

## Revision of the genus *Pterorthochaetes* first contribution (Coleoptera: Scarabaeoidea: Ceratocanthidae)

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**Abstract.** As a first contribution to the revision of the genus *Pterorthochaetes* Gestro, 1899 the author describes two new species: *Pterorthochaetes septentrionalis* sp. n. from Nepal and *P. montanus* sp. n. from peninsular Malaysia. *P. insularis* Gestro, 1899 is recorded for the first time from Nepal and an interesting teratology is discussed. *P. feae* Gestro, 1899 is transferred to the genus *Madrasostes* Paulian, 1975, a lectotypus is designated and its geographical distribution is revised: all the published records of *Madrasostes franzi* Paulian, 1978 are to be referred to it.

**Taxonomy, new species, new combination, lectotype designation, new record, structural abnormality, Coleoptera, Scarabaeoidea, Ceratocanthidae, *Pterorthochaetes*, *Madrasostes*, Oriental Region**

### Introduction

The Ceratocanthidae genus *Pterorthochaetes* Gestro, 1899 is a widespread Oriental-Australasian genus ranging from India to Vanuatu Islands, with most species diversity in the Indomalayan archipelago (Paulian, 1978, 1987). It has never been revised before. The last published synopsis is due to Paulian (1978) who listed 19 species. To this list a further species shall be added (Paulian, 1987), so that presently the number of species is 20 with a total of 22 species-group available names. In 1995 I began the revision of the genus. The study of male and female genitalia, structures never previously considered, led to the discovery of several new species. Now, although the revision is still in progress, there are two new species and one new combination which need immediate publication to be included in forthcoming catalogues and faunistic papers and therefore in this first contribution these new nomenclatorial acts will be dealt with.

### Methods and acronyms

For terminological conventions and methods I refer to the definitive revision which will probably appear in two or three years. The descriptions herein provided are simple differential descriptions, since the full generic description will be given

in the definitive revision; the outer sexual dimorphism, being homogeneous within the genus (males have the apical spur of foretibiae distally bent downward, the inner apex of middle tibiae with a hook bent inward at a right angle and the inner apical spur of hind tibiae twisted and spatulate) is not reported in species descriptions. The sclerites of the bursa copulatrix are a key character, they are thick tridimensional structures fairly variable in shape, although a basic pattern, different in each species, remains constant. To a lesser extent the same applies to the male genitalia (parameres, sclerites of internal sac and genital segment).

In the label data of type material separate labels are indicated by slashes and author's comments are given in square brackets.

Abbreviations and acronyms of collections are as follows:

EL	maximum elytral length;
EW	maximum total elytral width;
HL	maximum head length;
HW	maximum head width;
L	length;
PL	maximum pronotum length;
PW	maximum pronotum width;
W	width;
ABCB	Alberto Ballerio private collection, Brescia;
BMNH	The Natural History Museum, London;
DKCP	David Král private collection, Praha;
HNHM	Hungarian Natural History Museum, Budapest;
JSCW	Joachim Scheuern private collection, Westum;
MCSN	Museo Civico di Storia Naturale "Giacomo Doria", Genova;
MHNG	Muséum d'histoire naturelle, Genève;
MNHN	Muséum national d'Histoire naturelle, Paris;
NHMW	Naturhistorisches Museum, Wien;
ZMUC	Zoologisk Museum, Københavns Universitet, København.

## Taxonomy

### *Madrasostes feae* (Gestro, 1899) comb. n.

*Pterorthochaetes feae* Gestro, 1899: 486; Arrow 1912: 45 (catalogue); Paulian 1978: 495 (catalogue).  
*Madrasostes franzi* Paulian, 1978: 487 (partim); Paulian 1980: 59 (new record); Paulian 1987: 723 (key);  
 Paulian 1989: 315 (key and distribution).

