

A KEY TO THE SPECIES OF THE ANOMALINI (RUTELINAE) OF PAKISTAN WITH REDESCRIPTION OF MIMELA HORSFIELDI HOPE (COLEOPTERA : SCARABAEIDAE)

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Keys (with distinguishing characters) for the identification of the species of the Anomalini of West and East Pakistan are presented along with the redescription of a male of *Mimela horsfieldi* Hope, 1836 from Jangshahi, Sind—a new record.

I. Introduction

In the preceding paper (Abdullah and Roohi),¹ we presented keys to the genera of the Anomalini of Pakistan, and species of *Anomala* Samouelle, 1819 found or likely to be discovered in East and West Pakistan. In this paper we shall present a key to the remaining species of the Anomalini from East and West Pakistan in addition to redescrbing a male of *Mimela horsfieldi* Hope, 1836 from Sind, West Pakistan.

(a) *Key to the Species of the Anomalini of West Pakistan*

(Arrow, 1917)

(1) Genus *Anomala* Samouelle, 1819

Vide Abdullah and Roohi¹

(2) Genus *Callistopopillia* Ohaus, 1903

1. Bright metallic green above and beneath, with the sides of the elytra (but not the extreme edges) golden and in part fiery-red, the tarsi blue black; mesosternum forming a horizontal process.....
.....*C. iris* (Candeze, 1869) Arrow, 1917

Steely bluish or greenish black, with the scutellum, elytra (except at the edges), the femora and parts of the tibiae, and the lower surface of the body lurid coppery-red; mesosternum vertical in front
.....*C. lurida* Arrow, 1917

(3) Genus *Mimela* Kirby, 1825

1. Pygidium clothed with conspicuous hair..2

Pygidium without conspicuous hair; deep metallic green above and beneath, including the legs, with fiery-red markings upon each side of the middle of the pronotum, and an oblique median longitudinal

stripe upon each elytron, uniting at the apex with a lateral stripe.....
.....*M. horsfieldi* Hope, 1836

2. Deep grass-green above, with the clypeus, the sides of the pronotum and the sides and apices of the elytra vaguely paler, the lower surface reddish coppery, the femora orange, the tibiae dark red and the tarsi nearly black.....
.....*M. passerinii* Hope, 1842

Deep metallic green, with the tibiae and tarsi coppery red, and the mouth, antennae, front and middle femora, and the extreme lateral margins of the prothorax testaceous.....
.....*M. pectoralis* Blanch, 1851

(4) Genus *Popillia* Serv., 1825

- 1 Pygidium without hairs; clypeus transverse semicircular; deep steel-blue, indigo-blue, or nearly black, above and beneath, with the sides of the sternum and abdomen not very thickly clothed with coarse greyish hair.....*P. cyanea* Hope, 1831

Pygidium decorated with pale hairs, generally in two patches.....2

- 2 Pronotum without hair above.....3

Pronotum more or less hairy.....4

- 3 The four inner elytral striae entire, similar and equidistant; deep metallic green, golden green, or fiery-red, with the lower surface usually deep green and the elytra orange-red.....
.....*P. clypealis* Ohaus, 1897

Second elytral stria more or less disrupted; brilliant metallic crimson, less frequently golden green, with the lower surface and femora usually deep green and the elytra orange-red with a rosy metallic tinge....
.....*P. cupricollis* Hope, 1831

4 Pygidium with basal hair-patches.....5

Pygidium without basal hair-patches; shining black or blue-black beneath, and coppery, deep metallic green or blue-black above, the elytra being orange or reddish, sometimes with a slight metallic suffusion, with the lateral margins black.....*P. sulcata* Redt., 1848

5 Front margin of the clypeus strongly reflexed.....*P. simlana* Arrow, 1913

Front margin of the clypeus not strongly reflexed..*P. pilosa* Arrow, 1913

(5) Genus *Rhinyptia* Burm., 1844

1] Clypeus with a very sharp median longitudinal keel.....2

Clypeus not sharply keeled longitudinally; pale testaceous yellow, with the clypeus and tarsi reddish, and the forehead and vertex nearly black.....*R. laeviceps* Arrow, 1917

