldi  
161 and Engel 2005: Fig. 7.98). Unclear in *Juramantis*, *Jersimantis*, *Burmantis* and *Ambermantis*.

162 28. **Size of arolium** (0) not enlarged and not pan-shaped, (1) enlarged and pan-shaped. Enlarged and  
163 pan-shaped in Mantophasmatodea and Phasmatodea-Timematidae (Beutel and Gorb 2006, 2008)  
164 and homoplasiacally in some Alienopteridae and Umenocoleidae. *Teyia* immatures have extremely  
165 large arolia, while adult has comparatively more standard (even though still large). This character  
166 might be related to contact with ants, sometimes even regarded for related to their phoresis  
167 (referenced below).

168 29. **Jumping legs** (0) absent, (1) present. Jumping hindlegs with enlarged femora are characteristic for  
169 Orthoptera. This condition does not occur in other investigated taxa including *Alienopterus*,  
170 *Ponopterus* (Vršanský 2003; Lee 2016) and extant and extinct members of Mantodea (Grimaldi 2003;  
171 Wieland 2013). disregarded

172 30. **Resting position of wings** (0) not folded back over the abdomen, (1) folded back over the  
173 abdomen. The wings of *Alienopterus* and other winged fossils under consideration (Grimaldi 2003;  
174 Vršanský 2003; Lee 2016; Vršanský and Bechly 2015) are folded back over the abdomen as in other  
175 groups of Neoptera. Disregarded due to presence in all Dictyoptera.

176 31. **Middle plate of wing base** (0) undivided, (1) divided. Generally divided in neopteran insects with  
177 developed wings.

178 32. **Connection between axillary sclerites and the main longitudinal veins** (0) present, (1) absent.  
179 The main longitudinal veins are separated from the axillary sclerites in neopteran insects with  
180 developed wings.

- 181 33. **Forewings, length relative to length of hindwings** (in unfolded condition) (0) of similar length or  
182 longer, (1) at most half as long as the hindwing. Short in most Alienopteridae (unique autapomorphy  
183 within Mesozoic cockroaches; a single collected Mesozoic (and none Palaeozoic) cockroach other  
184 than Alienopteridae (none Umenocoleidae) has reduced forewing length although forewing  
185 reduction is common in living cockroaches). This state is homoplasically common in Dermaptera  
186 (Haas 2006; Giles 1963), Phasmatodea (Bradler 2003: Fig. 16.1b) (and very common in e.g., beetles).
- 187 34. **Callous stigma (pseudovein)** (Grimaldi 2003: char. 9) (0) absent, (1) present. The callous stigma of  
188 the forewing, also called pseudovein in Grimaldi (2003: Figs. 4, 5, 6), is present in *Ambermantis* and  
189 *Santanmantis* (Grimaldi 2003). It is apparently absent in *Manipulator* (Vršanský and Bechly 2015: Fig.  
190 1d). Absent in all studied Umenocoleoidea.
- 191 35. **Hindwings** (0) well-developed, (1) absent. Well developed in *Alienopterus* and most other groups  
192 under consideration (Grimaldi 2003; Vršanský 2003; Lee 2016; Vršanský and Bechly 2015). Absent in  
193 Grylloblattodea and Mantophasmatodea. Disregarded due to presence in all Mesozoic Dictyoptera.
- 194 36. **Transverse hindwing folding** (0) absent, (1) present. Transverse hindwing folding is a  
195 characteristic feature of Dermaptera and some Blattodea (Kleinow 1966; Haas and Kukulová-Peck  
196 2001). This condition is missing in †*Alienopterus* and other groups of Polyneoptera. Disregarded due  
197 to presence in all Mesozoic Dictyoptera.
- 198 37. **Hindwing vannus** (0) large, (1) small ((0) small, (1) large according to Bai et al. (2016)). Large in all  
199 Mesozoic cockroaches including stem Umenocoleidae, *Alienopterus* and most Alienopteridae. (small  
200 in derived genus *Mimimio*) like in most other groups of Polyneoptera with developed wings (Bai et al.  
201 2016). Reverse polarity would work in earlier, Palaeozoic derivation of the family.
- 202 38. **Precostal field of hindwing** (0) small, (1) enlarged. Small in *Alienopterus* and other winged fossils  
203 included here (Vršanský 2003: Figs. 15, 79). A distinctly enlarged precostal field is a characteristic of  
204 Orthoptera. Disregarded due to presence in all Dictyoptera.
- 205 39. **Anal filament** (0) a long segmented process, (1) a short unsegmented process or absent. Among  
206 the taxa here sampled, a long segmented filament is only found in *Thermobia* and *Oniscigaster*, but  
207 not in *Alienopterus* and the remaining pterygote taxa (e.g., Beutel and Gorb 2006). Disregarded due  
208 to absence in all Dictyoptera.
- 209 40. **Cerci** (0) present, (1) absent. Cerci are distinctly developed in *Alienopterus* and *Ponopterix* (e.g.,  
210 Vršanský 2003: Fig. 15), as in Mantodea (Klass and Ehrmann 2003) and other groups of Polyneoptera  
211 (e.g., Wipfler et al. 2011). Absent in *Stenopsocus* and *Macroxyela*. Disregarded due to presence in all  
212 Dictyoptera.
- 213 41. **Cerci**: (0) segmented, (1) unsegmented. The cerci are segmented in all cockroaches except  
214 Attaphilidae, in Mantodea, Grylloblattodea and other polyneopteran groups. They are one-  
215 segmented in Mantophasmatodea, Orthoptera, Phasmatodea, Odonata, Dermaptera and Zoraptera  
216 (Klass and Ehrmann 2003; Beutel et al. 2014).
- 217 42. **Shape of cerci in females** (0) straight, (1) curved. Curved cerci in females are a characteristic  
218 feature of Dermaptera even though this derived condition is not found in Arixenina and Hemimerina  
219 (e.g., Haas 2006). Claspig cerci also occur in cockroaches of the family Fuziidae (Vršanský et al.