**Material examined.** Lectotype (by present designation) 1 ♂: Tikekee (Pegù), L. Fea VI.87 [print] / Typus [print] / *Pterorthochaetes feae* Gestro [hand] / *Pterorthochaetes feae* Gestro Typus! [hand] / *Pterorthochaetes feae* Gestro syntypus [hand] / *Pterorthochaetes feae* Gestro, lectotypus des. A. Ballerio 1997 [red, hand] / *Madrasostes feae* (Gestro) n. comb. det. A. Ballerio 1997 [white, hand] / (MCSN); 1 ♂ paralectotype same data as lectotype (MCSN).

**Additional material examined.** 216 Dhading Dist. [Nepal], Ankhu Khola Tal, Ankhu Sangu bis Sellentar, 530-750 m, 26 jul. 83, Kulturland, Flussufer/Strand, Martens & Schawaller leg., 1 ex. (JSCW); Inde, Bengale occ., Darjeeling, Sevoke, 200m, 7.X.1978, Besuchet & Löbl 1 ex. (MHNG); NE India, Meghalaya State, W. Garo Hills, Balphakram N. P., 22-27.V.1996, 400±150 m,

GPS N25°11' E90°51' (WGS 84) E. Jendek & O. Šauša leg., 1 ♂ (NHMW); Tharrawaddy Burma, H. E. Andrews Bequest. B. M. 1922-221, 1 ex. (BMNH); Mountains Tennasserim, Siam Border, Feb. To May, 1913, K. G. Gairdner 1913-474, 1 ♂ (BMNH); Prae Siam 1927-33 Paul Fogh/Coll. Rosenberg, 1 ♂, 1 ♀ & 1 sex unstated (ZMUC); Thai, N, Mae Hong Son prov., Soppong env. 600 m, 19°27' N 98°20' E, 28.V-2.VI.1999, D. Hauck leg., 1 ♂ (ABCB); Thai, NE, Loei prov., Phu Kradung N. P., 1000 m, 16°52' N 101°49' E, 16-17.V.1999, D. Hauck leg., 1 ♂ & 1 ♀ (ABCB); Thai 10-16/5.1991, Chiang Dao 600m, 19.24 N, 98.55 E, David Král lgt., in flight evening, 1 ♂ (DKCP); W. Thailand: 300 m, Thung Yai Wildlife Sanctuary, 15°28' N-98°48' E, Tak Province, Umphang District, Song Bae Stream, 18-27.IV.1988 at light, M. J. D. Brendell, B. M. 1988-183, 2 exx. (BMNH); Cambodge, region de Chichreng, G. Thomas, 1912, 8 exx. (MNHN) & 1 ex. (JSCW).

**Remarks.** The taxon *feae* clearly doesn't share any genus specific character with *Pterorthochaetes*. It differs from *Pterorthochaetes* in the following characters:

- antennae 10-jointed;
- base of scutellum without smooth wide subrectangular raised area;
- female middle tibiae with two apical spurs;
- male hind tibiae with apical inner spur straight and sharp;
- male genitalia: genital segment with base very weakly sclerotized and a long manubrium, parameres short with respect to the basal piece;
- female genitalia: bursa copulatrix without sclerites and spermatheca weakly sclerotized.

The best placement of the taxon should be the genus *Madrasostes* Paulian, 1975 although this latter is a very poorly defined genus, probably polyphyletic; *M. feae* is very close to *M. tonkinense* (Paulian, 1945) and both these species belong to the group of species related to *M. variolosum* (Harold, 1874). Examination of a rich material revealed that all the records previously attributed to *M. franzi* Paulian, 1978, including the specimens from "Prae" quoted in the original description (Paulian, 1978, 1980, 1989), are to be assigned to *M. feae*. The synonymy between the two species cannot be stated because the holotype of *M. franzi* is a female with aberrant coloration (light metallic bronze instead of black) that doesn't allow an adequate comparison with the other taxon and therefore it doesn't seem prudent to synonymize it until further material from the type locality ("Thailande: Sakaerat") is collected.

