

## APPENDIX II. CHARACTER LIST

1. Epibranchial region without (0) or with (1) pile.
2. Epibranchial region without (0) or with (1) setae.
3. Epibranchial region setae are sparse (0) or numerous (1).
4. Epibranchial region without (0) or with (1) tuberculation.
5. Epibranchial region ridge below orbit is without (0) or with (1) tuberculation.
6. Antennae are long (0) or short (1).
7. Antennular flagella or hidden beneath the front (0) or are not hidden (1).
8. Gill on 3<sup>rd</sup> maxilliped is large with many books (0) or small and leaflike (1) (Crane, 1975).
9. Spoon-shaped setae of 2<sup>nd</sup> maxilliped without (0) or with (1) basal process (Crane, 1975).
10. Highly dimorphic chelipeds are found only in the males (0) or in both sexes (1).
11. Minor ischium without (0) or with (1) a large tubercle on the distal ventral anterior margin.
12. Large teeth absent (0) or present (1) on the postero-ventral margin of the minor merus.
13. Posterior surface of minor merus without (0) or with (1) longitudinal row of tubercles above posteroventral margin (Crane, 1975; George and Jones, 1982).
14. Posterior surface of minor merus rounded (0) or flattened (1) (Crane, 1975).
15. Chela length of minor cheliped are shorter/equal (0) or longer (1) than the manus (Crane, 1975).
16. Minor gape width is narrower than half of adjacent dactyl (0), between half and full width of adjacent dactyl (1), or greater than the width of the adjacent dactyl (2).
17. Minor pollex without (0) or with (1) an enlarged tooth.
18. Minor dactyl without (0) or with (1) an enlarged tooth.
19. Minor pollex without (0) or with (1) a ridge along the ventral margin.

20. Minor dactyl without (0) or with (1) a ridge along the dorsal margin.
21. Minor cheliped without (0) or with (1) serrations in the gape (George and Jones, 1982; von Hagen and Jones, 1989).
22. Minor cheliped serrations are small and similar in size (0) or large and unequal (1) (Crane, 1975).
23. Minor cheliped tip shape is forceps-like (0) or spooned (1) (Collins *et al.*, 1984).
24. Major cheliped is found approximately equally on the left and right side (0) or is found predominantly (>80%) on the right side (1).
25. Major ischium without (0) or with (1) a stridulating ridge.
26. Major ischium without (0) or with (1) a large tubercle on the distal ventral anterior margin.
27. Antero-ventral margin of major merus is without (0) or with (1) tuberculation.
28. Antero-dorsal margin of major merus is without (0) or with (1) tuberculation (Crane, 1975).
29. Antero-dorsal margin of major merus without (0) or with (1) a distal tooth (Jones and Morton, 1994).
30. Antero-dorsal margin of major merus without (0) or with (1) a large convex flange (Crane, 1975).
31. Antero-dorsal margin of major merus without (0) or with (1) a long crest (Crane, 1975).
32. Dorsal margin of major merus is without (0) or with (1) pile.
33. Ventral margin of major merus is without (0) or with (1) pile.
34. Large tooth absent (0) or present (1) on inner anterior surface of major carpus.
35. Large tooth absent (0) or present (1) from proximal antero-dorsal margin of major carpus (possible variation = 3 tubercles vs 1 tubercle).
36. Vertical row of tubercles absent (0) or present (1) from anterior surface of major carpus.
37. Antero-dorsal margin of major carpus without (0) or with (1) tuberculation.
38. Major carpus without (0) or with (1) dorsal margin pile.