220 2009). Disregarded here as cerci are modified, but not hardened in Umenocoleoidea (and all  
221 Dictyoptera).

222 **43. Ventromedian drumming process on the male subgenital plate** (0) absent, (1) present. This  
223 structural modification of the male abdominal coxosternite IX is a characteristic feature of  
224 Mantophasmatodea but it also occurs in many Plecoptera (Zwick 1980: p. 53; with much structural  
225 variation). It is missing in †*Alienopterus* and other groups of Polyneoptera. Disregarded due to  
226 absence in all Dictyoptera. Nevertheless, some unidentified process at coxosternite IX (and coevally  
227 at other coxosternites) is present in an undescribed immature of Alienopteridae (Fig. S16b).

228 **44. Insemination** (0) indirect, (1) direct with secondary copulatory organ on abdominal venters II and  
229 III; (2) direct, with phallic organ of abdominal venter IX. The insemination is direct with an  
230 anteroabdominal copulatory organ in Odonata and a postabdominal one in Neoptera (e.g., Beutel et  
231 al. 2014). This very likely also applies to the extinct taxa included in this study considering the  
232 structure of the postabdomen (scored as 2). Disregarded due to presence in all Dictyoptera and  
233 absence of evidence in fossils.

234 **45. Chambered ootheca formed by asymmetrical accessory glands IX** (0) absent, (1) present. The  
235 presence is characteristic for Dictyoptera (e.g., Hennig 1969; Nalepa and Lenz 2000; Wieland 2010).  
236 Disregarded due to absence in all Umenocoleoidea (possessing ovipositor).

237 **46. Micropylar plate system at the dorsal surface** (0) absent, (1) present. Eggs with a micropylar  
238 plate system on the dorsal surface are characteristic for Embioptera and Phasmatodea. Disregarded  
239 due to absence of evidence in Umenocoleoidea.

240 **47. Anterior terminal tibial spine of protibia (Tt1) placed on a projection of the apical tibial margin**  
241 **(formation of tibial claw)** (0) present, (1) absent ((0) absent, (1) present according to Bai et al.  
242 (2016)). In most Polyneoptera the Tt1 spines of the protibia (as far as Tt1 spines can be identified) are  
243 placed on a part of the apical tibial margin that projects not at all or only a little – the same condition  
244 as for the Tt1 of the meso- and metatibiae. This condition has also been documented for *Burmantis*  
245 and *Jersimantis* (Grimaldi 2003: Figs. 8, 14, 15) and is also present in *Alienopterus*. Only in all extant  
246 mantodeans (Wieland 2013) and at least in *Ambermantis*, *Burmantis* and *Jantarimantis* among the  
247 fossil ones (Grimaldi 2003: Fig. 3b,c) the part of the tibial apex that bears Tt1 forms an elongate  
248 projection; the projection and spine Tt1 form the tibial claw. Also indicated in *Santanmantis*  
249 (Grimaldi 2003; Hörnig et al. 2013, 2016). Due to the presence of this structure in certain  
250 Alienopteridae, basal Umenocoleidae (*Vitisma*) and also in stem Liberiblattinidae, the polarity is  
251 reversed.

252 **48. Abdominal sternite VII of female strongly expanded posteriorly** (0) absent, (1) present. Present  
253 in all extant Dictyoptera and Dermaptera, and also visible in †*Ponopterix* (Lee 2016: Fig. 13);  
254 unknown for most fossil taxa. Absent in the other sampled extant taxa. Disregarded due to presence  
255 in all Mesozoic Dictyoptera.

256 **49. Discoidal spines ventromedially on proximal part of profemur** (0) absent, (1) present ((0) absent,  
257 (1) present according to Bai et al. (2016)). Absent in all non-dictyopteran Polyneoptera, all extant  
258 Blattodea, and in the fossil Mantodea *Jersimantis*, *Burmantis*, and *Ambermantis* (Grimaldi 2003).  
259 Present in all extant Mantodea including *Chaeteessa* and *Metallyticus* (Wieland 2013: section 4.6.4.).



