

**Appendix 1.** Morphological characters list and their corresponding states used in this study.

### **Head**

- [1] Head vertex coloration: (0) brown; (1) reddish brown; (2) reddish yellow; (3) reddish; (4) yellowish brown; (5) light brown; (7) occiput brown.
- [2] Vertex with: (0) markings; (1) without markings.
- [3] The yellow hind margin on vertex: (0) present; (1) abbreviated into two yellow portions laterally; (2) absent.
- [4] The dark brown mid line along the epicranial suture on vertex: (0) present; (1) absent.
- [5] Vertex above antennae convex: (0) present; (1) absent.
- [6] Vertex area: (0) broad; (1) narrow.
- [7] The yellow transverse spots on the frons above the antennae: (0) present; (1) absent.
- [8] The two yellow lateral spots on vertex near the eye margin: (0) present; (1) absent.
- [9] Frons below antennae coloured: (0) present; (1) absent.
- [10] Eyes: (0) large; (1) small.
- [11] Eyes: (0) broadly separated; (1) narrowly separated.
- [12] Antennae length: (0) long; (1) short ;( 3) medium.
- [13] Antennae colour: (0) yellow; (1) whitish yellow; (2) brown; (3) dark yellowish; (3) Reddish yellow; (4) ochreous.
- [14] Antennae tip segment: (0) ending in acute tip; (1) ending in membranous tip; (2) narrowed to a point.
- [15] Antennae tip segment: (0) completely membranous; (1) partially membranous; (2) not applicable.

### **Thorax**

- [16] Thorax: (0) striped; (1) un-striped; (2) striped partially.
- [17] Pronotum pruinose: (0) lightly; (1) absent; (2) strongly.
- [18] Pronotum colour: (0) yellow; (1) brown; (2) creamy; (3) greyish; (4) greyish brown; (5) yellowish brown; (6) white; (7) pale brown.
- [19] Pronotum mid-stripe: (0) distinct; (1) indistinct; (2) faintly distinct; (3) appear as spots; (4) extremely distinct.
- [20] Pronotum mid-stripe: (0) brown; (1) dark brown; (2) not applicable.
- [21] Pronotum lateral-stripes: (0) distinct; (1) faintly distinct; (2) appear as lateral spots; (3) indistinct; (4) extremely distinct.
- [22] Pronotum lateral-stripes: (0) brown; (1) dark brown; (2) indistinct; (3) pale yellow.
- [23] Pronotum lateral-stripes: (0) broad; (1) narrow; (2) oblique; (3) not applicable
- [24] Pronotumsetation of fore margin and hind margin colouration: (0) entirely black; (1) entirely white; (2) admixed (3)
- [25] Prescutum pruinose: (0) lightly; (1) absent; (2) strongly.
- [26] Prescutum colour: (0) Brown; (1) yellow; (2) creamy; (3) greyish; (4) brownish grey; (5) greyish brown; (6) white; (7) light brown.
- [27] Prescutum with: (0) mid and tow lateral stripes; (1) with mid stripes only; (2) unstriped.

- [28] Prescutum mid-stripe: (0) faint; (1) dark; (2) not applicable.
- [29] Prescutum with a pair of yellowish lateral spots anteriorly: (0) present; (1) absent.
- [30] Space between prescutum and mesoscutum: (0) yellow; (1) black; (2) white; (3) brown; (4) greyish.
- [31] Prescutum anterior-lateral hairiness colour: (0) mainly white with few black hairs intermingled; (1) mainly black with few white hairs intermingled; (2) only white; (3) Only black; (4) mainly white with few brownish hairs intermingled.
- [32] Prescutum hairiness on the disc: (0) uniformly white; (1) Uniformly black; (2) admixed.
- [33] Prescutum hairiness along the sides: (0) white; (1) black.
- [34] Prescutum hairiness: (0) short; (1) long; (2) very long.
- [35] Prescutum hairiness: (0) dense; (1) sparse.
- [36] Prescutum pruinose: (0) present; (1) absent.
- [37] Mesoscutum mid-stripe: (0) distinct; (1) indistinct; (2) extremely distinct.
- [38] Mesoscutum pruinose: (0) lightly; (1) absent; (2) strongly.
- [39] Mesoscutum hairiness colour: (0) black; (1) white; (2) admixed.
- [40] Mesoscutum hairiness: (0) sparse; (1) dense.
- [41] Mesoscutum hairiness: (0) short; (1) long.
- [42] Mesoscutum lateral sides: (0) naked; (1) clothed with hairs.
- [43] Mesocutllum mid-stripe: (0) distinct; (1) indistinct; (2) faintly shaded; (3) faintly distinct; (4) extremely distinct.
- [44] Mesocutllum hairiness colour: (0) white (1) black.
- [45] Mesocutllum pruinose: (0) lightly; (1) absent; (2) strongly.
- [46] Mesocutllum hairiness: (0) sparse; (1) dense.
- [47] Metanotum pruinose: (0) lightly; (1) absent; (2) strongly.
- [48] Metanotum colour: yellow (0) brown; (1) greyish; (2) white.
- [49] Metanotum mid-stripe: (0) distinct; (1) indistinct; (2) extremely distinct.
- [50] Metanotum hairiness colour: (0) white; (1) black.
- [51] Metanotum hairiness: (0) short; (1) long; (2) extremely long.