39. Dorsal part of major carpal cavity without (0) or with (1) pile.
40. Pile absent (0) or present (1) in the gape of the major cheliped.
41. Outer major manus without (0) or with (1) depression at the base of the pollex (George and Jones, 1982).
42. Outer major manus dorsal margin is smooth (0) or rough (1) (Collins *et al.*, 1984).
43. Outer major manus without (0) or with (1) a groove along the dorsal margin.
44. Outer major manus without (0) or with (1) a groove outside the dactyl cusp.
45. Outer major manus without (0) or with (1) a ventral supramarginal groove.
46. Ventral supramarginal groove of outer major manus extends to base of pollex (0) or well onto pollex (1).
47. Ventral supramarginal groove of outer major manus without (0) or with (1) pile.
48. Outer major manus ventral margin armature is weak (0) or strong (1).
49. Outer major manus without (0) or with (1) tuberculation.
50. Outer major manus with small (0) or large (1) tubercles on the upper surface.
51. Outer major manus with small (0) or large (1) tubercles on the lower surface.
52. Base of major cheliped palm without (0) or with (1) a stridulating ridge.
53. Major cheliped palm without (0) or with (1) oblique tubercle ridge.
54. Oblique ridge of the major cheliped consists of small (0) or large (1) tubercles.
55. Oblique ridge of major palm ends without (0) or with (1) a large tubercle.
56. Tubercles of oblique ridge of palm are in a single row (0) or multiple rows (1) (Hendrickx, 1984).
57. Oblique ridge of the major cheliped terminates at the carpal cavity (0) or the ventral margin (1).
58. Dorsal margin of major palm is without (0) or with (1) a beaded ridge along the carpal cavity.
59. Predactyl ridge(s) along palm of major cheliped are parallel to (0) or diverging from (1) the palm-dactyl joint (Crane, 1975; Thurman, 1979; von Hagen, 1980).
60. Major palm has one (0) or two (1) predactyl ridges (Crane, 1975).
61. Major palm without (0) or with (1) a trench at the base of the pollex.

62. Trench at base of major palm is linear (0) or trifold (1).
63. Major palm without (0) or with (1) a tuberculate ridge running between the oblique ridge and the dactyl.
64. Major palm without (0) or with (1) tuberculation (Thurman, 1979).
65. Middle tubercle row on major pollex is without (0) or with (1) a large median tooth.
66. Outer tubercle row on major pollex is without (0) or with (1) a median tooth.
67. Middle tubercle row on major pollex is without (0) or with (1) a large subdistal tooth.
68. Outer tubercle row on major pollex is without (0) or with (1) a large subdistal tooth.
69. Middle tubercle row on major pollex is without (0) or with (1) a proximal tooth.
70. Outer tubercle row on major pollex is without (0) or with (1) a proximal tooth.
71. Middle tubercle row on major dactyl is without (0) or with (1) a median tooth.
72. Outer tubercle row on major dactyl is without (0) or with (1) a median tooth.
73. Middle tubercle row on major dactyl is without (0) or with (1) a small subdistal tooth.
74. Middle tubercle row on major dactyl is without (0) or with (1) a large proximal tooth.
75. Inner tubercle row on major dactyl is without (0) or with (1) an extra large tubercle on the inside edge of the dactyl.
76. Inner tubercle row on major dactyl is absent (0) or present (1) distally.
77. Inner tubercle row on major dactyl is absent (0) or present (1) proximally.
78. Outer tubercle row on major dactyl is absent (0) or present (1) distally.
79. Outer tubercle row on major dactyl is absent (0) or present (1) proximally.
80. Major pollex without (0) or with (1) little teeth on its distal cutting edge (George and Jones, 1982).
81. Major dactyl without (0) or with (1) little teeth on its distal cutting edge (George and Jones, 1982).

82. Inner tubercle row of major pollex extends to the base of the dactyl (0) or past the base of the dactyl (1).
83. Outer tubercle row of major pollex does not (0) or does (1) start at the dactyl base.
84. Length of the major dactyl is less than or equal to the length of the manus (0), between one and two times as long as the manus (1), twice as long or greater than the length of the manus (2).
85. Major pollex without (0) or with (1) an outer median groove.
86. Outer median groove of major pollex without (0) or with (1) pile.
87. Outer median groove of major pollex curves up to center of pollex base (0) or stays close to ventral margin (1).
88. Major dactyl without (0) or with (1) an outer median groove (George and Jones, 1982).
89. Major dactyl without (0) or with (1) an outer subdorsal groove (George and Jones, 1982).
90. Outer subdorsal groove of major dactyl short (0) or long (1) (Bairagi and Misra, 1988).
91. Major pollex shape not triangular (0) or strongly triangular (1).
92. Major pollex is the same width/wider than the dactyl (0) or narrower than the dactyl (1).
93. Major pollex tip is simple (0) or bifid/trifid (1).
94. Major dactyl tip is simple (0) or bifurcate (1).
95. Major chela tips are not (0) or are (1) forcep-like.
96. Major dactyl and pollex without (0) or with (1) thin sharp, inward spines.
97. Major pollex without (0) or with (1) a ventral margin carina.
98. Major pollex without (0) or with (1) outer surface tuberculation.
99. Major dactyl without (0) or with (1) outer surface tuberculation.
100. Outside of major pollex without (0) or with (1) pits (Crane, 1975).
101. Pits on outer pollex without (0) or with (1) pile.
102. Ambulatories are short (0) or long (1) (Crane, 1975).