260 Unknown for *Santanmantis* (scored as ?; though presence may appear likely based on Hörnig et al.  
261 2013: Fig. 2) and remaining fossils (scored as ?). This character was meanwhile proved for  
262 *Santanmantis* (Hörnig (in press)) and also recorded in Mesozoic mantodeans (Bo et al. 2015, cover of  
263 the book), Manipulatoridae and numerous other Mesozoic cockroaches of diverse families (such as  
264 Mesoblattinidae - Hörnig et al. (2016) corrected interpretation by Lee (2016) and also *Liberiblattina*  
265 (used here as an outgroup which results in a reverse polarity – in a more wide taxonomic study the  
266 former polarity would work).

267 50. **Mandibular postmola** (0) absent, (1) present. A membranous postmola on the mandible is  
268 present in extant Dictyoptera (Wipfler et al. 2011) but absent in all other studied species.  
269 Disregarded due to unclear situation in the fossils.

270 51. **Posterior part of apical mesotibial margin with a notch** and an accessory lobe adjoining it  
271 ventrad (0) absent, (1) present. This character is poorly documented across insects; detailed data are  
272 only available for Dictyoptera and selected members of some other polyneopteran orders (Klass et  
273 al. 2009). Among the taxa here sampled, the presence of a notch and an accessory lobe is  
274 documented for *Chaeteessa* and *Metallyticus* (Klass et al. 2009) and likely for the early fossil taxon  
275 *Burmantis* (Grimaldi 2003: Fig. 9e). Some Alienopteridae show the notch. Absence is known for the  
276 blattodeans *Periplaneta* and *Ectobius* (Klass et al. 2009) and for the Orthoptera, Mantophasmatodea,  
277 and Grylloblattodea here sampled (Klass et al. 2009, Bai et al. 2016).

278 52. **Presence of intertibiotalar sclerite (itts) on midlegs** (0) absent, (1) present. The occurrence of  
279 this sclerite, which is located anteroventrally in the membrane between the distal tibial and the basal  
280 tarsal margins was found only (autapomorphy) in all extant dictyopterans so far studied (except for  
281 Isoptera; Klass et al. 2009), in extinct *Alienopterus*, *Jantaripterix*, *Vitisma*, *Cratovitisma* and  
282 *Manipulator* (only sufficiently studied amber cockroaches to date) and Mesozoic mantodeans.

283 53. **Lacinial incisivi** (0) present, (1) absent. Lacinial incisivi are present in all studied species with the  
284 exception of *Macroxyela* and *Stenopsocus* (Wipfler et al., 2011). Disregarded due to unclear situation  
285 in the fossils and presence in all Dictyoptera.

286 54. **Stipital ridge on maxillary stipes** (0) present, (1) absent. In all studied species with the exception  
287 of *Macroxyela* and *Stenopsocus* the stipes has a stipital ridge (Wipfler et al. 2011).

288 55. **Lacinia** (0) free, (1) in galeal cavity. Autapomorphy of dictyopterans (Wipfler et al. 2012). The  
289 state in amber fossils proved except for *Alienopterus*.

290 56. **Proximal part of antennal vessel wall** (0) one-layered, (1) two-layered. In Dictyoptera and  
291 Mantophasmatodea the antennal vessel wall is two-layered with an inner transport epithelium, while  
292 in all other studied species that have antennal vessels it is one-layered (Pass et al. 2006). Disregarded  
293 due to unclear situation in the fossils.

294 57. **Musculus interampullaris** (Oah1) (0) absent, (1) present. *M. interampullaris* connects the  
295 antennal ampullae of the two sides, thus dilating them. It is present in Dictyoptera, Orthoptera,  
296 Phasmatodea and Zoraptera (Pass et al. 2006; Wipfler and Pass 2014). Disregarded due to unclear  
297 situation in the fossils.

298 58. **Detachable operculum at the anterior pole of the egg** (0) absent, (1) present. Such an operculum  
299 is only found in Plecoptera, Embioptera and Phasmatodea. Disregarded due to unclear situation in  
300 the fossils.

301 59. **Head oval/globular** (1) absent, (0) present. Head is globular in most stem *Liberiblattinidae* and  
302 also in most primitive *Vitisma* and primitive *Jantaripterix* (Vršanský 1999, 2002, 2009) and thus is  
303 regarded as plesiomorphic at the level of Umenocoleoidea.

304 60. **Head** (0) standard, (1) prognathous. Head is prognathous only (homoplasically) in unrelated  
305 (*Caloblattinoidea*) *Raphidiomimidae* (Vishniakova 1973; Liang et al. 2009, 2012) and in *Grant* it is  
306 regarded for autapomorphy.

307 61. **Head** (0) standard, (1) modified. Head is extremely conservative in living cockroaches  
308 (exceptionally orthognathous in *Melyroidea*) and little variability, except for predatory  
309 *Manipulatoridae*, *Eadiidae* and *Raphidiomimidae* (and *Mantodeans*) (Vishniakova 1973; Liang et al.  
310 2011, 2012; Vršanský 2009; Vršanský and Bechly 2015), is characteristic also for Mesozoic  
311 cockroaches. The head underwent drastic changes (to-orthognathy) in the transition to beetle-like  
312 habits (while no such change occurred in other beetle-like lineages like *Diplopteridae* or  
313 *Anaplectidae*) (Vršanský et al. 2016; Barna et al. submitted) and further in certain *Alienopteridae* (up  
314 to prognathous state in *Grant*) in seriously modified unlike in any other *Dictyoptera*.