2 Clypeus distinctly punctured.....3

Clypeus shining, scarcely punctured; pale testaceous, with the clypeus and tarsi red, the rest of the head, the elytral suture, a pair of anterior spots and a larger pair of posterior spots close to the middle line of the pronotum, black.....*R. meridionalis* var. *puncticollis* Arrow, 1917

3 Suture dark; testaceous yellow, with the head black, except the clypeus.....*R. suturalis* Kraatz, 1895

Suture not dark; orange-yellow, with the tarsi reddish, and the vertex of the head and the forehead at the sides black.....*R. migrifrons* Kraatz, 1895

(6) Genus *Trichanomala* Arrow, 1917

There is only one species, *T. fimbriata* (Newman, 1841) Arrow, 1917. The male is dark bronzy or bronzy green, with elytra pale yellow, except at the outer margins, which are black. The female has the outer margins of the elytra imperfectly, or not at all, bordered with black.

(7) Genus *Tropiorrhynchus* Blanch., 1850

1 Mesosternum produced, hind trochanters simple; pronotum entirely hairy, broad

at the base; longer claw of the front foot cleft.....*T. orientis* (Newman, 1838) Arrow, 1917

Mesosternum not produced; hind trochanters spinose; pronotum narrowed at the base, decorated with patches of hairs; longer claws of the front and middle feet cleft.....*T. podagricus* (Burm., 1844) Arrow, 1917

(b) Key to the Species of the Anomalini of East Pakistan

(Arrow, 1917)

(1) Genus *Anomala* Samouelle, 1819Vide Abdullah and Roohi¹(2) Genus *Callistopopillia* Ohaus, 1903

There is a single species here *C. iris* (Candeze, 1869) Arrow, 1917.

(3) Genus *Dactylopopillia* Arrow, 1917

1 Pronotum punctate, shining.....2

Pronotum rugose, dull.....*D. opacicollis* (Kraatz, 1892) Arrow, 1917

2 Pygidium lightly punctate, with small basal tufts.....*D. virescens* (Hope, 1831) Arrow, 1917

Pygidium rugose with the sides hairy.....*D. blanchardi* (Ohaus, 1897) Arrow, 1917

(4) Genus *Mimela* Kirby, 1825

1 Pygidium clothed with conspicuous hair...2

Pygidium without conspicuous hair.....3

2 Pronotum rather strongly punctate, femora orange, tibiae dark-red.....*M. passerinii* Hope, 1842

Pronotum very lightly punctate; legs testaceous.....*M. vernicata* (Fairmaire, 1896) Arrow, 1917