103. Merus of the 1<sup>st</sup> ambulatory is slender (0) or broad (1).
104. Merus of the 2<sup>nd</sup> ambulatory is slender (0) or broad (1).
105. Merus of the 3<sup>rd</sup> ambulatory is slender (0) or broad (1).
106. Merus of the 4<sup>th</sup> ambulatory is slender (0) or broad (1).
107. Dorsal margin curvature of the merus of the 2<sup>nd</sup> ambulatory is straight (0) or convex (1).
108. Dorsal margin curvature of the merus of the 3<sup>rd</sup> ambulatory is straight (0) or convex (1).
109. Dorsal margin curvature of the merus of the 4<sup>th</sup> ambulatory is straight (0) or convex (1).
110. Posterior surface of 1<sup>st</sup> ambulatory without (0) or with (1) tuberculation (Collins *et al.*, 1984).
111. Longitudinal row of setae absent (0) or present (1) on anterior surface of the merus of the 1<sup>st</sup> ambulatory.
112. Ambulatory meri without (0) or with (1) tubercles on striae.
113. Anterior tubercles on the manus of the 1<sup>st</sup> ambulatory are absent (0) or present (1).
114. Anterior tubercles on the merus of the 1<sup>st</sup> ambulatory are absent (0) or present (1).
115. Anterior tubercles on the carpus of the 1<sup>st</sup> ambulatory are absent (0) or present (1).
116. Pile absent (0) or present (1) on the manus of the 1<sup>st</sup> ambulatory.
117. Pile absent (0) or present (1) on the carpus of the 1<sup>st</sup> ambulatory.
118. Pile absent (0) or present (1) on the merus of the 1<sup>st</sup> ambulatory.
119. Pile absent (0) or present (1) on the carpus of the 2<sup>nd</sup> ambulatory.
120. Pile absent (0) or present (1) on the manus of the 2<sup>nd</sup> ambulatory.
121. Pile absent (0) or present (1) on the merus of the 2<sup>nd</sup> ambulatory.
122. Pile absent (0) or present (1) on the carpus of the 3<sup>rd</sup> ambulatory.
123. Pile absent (0) or present (1) on the manus of the 3<sup>rd</sup> ambulatory.
124. Pile absent (0) or present (1) on the merus of the 3<sup>rd</sup> ambulatory.
125. Pile absent (0) or present (1) on the carpus of the 4<sup>th</sup> ambulatory.
126. Pile absent (0) or present (1) on the merus of the 4<sup>th</sup> ambulatory.

127. Large teeth absent (0) or present (1) on postero-ventral margin of the merus of the 1<sup>st</sup> ambulatory.
128. Large teeth absent (0) or present (1) on postero-ventral margin of the merus of the 2<sup>nd</sup> ambulatory.
129. Large teeth absent (0) or present (1) on postero-ventral margin of the merus of the 3<sup>rd</sup> ambulatory.
130. Large teeth absent (0) or present (1) on postero-ventral margin of the merus of the 4<sup>th</sup> ambulatory.
131. Antero-ventral margin serration absent (0) or present (1) distally on the merus of the 1<sup>st</sup> ambulatory.
132. Antero-ventral margin serration absent (0) or present (1) proximally on the merus of the 1<sup>st</sup> ambulatory.
133. Postero-ventral margin serration absent (0) or present (1) on the merus of the 1<sup>st</sup> ambulatory.
134. Dorsal margin serration absent (0) or present (1) on the merus of the 1<sup>st</sup> ambulatory.
135. Antero-ventral margin serration absent (0) or present (1) distally on the merus of the 2<sup>nd</sup> ambulatory.
136. Antero-ventral margin serration absent (0) or present (1) proximally on the merus of the 2<sup>nd</sup> ambulatory.
137. Postero-ventral margin serration absent (0) or present (1) on the merus of the 2<sup>nd</sup> ambulatory.
138. Dorsal margin serration absent (0) or present (1) on the merus of the 2<sup>nd</sup> ambulatory.
139. Antero-ventral margin serration absent (0) or present (1) distally on the merus of the 3<sup>rd</sup> ambulatory.
140. Antero-ventral margin serration absent (0) or present (1) proximally on the merus of the 3<sup>rd</sup> ambulatory.