315 62. **Antenna** (0) filiform, (1) other. Antenna is filiform and filamentous in all cockroaches including  
316 type *Alienopterus* (see Bai et al. 2016). Nevertheless, in most of the species of the family (and also in  
317 some *Umenocoleidae* – Vršanský 2003) it is modified and regarded for apomorphic.

318 63. **Antenna with numerous small homogenic sensilla** (1) present, (0) absent. Autapomorphy of  
319 certain *Umenocoleoidea*. NB! Sensillar apparatus on antenna is family-specific in cockroaches  
320 (Vršanský et al. 2001).

321 64. **Antenna** (1) diversified – not straight, (0) straight. Autapomorphy of undescribed specimen at fig  
322 S13.

323 65. **Antenna** (0) thin, (1) truncate. Autapomorphy of certain *Umenocoleoidea*.

324 66. **Palp** (0) elongate, (1) short. Plesiomorphy at the level of order. Palp reduces only among  
325 Mesozoic *Umenocoleoidea* and some stem *Liberiblattinidae*.

326 67. **Ocelli** (1) in one line, (0) in triangle. Autapomorphy of advanced *Alienopteridae*.

327 68. **Ocelli** (1) lentiform, (0) diffuse or plain. Ocelli are primitively structured in standard cockroaches  
328 (Vršanský 2008). Autapomorphy of *Umenocoleoidea*, homoplastic with *Mantodeans*.

329 69. **Ocelli very large** (1) present, (0) absent. Autapomorphy of some *Umenocoleoidea*.  
330 Homoplasically can occur in certain *mantodeans*. Ocelli of Mesozoic standard cockroaches (including  
331 *Blattulidae*, *Caloblattinidae*, *Mesoblattinidae* and *Raphidiomimidae*) are small (Vršanský 2008).

332 70. **Ocelli directed** (1) laterally, (0) forwards. Autapomorphy of *Caputoraptor*.

333 71. **Eyes protruding laterally** (1) present, (0) absent. Eyes slightly protruding from the head outline  
334 are characteristic for advanced cockroaches including Mesozoic groups (validated for *Fuziidae*,

335 Vršanský 2009). Significant protrusion is autapomorphy of advanced Umenocoleoidea (see character  
336 matrix). While this character is absent in most primitive Umenocoleoidea, synapomorphy with  
337 mantodean is excluded, instead a homoplasy is proposed. Slight lateral protrusion is characteristic for  
338 all studied umenocoleoids.

339 72. **Eyes modified and white with structured surface** (1) present, (0) absent. Autapomorphy of *Meilia*.

340 73. **Glossa**. Disregarded to the lack of evidence in fossils.

341 74. **Neck** (1) elongate, (0) short. Autapomorphy of *Teyia*.

342 75. **Antenna directed** (1) to sides, (0) forwards. Autapomorphy of advanced Umenocoleoidea.

343 76. **Pronotum strongly 3D** (1) present, (0) absent. Autapomorphy of advanced Umenocoleoidea.

344 77. **Paranotalia** (1) partially reduced, (0) fully developed. Paranotalia are plesiomorphically well  
345 developed (at the level of the order).

346 78. **Paranotalia** (1) totally reduced, (0) present. Autapomorphy of advanced Umenocoleoidea.

347 79. **Pronotum with sharp teeth** (1) present, (0) absent. Autapomorphy of *Caputoraptor*.

348 80. **Pronotum with lateral extensions** (1) present, (0) absent. Autapomorphy of *Caputoraptor*.

349 81. **Pronotum with basal separation sutura and tubercle** (1) present, (0) absent. Plesiomorphically  
350 this state is absent in stem *Liberiblattina* and *Jantaropterix* (Vršanský 2003, 2008); occurs in most of  
351 the Umenocoleidae (Vršanský 2003) and Alienopteridae (Bai et al. 2016 and character matrix).

352 82. **Pronotum with color fields** (1) present, (0) absent. Autapomorphy of *Meilia*.

353 83. **Prothoracic posterior gland** (1) present, (0) absent. Autapomorphy of *Teyia*.

354 84. **Scale FW large** (0) present, (1) absent. Alienopterid scale originated from the modified but hard  
355 Umenocoleoid forewing. It is still completely developed in a group of species at Figs. SI2.

356 85. **Scale** (0) standard, (1) carved. Autapomorphy of certain Alienopteridae.

357 86. **Hindwing membrane** (0) transparent, (1) dark. Hindwing membrane is plesiomorphically  
358 transparent in fossil cockroaches (and very rarely locally dark). Autapomorphy of certain  
359 Alienopteridae.

360 87. **FW venation** (0) traceable, (1) absent. Plesiomorphy at the level of order. Tend to reduce with  
361 degree of elytrization.