3 Yellow or red above.....4

Entirely or mostly green above.....5

4 Pronotum with a M-shaped mark.....*M. inscripta* (Nonfr., 1892) Arrow, 1917

- Pronotum immaculate..... 16
*M. bicolor* Hope, 1836
- 5 Body very convex.....8
 Elytra broad and not very convex.....6
- 6 Dark green with coarse sculpture.....7
 Pale green, with very minute sculpture; legs and antennae shining reddish-testaceous
*M. schneideri* Ohaus, 1905
- 7 Dorsal surface granular; orange-brown ventrally.....*M. sericea* Ohaus, 1905
 Dorsal surface coarsely punctate; testaceous ventrally *M. pyriformis* Arrow, 1908
- 8 Elytra decorated with fiery stripes.....9
 Elytra not decorated with fiery stripes....11
- 9 Mesosternal process distinct and acute....
*M. horsfieldi* Hope, 1836
 Mesosternal proces, not, or scarcely, produced.....10
- 10 Dorsal surface strongly punctate.....
*M. leei* (Swed., 1787) Hope, 1836
 Dorsal surface lightly punctate.....
*M. fulgidivittata* Blanch., 1851
- 11 Elytra without yellow margin.....12
 Elytra with outer margins yellow; mesosternum produced.....
*M. marginalis* Arrow, 1908
- 12 Dorsal surface strongly punctate.....13
 Dorsal surface not strongly punctate....15
- 13 Pronotum uniformly coloured; green....14
 Pronotum decorated with two dark patches; testaceous yellow.....
*M. vittaticollis* Burm., 1855
- 14 Legs dark metallic green.....
*M. soror* Arrow, 1908
 Legs reddish; pygidium shining.....
*M. princeps* Hope, 1842
- 15 Dorsal surface metallic green.....16
 Dorsal surface non-metallic green.....18
- Elytra uniformly punctate.....17
 Elytra strongly punctate laterally.....
*M. laevigata* Arrow, 1908
- 17 Legs metallic; tibiae green.....
*M. viridipes* Arrow, 1917
 Legs not metallic; tibiae orange-red....
*M. heterochropus* Blanch., 1851
- 18 Pygidium very smooth.....19
 Pygidium opaque; deep non-metallic apple-green, with the pygidium slightly metallic and the lower surface and legs deep coppery red.....
*M. rugicauda* Arrow, 1917
- 19 Large, mesosternum produced.....
*M. dehaani* (Hope, 1840) Arrow, 1917
 Small, mesosternum not produced.....
*M. glabra* Hope, 1842
 (5) Genus *Popillia* Serv., 1825
- 1 Pygidium decorated with pale hairs, generally in two patches.....2
 Pygidium without hairs; clypeus transverse, semicircular...
*P. cyanea* Hope, 1831
- 2 Pronotum more or less hairy.....3
 Pronotum without hair above.....4
- 3 Hair confined to the sides of the pronotum; pronotum closely punctured; deep blue-black.....*P. adamas* Newm., 1838
 Pronotum covered with close even hair; coppery green.....
*P. pilicollis* Kraatz, 1892
- 4 Each elytron with a fovea before the middle; pygidium not very prominent or convex; hair-tufts large and close.....
*P. feae* Kraatz, 1892
 Elytra without distinct dorsal fovea.....5
- 5 Elytra with five equidistant dorsal striae....6
 Elytra with dorsal striae not equidistant, or more than five.....7
- 6 Large; elytral intervals less convex; deep metallic green or golden green, with the

clypeus, the sides of the pronotum, the elytra, the extremity of the abdomen (generally) and the legs and antennae reddish orange with a metallic lustre (generally very slight or absent upon the elytra, except along the suture); the hind tibiae and the tarsi generally darker in colour than the remainder of the legs
*P. marginicollis* Hope, 1831

Smaller; elytral intervals more convex; reddish testaceous, with the head (except the clypeus), the middle of the pronotum, the scutellum and parts of the lower surface dark green, entirely suffused with a metallic green lustre except upon the elytra, which have usually more or less distinct longitudinal dark lines.....
*P. birmanica* Arrow, 1913

7 Elytra with abrupt lateral flange.....8

Elytra without abrupt lateral flange.....9

8 Mesosternal process rather long; pronotum very strongly punctate, elytra pale yellow with a metallic green lustre.....
*P. amabilis* Arrow, 1913

Mesosternum short; elytra orange.....
*P. impressipya* Ohaus, 1897

9 Elytra with four inner striae entire, similar and equidistant.....10

Elytra with second stria more or less disrupted.....12

10 Sternal process broad and blunt; elytra with the fifth interval not broad.....
*P. nitida* Hope, 1831

Sternal process narrow; elytra with the fifth interval broad and irregularly punctate.. 11

11 Clypeus with the front margin narrowly reflexed *P. laevicollis* Kraatz, 1892

Clypeus with the front margin broadly reflexed *P. clypealis* Ohaus, 1897

12 Mesosternum produced..... 13

Mesosternum vertical in front.....14

13 Pronotum with the sides strongly punctate
*P. cupricollis* Hope, 1831

Pronotum with the sides very lightly punctate
*P. maccllelandi* Hope, 1845

14 Elytra with the second stria entirely disrupted, colour orange.....
*P. nottrotti* Kraatz, 1892

Elytra with the second stria almost entire, colour testaceous.....
*P. patricia* Arrow, 1917

(6) Genus *Rhinyptia* Burm., 1844

There is only one species, *R. meridionalis*, var. *puncticollis* Arrow, 1917 here.

(7) Genus *Spilopopillia* Kraatz, 1892

There is only one species, *S. sexguttata* (Fairmaire, 1887) Arrow, 1917 here. The colour is metallic green or coppery, with the elytra black or dark brown.