141. Postero-ventral margin serration absent (0) or present (1) on the merus of the 3<sup>rd</sup> ambulatory.
142. Dorsal margin serration absent (0) or present (1) on the merus of the 3<sup>rd</sup> ambulatory.
143. Antero-ventral margin serration absent (0) or present (1) distally on the merus of the 4<sup>th</sup> ambulatory.
144. Antero-ventral margin serration absent (0) or present (1) proximally on the merus of the 4<sup>th</sup> ambulatory.
145. Postero-ventral margin serration absent (0) or present (1) on the merus of the 4<sup>th</sup> ambulatory.
146. Dorsal margin serration absent (0) or present (1) on the merus of the 4<sup>th</sup> ambulatory.
147. Setae absent (0) or present (1) on ventral margin of the merus of the ambulatories.
148. Setae absent (0) or present (1) on dorsal margin of the merus of the ambulatories.
149. Setae on ventral margin of 1<sup>st</sup> ambulatory merus are sparse (0) or numerous (1).
150. Setae on ventral margin of 1<sup>st</sup> ambulatory merus are short (0) or long (1).
151. Setae on dorsal margin of 1<sup>st</sup> ambulatory merus are sparse (0) or numerous (1).
152. Setae on dorsal margin of 1<sup>st</sup> ambulatory merus are short (0) or long (1).
153. Setae on ventral margin of 2<sup>nd</sup> ambulatory merus are sparse (0) or numerous (1).
154. Setae on ventral margin of 2<sup>nd</sup> ambulatory merus are short (0) or long (1).
155. Setae on dorsal margin of 2<sup>nd</sup> ambulatory merus are sparse (0) or numerous (1).
156. Setae on dorsal margin of 2<sup>nd</sup> ambulatory merus are short (0) or long (1).
157. Setae on ventral margin of 3<sup>rd</sup> ambulatory merus are sparse (0) or numerous (1).
158. Setae on ventral margin of 3<sup>rd</sup> ambulatory merus are short (0) or long (1).
159. Setae on dorsal margin of 3<sup>rd</sup> ambulatory merus are sparse (0) or numerous (1).
160. Setae on dorsal margin of 3<sup>rd</sup> ambulatory merus are short (0) or long (1).
161. Setae on ventral margin of 4<sup>th</sup> ambulatory merus are sparse (0) or numerous (1).
162. Setae on ventral margin of 4<sup>th</sup> ambulatory merus are short (0) or long (1).
163. Setae on dorsal margin of 4<sup>th</sup> ambulatory merus are sparse (0) or numerous (1).

164. Setae on dorsal margin of 4<sup>th</sup> ambulatory merus are short (0) or long (1).
165. Ambulatories without (0) or with (1) long setae on the carpus and merus.
166. Orbital region with a large tubercle absent (0) or present (1) at the base of the eyestalk.
167. Style absent (0) or present (1) on eyestalk on major side in adults.
168. Style absent (0) or present (1) on eyestalk on major side in juveniles.
169. Eyebrow inclination is vertical (0) or inclined (1) (Rathbun, 1900a; von Hagen, 1980).
170. Lower margin of the eyebrow is absent (0) or present (1).
171. Width of the eyebrow is narrower (0) or equal/wider (1) than the eyestalk (Crane, 1975).
172. Cornea is equal (0) or greater (1) than the width of the eyestalk (Crane, 1975).
173. Eyestalk is thin (0) or thick (1) (Rathbun, 1900a; Dai and Young, 1991).
174. Base of front width is less than (0) or greater than (1) the diameter of the eyestalk (Crane, 1975).
175. Eye shape is round (0) or elongate (1).
176. Eye length is longer than half of the eyestalk (0) or shorter than half of the eyestalk (1).
177. Suborbital crenellations are evenly sized (0) or largest at outer margin (1).
178. Suborbital crenellations are small (0) or large (1) (Crane, 1975).
179. Suborbital crenellations are fused/missing from the entire margin (0) or run the full length of the margin (1) (Collins *et al.*, 1984).
180. Floor of orbit without (0) or with (1) a row of setae running behind the crenellations.
181. Floor of orbit without (0) or with (1) a line of accessory granules behind crenellations (George and Jones, 1982; vonHagen and Jones, 1989).
182. Floor of orbit without (0) or with (1) a ridge.
183. Floor of orbit without (0) or with (1) tuberculation.
184. Floor of orbits without (0) or with (1) lots of setae.