362 88. **Clavus** (0) distinct, (1) indistinct. Plesiomorphy at the level of order. Tend to reduce with degree  
363 of elytrization.

364 89. **Clavus sigmoidal** (1) present, (0) absent. Synapomorphy of *Umenocoleus* and *Umenopterix*.  
365 Homoplasically present in *Anaplecta* sp. from Mexican amber (Barna et al., submitted).

366 90. **Bunky** (1) present, (0) absent. Autapomorphy of most Umenocoleoidea. In modified form  
367 homoplasically present in some Anaplectidae, some Diplopteridae, *Oulopterix* and some others.

- 368 91. **Bunky distributed** (1) everywhere, (0) locally. Synapomorphy of advanced Umenocoleoidea  
369 (except the most basal undescribed taxa and *Vitisma*).
- 370 92. **FW posterior margin with bunky** (1) present, (0) absent. Bunky are synapomorphically present  
371 throughout the FW surface also in some Umenocoleoidea, such as *Jantaropterix* (without delimited  
372 margin – Vršanský 2003).
- 373 93. **FW posteriorly with margin** (1) narrow, (0) wide. FW posterior margin is wide in primitive (in this  
374 respect) or standard cockroaches due to wing overlap. Margin becomes narrow with the  
375 specialization.
- 376 94. **Legs** (1) short, (0) standard. Legs are of normal length in stem Liberiblattinidae and primitive  
377 *Vitisma* (Vršanský 1999, 2002).
- 378 95. **Legs extremely short** (1) present, (0) absent. Autapomorphy of *Chimaeroblattina*.
- 379 96. **Smaller claw adjacent to big arolium** (1) present, (0) absent. Autapomorphy of Alienopteridae.  
380 Homoplasically rarely present in living lineages but in a different combination of characters (no big  
381 arolia). This character become less obvious with the immature stages (in early instar extremely well  
382 developed possibly due to phoresis (see analogical character and function in living ant nest  
383 parasitizing Attaphilidae – Gurney 1937).
- 384 97. **Carination** (1) reduced, (0) present. Most cockroaches plesiomorphically possess rich carination  
385 of legs. This character is autapomorphically reduced in Umenocoleoidea except *Jantaropterix*-group  
386 (Vršanský 2003).
- 387 98. **Carination** (1) entirely reduced, (0) locally present. Autapomorphy of Umenocoleoidea (except  
388 *Jantaropterix* lineage – Vršanský 2003).
- 389 100. **HW** (1) fenestrate, (0) standard. Autapomorphy of certain Umenocoleoidea (probably due to  
390 aerodynamics replacing the forewings stroke). Homoplasically present in Diplopteridae (see Vršanský  
391 et al. 2016).
- 392 101. **HW wide intercalary present** (0) present, (1) absent. Plesiomorphy at the level of orderm  
393 present in all Phyloblattoidea, Caloblattinoidea and stem Liberiblattinidae (Schneider 1973; Vršanský  
394 2000, 2002; Martin 2010). Character tends to reduce within Umenocoleoidea.
- 395 102. **HW pterostigma** (0) present, (1) absent. Plesiomorphy at the level of stem Liberiblattinidae.  
396 Nevertheless, this character might rarely vary among right and left wing (*Petropterix*, *Ponopterix* –  
397 Vršanský 2003).
- 398 103. **HW venation extremely simplified** (1) present, (0) absent. Autapomorphy of certain  
399 Umenocoleoidea.
- 400 104. **RS dense** (1) present, (0) absent. Autapomorphy of fully elytrised *Alienopterix*.
- 401 105. **R1** (0) present, (1) reduced to few veins. R1 is rich in stem cockroaches (if differentiated; see  
402 Paleozoic - Schneider 1973 and Mesozic – Martin 2010 groups) and also in stem Liberiblattinidae (in  
403 some it tends to reduce with narrowing of the corresponding field). It tends to reduce with  
404 decreasing size as in miniature Liberiblattinidae (Vršanský 2002).