II. *Mimela horsfieldi* Hope, 1836

(Figs. 1 and 2)

This species has so far been recorded in Nepal, Sikkim, India (Assam, U.P. and Punjab). The male specimen described below mostly agrees with the description of this species given by Arrow (1917:110) and was collected from West Pakistan, Sind, Jangshahi by our colleague Miss Noorun-Nisa Qadri. As far as we know, this is a **new record** for Sind. We shall present this material to the University of Karachi.

With the general characters of the species (*vide* Arrow, 1917:110) except as follows. A fiery red patch on the lower face of the hind femur is

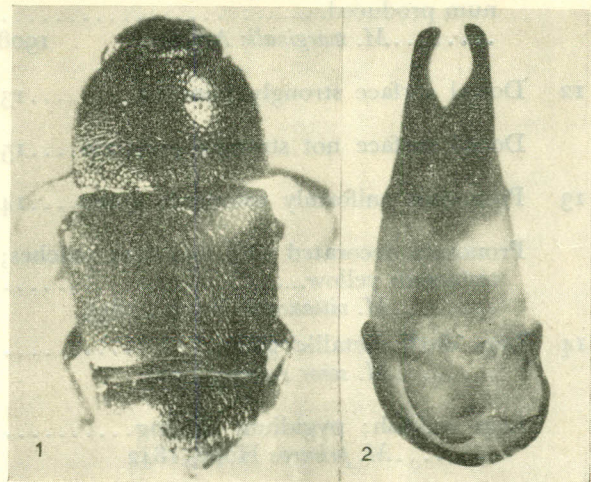


Fig. 1.—*Mimela horsfieldi* Hope, male, dorsal view.

Fig. 2.—*M. horsfieldi* Hope, aedeagus.

missing. Clypeus is neither elevated in the middle nor rugose. Scutellum is not rugose. The front tibia has a usual long curved terminal tooth but a vestige of another upper tooth is also distinct in the male.

The aedeagus was not described by Arrow (1917) and we have not examined the type. Consequently, the above differences are interpreted here as being due to infra-specific variation.

The seventh abdominal sternite is weakly emarginate and the seventh tergite entire at apex. The apices of the lateral lobes of the aedeagus are converging and blunt (Fig. 2). The general shape

prompts comparison with *Anomala validipes* (vide Arrow, 1917: pl. III, fig. 14) but there are many differences. The genera *Anomala* and *Mimela* are no doubt closely related.

References

1. M. Abdullah and R.A. Roohi, Pakistan J. Sci. Ind. Res., **11**, 427(1968).
2. G. J. Arrow, *The Fauna of British India including Ceylon and Burma (Coleoptera, Lamellicornia. II. Rutelinae, Desmomyrinae and Euchirinae)* xiii+387 pp., pls. I-V. London. (1917).

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Table 1.—Influence of Temperature on Root and Stem Lesions of *Carotus* Inoculated with P-44, P-14 and P-14A

Treatment	Total No. of plants of plants	
	tested	wilted
Control	13	0
P-44	13	0
P-14	13	0
P-14A	13	0
Control	13	0
P-44	13	0
P-14	13	0
P-14A	13	0
Control	13	0
P-44	13	0
P-14	13	0
P-14A	13	0
Control	13	0

The optimum for radial growth of mycelium on potato dextrose agar plates for all the three organisms was 24-28°C, whereas the dry weights at 24, 27, 30 and 33°C were 0.367 g, 0.375 g and 0.172 g, respectively.

Materials and Methods

The inoculum was poured in the vicinity of the root zone and stem of the plant below the soil level in a 7-in pot. Five-day old cultures grown on PDA medium were taken, the cultures were spread on and mixed with sterile water in a washing blender for 1 min.

The pathogenicity tests were conducted for 8-12 days in the greenhouse at 25-27°C and at controlled temperatures of 20-25°C. At the conclusion of each experiment the plants were carefully removed from the soil, washed and inspected for lesions. The latter included stem lesions, determination of length of root and root symptoms, severity of injury, weight of the plant and flowers. Recovery tests were made for control. The experiment was repeated 3 times and 3 replicates in each test.

Results

The relative pathogenicity of the three species studied are given in Tables 1 and 2.