### **Legs**

- [52] Legs coloration: (0) yellow; (1) brown; (2) blackish brown; (3) whitish yellow; (4) whitish yellow; (5) pale citrine.
- [53] Legs femur: (0) with whole tip tinged; (1) not tinged; (2) tinged as spots.
- [54] Tibiae and last tarsal segment tips: (0) tinged; (1) not tinged.
- [55] Fore coxae hairs: (0) white hairs; (1) black hairs; (2) naked.
- [56] Middle coxae hairs: (0) white hairs; (1) black hairs; (3) naked.
- [57] Hind coxae hairs: (0) white hairs; (1) black hairs; (2) naked.
- [58] Ventral side of thorax: (0) tinged dark; (1) not tinged.

### **Forewings**

- [59] Forewings tip: (0) rounded; (1) acute; (2) sub-acute; (3) short rounded; (4) narrowly rounded.
- [60] Forewings emargination before the apex: (0) slightly; (1) largely; (2) not found.

- [61] Forewings: (0) broad; (1) elongate.
- [62] Forewings membrane: (0) hyaline; (1) tinged; (3) tinged except the apical tip.
- [63] Pterostigma colour: (0) white; (1) brown; (2) dark brown; (3) yellowish brown; (4) Yellowish.
- [64] Pterostigma occupying: (0) single costal cell; (1) more than one costal cell.
- [65] Costal area beyond pterostigma coloured: (0) whitish; (1) grey brown; (2) brown; (3) Dark brown; (4) Not coloured.
- [66] Radial area below and beyond pterostigma tinged: (0) tinted all; (1) not tinged; (2) tinged distally towards pterostigma.
- [67] Cells before and beyond the pterostigma: (0) tinged; (1) not tinged.
- [68] Forewings pterostigma: (0) broad basely; (1) not broad.
- [69] Pterostigma: (0) long; (1) short.
- [70] Costal colouration: (0) whitish; (1) brown; (2) yellowish; (3) darkest
- [71] Costals: (0) shaded; (1) the shading between the costals.
- [72] Sub costal area: (0) all tinged; (1) proximally hyaline and tinged distally; (2) not tinged; (3) proximally tinged and hyaline distally.
- [73] Proximal Cu and anal area and forking points: (0) tinged; (1) not tinged.
- [74] Costals number: (0) > 30; (1) < 30.

### **Hindwings**

- [75] Dark area: (0) distinct; (1) indistinct.
- [76] Dark area: (0) shorter than the white area; (1) longer than the white area; (2) same length of white area; (3) not.
- [77] Hairiness colour in the white area: (0) white; (1) black.
- [78] Hind wings colour before the dark area: (0) pale yellow; (1) pale brown; (2) yellowish brown; (3) pale; (4) dark; (5) greyish; (6) pale creamy white; (7) whitish yellow; (8) dark pink.
- [79] Portion of hindwings before the dark area coloured: (0) white; (1) pale; (2) dark; (3) white area interrupts with dark brown region.
- [80] Hindwings membrane: (0) hyaline; (1) tinged.

### **Abdomen**

- [81] Abdomen pruinose: (0) lightly; (1) absent; (2) strongly.
- [82] Abdomen dorsum colouration: (0) yellow; (1) black; (2) brown; (3) yellowish brown; (4) Blackish brown; (5) reddish brown; (6) discoloured; (7) white; (8) pink.
- [83] Abdomen venter colour: (0) yellow; (1) black; (2) brown; (3) reddish brown; (4) Yellowish brown; (5) blackish brown; (6) greyish; (7) whitish; (8) citrine.
- [84] Abdomen dorsum: (0) striped; (1) un-striped.
- [85] Abdomen venter: (0) striped; (1) un-striped.
- [86] Abdomen dorsal mid-stripe colour: (0) brown; (1) blackish brown; (2) reddish brown; (3) black; (4) not applicable.
- [87] Abdomen lateral stripes: (0) distinct; (1) indistinct; (2) extremely distinct.
- [88] Presence of pleuritocavae: (0) present; absent (1)
- [89] Hairiness colour in dorsum: (0) white; (1) black; (2) mixed.

- [90] Hairiness on dorsum: (0) sparse; (1) dense.
- [91] Hairiness colour in venter: (0) white; (1) black; (2) mixed.
- [92] Hairiness on venter: (0) sparse; (1) dense.
- [93] Hairiness of terminal area: (0) black; (1) white; (2) admixed.
- [94] Dark area: (0) narrow; (1) broad; (3) not applicable.
- [95] Abdomen: (0) short; (1) long.
- [96] Antennae with: (0) long setae; (1) short setae.
- [97] Antennae: (0) thick; (1) thin.
- [98] Hind wings white area: (0) present; (1) absent; (2) not applicable.
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- [99] Length of dark area more than the rest of the hind wing: (0) present; (1) absent; (2) not applicable.
- [100] Dark area: (0) bifurcate; (1) oblique to one side; (2) not applicable.
- [101] Dark area with: (0) yellow dot; (1) white dot; (2) not applicable.
- [102] Species body appearance: (0) whitish; (1) greyish; (2) yellow.
- [103] Species body pruinosity: (0) light; (1) very dense; (2) not applicable.