- 405 106. **R1 sigmoidal and rich** (1) present, (0) absent. Autapomorphy of certain Umenocoleoidea.
- 406 107. **HW with numerous large distinct sensilla (mostly in form of sensillar pits)** (1) present, (0)  
407 absent. Most cockroaches have membrane covered with number of small sensilla from both sides  
408 (varying from total cover like in Blattulidae up to very sporadic or totally absent in some of the  
409 present fossils). Big sensilla are autapomorphic for certain Umenocoleoidea, while absence if  
410 characteristic for others (Alienopteridae).
- 411 108. **Pterostigma with dense sensilla chaetica** (1) present, (0) absent. Autapomorphy of *Teyia*.
- 412 109. **Body** (0) fat, (1) reduced. Plesiomorphy at the level of order. Body in N-fixing cockroaches loses  
413 fat (and *Blattabacterium*) only during changed diet such as in Nocticolidae (but surprisingly remain  
414 fixed in predatory Eadiidae and Raphidiomimidae, and in somewhat transitional form also in  
415 Manipulatoridae and Mantodea). Autapomorphy of advanced pollen-feeding Alienopteridae.
- 416 110. **Body extremely narrow** (1) present, (0) absent. Synapomorphy of *Alienopterus* and *Grant*.
- 417 111. **Cercus short** (0) absent, (1) present. Autapomorphy of Alienopteridae. Cercus can be shortened  
418 also in other ant-related taxa such as in immatures of Cryptocercidae (the hidden state in adults  
419 results from fixation, and is not the living state) and Attaphilidae (Scudder 1862; Wheeler 1900).
- 420 112. **Cercus extremely short** (0) absent, (1) present. Autapomorphy of certain Alienopteridae.
- 421 113. **Cercus extremely long** (0) absent, (1) present. Autapomorphy of certain Umenocoleoidea.  
422 Homoplasically present also in some *Macrocerca* Hanitsch, 1930.
- 423 114. **Antenna sensilla** (1) fine, (0) normal. Autapomorphy of certain Umenocoleoidea. NB! Sensillar  
424 apparatus on antenna is family-specific in cockroaches (Vršanský et al. 2001).
- 425 115. **Whole body densely covered with fine sensilla** (0) absent, (1) present. Autapomorphy of  
426 Alienopteridae.
- 427 116. **Subapical tarsomere with ventral processus** (0) absent, (1) present. Autapomorphy of  
428 Alienopteridae.
- 429 117. **Posterior RS (1) transparent, (0) coloured as other veins**. Autapomorphy of certain  
430 Alienopteridae.
- 431 118. **Legs coloured** (0 absent, 1 present). Although the wings are frequently coloured in stem  
432 Liberiblattinidae (including the type), legs are coloured only in form of stripes (including Blattulidae –  
433 see Vršanský et al. 2013). Sophisticated coloration is considered for autapomorphy within  
434 cockroaches (present homoplasically in certain Mantodea – see Grimaldi 2003).
- 435 119. **Pronotum widest at base** (0) present, (1) absent. This state is ancestral for Umenocoleoidea and  
436 pronota widest in the center are present only in strongly derived taxa.
- 437 120. **Hind wing coloured** (0 absent, 1 present). Coloration of hindwing except for pterostigma and  
438 terminal darkening is extraordinary rare among Mesozoic cockroaches and among described species  
439 occur only in *Mesoblattina zirkelli* Handlirsh, 1906 (Vršanský and Ansoerge 2007).

- 440 121. **Hind wing distinctly overlapping body** (1) absent, (0) present. HW overlaps body in most  
441 cockroaches including stem Liberiblattinidae and also primitive Umenocoleoidea.
- 442 122. **R1 reduced to 2 veins** (0) absent, (1) present. Reduction in R1 is present in some  
443 Umenocoleidae and Alienopteridae, but is never present in other groups including stem  
444 Liberiblattinidae.
- 445 123. **Ovipositor laterally compressed** (0) absent, (1) present. Ovipositor is round in section in all  
446 cockroaches including ancestral Liberiblattinidae, Umenocoleidae and basal Alienopteridae.  
447 Ovipositor is elongated horizontally only in *Teyia* (autapomorphy).
- 448 124. **Cerci elongated** (1) present, (0) absent. Cerci are not elongated in stem Liberiblattinidae and  
449 other Corydioid cockroaches. This character is primarily present in Caloblattinoidea (Vršanský 2002,  
450 2003).
- 451 125. **Forewing extremely hard** (1) present, (0) absent. Autapomorphy of *Elytropterix*.
- 452 126. **Forewing with coloration pattern** (0) present, (1) absent. All known representatives of the stem  
453 family Liberiblattinidae are coloured, similarly as most Umenocoleoidea (Vršanský 2002, 2003;  
454 Martin 2010), thus this character is regarded for plesiomorphic at the level of stem Liberiblattinidae  
455 (including all Umenocoleoidea including most Alienopteridae – even the totally black species like  
456 *Teyia* possess rudiments of FW coloration).
- 457 127. **Pronotum with coloration** (0) present, (1) absent. Pronotum is colored in all known  
458 representatives of the stem family Liberiblattinidae and homoplastically in representaitves of most  
459 lineages. In Umenocoleoidea it is thus regarded for ancestral state.
- 460 128. **Pronotum with distinct total ridge** (around pronotum) (1) present, (0) absent. This state is  
461 unique autapomorphy of *Umenopterix*, although in modified form it occurs also in *Teyia*.
- 462 129. **Eyes significantly protruding laterally** (1) present, (0) absent. Eyes slightly protruding from the  
463 head outline are characteristic for advanced cockroaches including Mesozoic groups (validated for  
464 Fuziidae, Vršanský 2009). Significant protrusion is autapomorphy of advanced Umenocoleoidea (see  
465 character matrix). While this character is absent in most primitive Umenocoleoidea, synapomorphy  
466 with mantodean is excluded, instead a homoplasy is proposed.
- 467 130. **Antenna differentiated** (1) present, (0) absent. Autapomorphy of undescribed specimen at fig  
468 S13
- 469 131. **Body elongated**- autapomorphy (1) of certain Umenocoleoidea (particularly Alienopteridae).
- 470 132. **Body dark in color**- plesiomorphy (0) at the level of Alienopteridae, with *Teyia*, background is  
471 black also in *Caputoraptor* and *Meilia*.
- 472 133. **Head triangular**- plesiomorphy (0) at the level of Umenocoleoidea.
- 473 134. **Sensilla on head small**- plesiomorphy (0) at the level of Umenocoleoidea.
- 474 135. **Sensilla on head sparsely distributed** - plesiomorphy (0) at the level of Umenocoleoidea.