**Distribution.** *Madrasostes feae* is distributed throughout Nepal, North East India, Myanmar (= Burma), Thailand and Kampuchea. The type locality lies in South Western Myanmar and not in Malacca (Malaysia) as quoted in Paulian (1978).

### *Pterorthochaetes septemtrionalis* sp. n.

**Type material** (all specimens dissected). Holotype, ♂: E. Nepal: Kosi, Val. Arun ss/Num, 1050 m, 22.IV.84, Löbl – Smetana (MHNG); allotype (MHNG) & 2 ♀♀ paratypes (MHNG, MNHN) same data as holotype.

**Description.** HL = 1.0 mm, HW = 1.6 mm, PL = 1.7, PW = 2.7 mm, EL = 2.8 mm, EW = 2.5 mm.

Large *Pterorthochaetes*, fairly shiny, black to dark brown, pubescence normally developed.

Head: interocular distance about 11 times the maximum width of dorsal ocular area, dorsal ocular area medium sized, sculpture distally made of very coarse and deep wrinkles and proximally of impressed large simple or horseshoe-shaped punctures (very opened).

Pronotum: wider than long (W/L ratio = 1.5), fore angles normally shaped, subclaviform setae of margins relatively short (0.03-0.04 mm), spaced out by an interval subequal to their length, disc with deeply impressed small foveolate punctures (slightly smaller than the ones on head), spaced out by an interval inferior or equal to their diameter, sides with medium sized (slightly larger than the ones on head) closed horseshoe-shaped punctures spaced out by an interval inferior or equal to their diameter, near margins horseshoes are opened outwards. Pronotal pubescence relatively short, approximately as long as marginal setae.

Scutellum: punctures horseshoe-shaped, very thick and coarse.

Elytra: ovalar, longer than wide (W/L ratio = 0.9), near base some transversal lines present, elytral surface covered by some irregular rows of thick, impressed, small horseshoe-shaped punctures (surface delimited by horseshoe very impressed and setae touching the bottom of the horseshoe), spaced out by an interval subequal to their diameter, opened backwards and, at elytral apex, also outwards, mixed with few simple fine punctures; apically few horseshoe-shaped punctures are closed; size of horseshoe-shaped punctures subequal to the ones of pronotal margins.

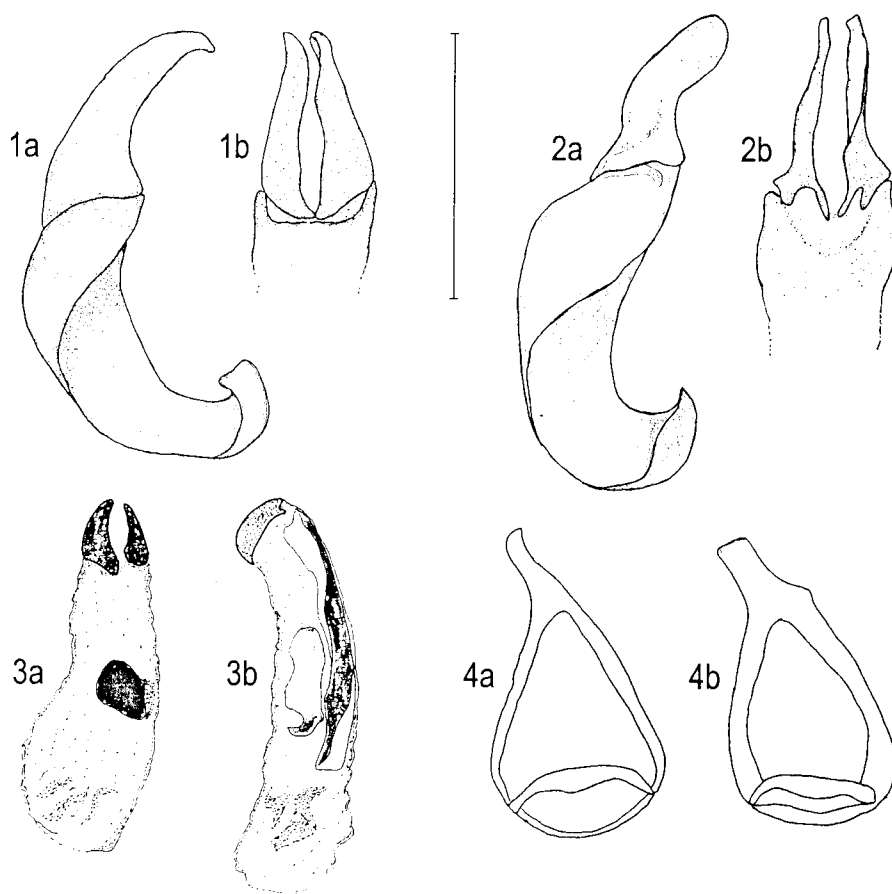
Male genitalia: parameres asymmetrical (Fig. 1), internal sac armed with a distinct subcircular sclerite in addition to the accessory sclerites (Fig. 3a), genital segment as in Fig. 4a.