185. Frontal margin is thin (0) or thick (1).
186. Frontal groove does not (0) or does (1) extend onto frontal V (George and Jones, 1982).
187. Frontal V is deep and narrow (0) or wide and shallow (1) (George and Jones, 1982).
188. Suborbital margin is rolled out (0) or erect (1) (Crane, 1975).
189. Orbital region without (0) or with (1) a tuft of setae below the antero-lateral angle.
190. Outer corner or suborbital margin is not (0) or is (1) a upward crest.
191. Outer corner of suborbital margin without (0) or with (1) a square notch.
192. General shape of carapace from dorsal view is square (0) or trapezoidal (1).
193. Carapace without (0) or with (1) pile.
194. Vertical lateral margin of carapace extends subdorsally (0) or to dorsal surface (1).
195. Front width is narrow (0) or broad (1).
196. Carapace convexity is gently rounded (0), flat (1), or strongly convex (2).
197. Slope of orbits is straight/slightly oblique (0) or strongly oblique (1).
198. Antero-lateral margins of carapace are absent (0) or present (1).
199. Antero-lateral margins of carapace are convergent (0), parallel (1), or divergent (2).
200. Antero-lateral margins of carapace are short (0) or long (1).
201. Antero-lateral angles of carapace shape is acute (0) or square (1) (Bairagi and Misra, 1988).
202. Antero-lateral angles point towards the front (0), at an angle (1), or to the side (2).
203. Antero-lateral/dorso-lateral junction of carapace is curved (0) or sharply angled (1).
204. Dorso-lateral margins of carapace are absent (0) or present (1) (George and Jones, 1982).
205. Dorso-lateral margins of carapace are short (0) or long (1).
206. Dorso-lateral margins of carapace are curved (0) or straight (1) (Thurman, 1979).
207. Dorso-lateral margins converge slightly (0) or strongly (1) (Thurman, 1979).
208. Dorso-lateral margin spines are absent (0) or present (1) (Crane, 1975).

209. Dorso-lateral margins of carapace consist of a microscopically beaded line of tubercles (0) or large, widely spaced tubercles (1) (von Hagen and Jones, 1989).
210. Postero-lateral stria are absent (0), 1 pair (1), or 2 pair (2) (George and Jones, 1982; von Hagen, 1984).
211. Postero-lateral stria are without (0) or with (1) hairs (von Hagen, 1980).
212. Postero-lateral stria are without (0) or with (1) tubercles (George and Jones, 1982).
213. Anterior margin of front of carapace is faint (0) or distinct (1) (Crane, 1975).
214. Caparace is smooth (0) or rough (1) (Thurman, 1979).
215. Carapace without (0) or with (1) a row of setae running directly beneath the antero-lateral and vertical-lateral margins.
216. Large tubercle absent (0) or present (1) at antero-lateral – dorsal-lateral junction.
217. Large tubercle absent (0) or present (1) at posterior end of dorsal-lateral margins.
218. 3<sup>rd</sup> and 4<sup>th</sup> segments of the abdomen are distinct (0) or fused (1).
219. 4<sup>th</sup> and 5<sup>th</sup> segments of the abdomen are distinct (0) or fused (1).
220. 5<sup>th</sup> and 6<sup>th</sup> segments of the abdomen are distinct (0) or fused (1).
221. Specialized pleonal clasping apparatus is absent (0) or present (1) (Guinot, 1979).
222. Gonopod has no/slight (0) or strong (1) torsion.
223. Gonopod thumb is absent (0) or present (1).
224. Gonopod thumb is a flat shelf (0), ends below the flange base (1), or ends above the flange base (2).
225. Gonopod flanges are absent (0) or present (1).
226. Anterior flange of gonopod is small (0) or large (1).
227. Posterior flange of gonopod is small (0) or large (1).
228. Anterior flange of gonopod ends at pore (0) or above pore (1).
229. Posterior flange of gonopod ends at pore (0) or above pore (1).
230. Gonopod flange without (0) or with (1) chitinous spine.
231. Gonopod tip is not (0) or is (1) calcified.
232. Gonopod tip is a blunt (0) or a projecting tube (1).

233. Inner process of gonopod is a sharp spine (0), fleshy and tumid (1), or a flat triangular shelf (2).
234. Gonopod without (0) or with (1) large flat projection below the base of the tube.
235. Gonopod without (0) or with (1) a tubercle at the base of the anterior flange.
236. Gonopod without (0) or with (1) tubercle on inner edge of the pore.