- 475 136. **Eye facets small**- plesiomorphy (0) at the level of superfamily Umenocoleoidea.
- 476 137. **Eye facets silver in color**- autapomorphy (1) of *Formicamendax*.
- 477 138. **Area between eyes wide**- plesiomorphy (0) at the level of Umenocoleoidea.
- 478 139. **Segments of maxillary palp of different length, terminal palpomere hook shaped**-  
479 autapomorphy (1) of *Formicamendax*.
- 480 140. **Antenna short**- plesiomorphy (0) of Umenocoleoidea except *Jantaropterix*.
- 481 141. **24 antennal segments**- autapomorphy (1) of *Formicamendax*.
- 482 142. **Antennal sensilla small**- plesiomorphy (0) at the level of Umenocoleoidea.
- 483 143. **Anntenal sensilla dense**- plesiomorphy (0) at the level of Umenocoleoidea.
- 484 144. **Proximal anntenal segments conical**- plesiomorphy (0) at the level of order.
- 485 145. **Distal antennal segments elongated**- plesiomorphy (0) at the level of order.
- 486 146. **Antennal segments 12-14 curved**- autapomorphy (1) of *Formicamendax*.
- 487 147. **Antennal segments 12-14 forming elbow**- autapomorphy (1) of *Formicamendax*.
- 488 148. **Neck short**- plesiomorphy (0) at the level of order.
- 489 149. **Pronotum elongated**- synapomorphy (1) of *Formicamendax*, *Teyia* and *Aethiocarenius*.
- 490 150. **Pronotum with toothed extension**- synapomorphy (1) of *Formicamendax*, *Laticephalana* and  
491 *Caputoraptor*.
- 492 151. **Head and Pronotum toothed extension small**- plesiomorphy (0) at the level of genus  
493 *Formicamendax*. (unless reduced from the state in *Caputoraptor*).
- 494 152. **Supracoxal furrow strong**- plesiomorphy (0) at the level of order.
- 495 153. **Supracoxal furrow ring shaped**- autapomorphy (1) of *Formicamendax*.
- 496 155. **Forewings with sensillary holes**- plesiomorphy (0) of Umenocoleoidea.
- 497 156. **Forewing sensillary holes densely distributed**- plesiomorphy (0) of Umenocoleoidea other than  
498 *Jantaropterix*.
- 499 157. **Hindwing extending beyond abdomen**- plesiomorphy (0) of order Blattaria.
- 500 158. **Hindwing transparent**- plesiomorphy (0) of order Blattaria.
- 501 159. **Veins thick**- autapomorphy (1) of Umenocoleoidea.
- 502 160. **Crossveins present**- plesiomorphy (0) at the level of Necmylacrididae.
- 503 161. **Venation simple**- autapomorphy (1) of Umenocoleoidea.

- 504 162. **Venation forming fenestrate structure**- autapomorphy (1) of Alienopteridae.
- 505 163. **Veins dark**- plesiomorphy (0) of Blattaria.
- 506 164. **Pterostigma dark**- plesiomorphy (0) of Corydioidea.
- 507 165. **Pterostigma brown in color**- autapomorphy (1) of *Formicamendax* and *Enervipraela*.
- 508 166. **CuP dichotomized**- autapomorphy (1) of *Formicamendax* and *Vzrkadlenie*.
- 509 167. **Sensillary holes densely distributed**- autapomorphy (1) of Alienopteridae.
- 510 168. **Sensillary holes regulary distributed**- autapomorphy (1) of Alienopteridae.
- 511 169. **Fore femur strong**- plesiomorphy (0) of Umenocoleoidea.
- 512 170. **Fore femur saddle-shape**- plesiomorphy (0) of Umenocoleoidea.
- 513 171. **Mid femur elongated**- synapomorphy (1) of *Formicamendax*, *Teyia* and *Aethiocarenius*.
- 514 172. **Hind femur longest**- plesiomorphy (0) of order Blattaria.
- 515 173. **Hind femur narrow**- autapomorphy (1) of *Formicamendax*.
- 516 174. **Femur with small sensilla**- autapomorphy (1) of Alienopteridae.
- 517 175. **Femur sensilla dense**- autapomorphy (1) of Alienopteridae.
- 518 176. **Curved sensilla on femoral surface**- autapomorphy (1) of *Formicamendax*.
- 519 177. **Hind tibia slender**- synapomorphy (1) with *Teyia* and *Aethiocarenius*.
- 520 178. **Tibia with dense sensilla**- autapomorphy (1) of several Umenocoleoidea.
- 521 179. **Tarsi elongated**- synapomorphy (1) of *Formicamendax*, *Teyia* and *Aethiocarenius*.
- 522 180. **Tarsi strong and well developed**- plesiomorphy (0) at the level of order Blattaria.
- 523 181. **Tarsal claw asymmetric**- synapomorphic (1) with several genera of Umenocoleoidea, such as  
524 *Alienopterix* (rarely original state occurs).
- 525 182. **Cerci with 7 segments**- synapomorphic (1) with Alienopteridae.
- 526 183. **Cercal sensilla long**- plesiomorphy (0) at the level of Umenocoleoidea.
- 527 184. **Cercal sensilla curved**- synapomorphy (1) of *Formicamendax* and *Vzrkadlenie*.
- 528 185. **Ovipositor asymmetric**- synapomorphy (1) of *Formicamendax* and *Vzrkadlenie*.
- 529 186. **Ovipositor segmented**- plesiomorphy (0) at the level of the order Blattaria.
- 530 187. **Ovipositor 5 segmented**- synapomorphy (1) of *Formicamendax* and *Vzrkadlenie*.



- 531 188. **Ovipositor terminal end pointed**- plesiomorphy (0) at the level of Umenocoleoidea (present  
532 also in *Alienopterix*).
- 533 189. **R1 reduced to two strong veins**- autapomorphy (1) of Alienopteridae (in Umenocoleidae this  
534 character might vary among respective wings).
- 535 190. **Rs long**- plesiomorphy (0) at the level of Umenocoleoidea.
- 536 191. **M straight**- synapomorphy (1) of Alienopteridae and advanced Umenocoleoidea.
- 537 192. **CuA reduced to 4 branches**- synapomorphy (1) with Alienopteridae and some Umenocoleoidea.
- 538 193. **CuP simple**- plesiomorphy (0) at the level of Corydioidea (Liberiblattinidae, Blattulidae).
- 539 194. **Forewings densely covered with hair ("fur")** – autapomorphy (1) of *Antophiloblatta*;  
540 *Jantaropterix* has not densely covered *sensilla* on its wings; this character homoplasically occurs in  
541 some living desert cockroaches and also parasitic species (see Vršanský et al. 2019).
- 542 195. **Forewing sensilla modified into scales** – autapomorphy (1) of *Lepidopterix*; this character  
543 homoplasically occurs in Collembola, Archaeognatha, Zygentoma, Psocodea, Coleoptera,  
544 Diptera, Trichoptera and Lepidoptera
- 545 196. **Body ventrally sophisticatedly coloured** – synapomorphy (1) of *Antophiloblatta* and *Lepidopterix*.
- 546 197. **Body segments densely approximated, trunk becomes compact** – synapomorphy (1) of  
547 *Antophiloblatta* and *Lepidopterix*; this character homoplasically occurs in Latiblattidae.
- 548 198. **Forewing sensilla are with structures** – synapomorphy (1) with *Antophiloblatta* and  
549 *Lepidopterix*.
- 550 199. **Subcosta richly branched on forewing** – plesiomorphy (0) at the level of order.
- 551 200. **First and second tarsomeres subequal** – synapomorphy (1) of *Lepidopterix* and *Jantaropterix*.
- 552 201. **R overlapping apex on forewing** – synapomorphy (1) of Umenocoleoidea except some  
553 Vitisminae.
- 554 202. **R1 tertiary branched on forewing** – autapomorphy (1) of *Lepidopterix* this character as a  
555 plesiomorphy occurs in lineages with rich venation, whose are not ancestral for present taxa .
- 556 203. **Cubital vein reduced to 2 veins on forewing** – synapomorphy (1) of *Lepidopterix* with  
557 *Blattapterix* and *Elytropterix*.
- 558 204. **Forewing strongly vaulted** – synapomorphy (1) of *Antophiloblatta* with *Elytropterix*.
- 559 205. **Subgenital plate strongly sigmoidally curved and vaulted** – autapomorphy (1) of *Lepidopterix*.
- 560 206. **Ovipositor fine** - synapomorphy (1) of *Antophiloblatta* and *Vzrkadlenie*.
- 561 207. **Pronotum disc-like with flattened paranotalia and small spikes** – autapomorphy (1) of  
562 *Archaeospinapteryx*

- 563 208. **Pronotum elevated and widest proximally** – autapomorphy (1) of *Trapezionotum*
- 564 209. **Pronotum with triangularly shaped with circle-like colouration** – autapomorphy (1) of  
565 *Poikiloprosopon*
- 566 210. **Forewings with 5 translucent fields** – autapomorphy (1) of *V. miso*
- 567 211. **Forewings with 4 translucent fields** – synapomorphy (1) of *Vzrkadlenie octomaculata* and *V.*  
568 *saintgermaini*
- 569 212. **Forewings with 4 translucent fields not vertically arranged** – autapomorphy (1) of *V.*  
570 *saintgermaini*
- 571 213. **Forewings with translucent fields** – autapomorphy (1) of *Vzrkadlenie*
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