Female genitalia: bursa copulatrix sclerites well sclerotized and fairly variable in shape (Figs 5a, b, c).

Differential diagnosis. Because of the outer appearance *P. septemtrionalis* sp. n. could be likened to *P. insularis* Gestro, 1899, namely because of the punctures of elytra made of mixed simple and horseshoe-shaped punctures. However in *P. septemtrionalis* sp. n. punctures are very impressed and very thick, the pronotal surface at the sides of disc is areolate (i.e. horseshoe is "closed" instead of opened outwards as in *P. insularis*) and marginal setae of pronotum are more spaced out. The aedeagus, although similar to the one of *P. insularis* has differently shaped parameres (more enlarged near the base in dorsal view and at apex in lateral view), the sclerite of the internal sac is different (rounded instead of transversely elongate) and the manubrium of genital segment is less bent and developed. The sclerites of bursa copulatrix are completely different from the ones of *P. insularis*.

Distribution. Known only from the type locality in Eastern Nepal.

Etymology. *Septemtrionalis* (= northern), because it seems to mark the northern border of the genus distribution.



Figs 1-4. 1a, 1b, 3a, 4a – *Pterorthochaetes septentrionalis* sp. n.: 1a, 1b – aedeagus of holotype: 1a – lateral aspect, 1b – dorsal aspect (median lobe and internal sac removed), 3a – median lobe and internal sac of holotype, 4a – genital segment of holotype; 2a, 2b, 3b, 4b – *P. montanus* sp. n.: 2a, 2b – aedeagus of holotype: 2a – lateral aspect, 2b – ventral aspect (median lobe and internal sac removed), 3b – median lobe and internal sac of holotype, 4b – genital segment of holotype. Scale bar = 1 mm.

### *Pterorthochaetes montanus* sp. n.

Type material (12 ♂♂ & 6 ♀♀ dissected). Holotype, ♂ & allotype: W. Malaysia – Pahang: Cameron Highlands, Tanah Rata: Parit Falls, 1500 m, 20.IV.1999, leg. A. Ballerio (MCSN). 34 paratypes as follows: 4 ♂♂ & 3 ♀♀ same data as holotype (ABCB); Malaysia, Pahang, Cameron Highlands, Parit Falls, degraded rainforest, at light no. 90, 27.III.1995, O. Merkl, 1 ♂ (HNHM); Gn. Jasar, 19-25.6.1995, leg. S. Bečvář, 2 ♂♂ & 1 ♀ (ABCB); W. Malaysia, Pahang: Cameron Highlands, Tanah Rata, Gn. Jasar, 12-15.II.1998, lgt. S. Bečvář, 2 ♂♂ & 1 ♀ (ABCB, JSCW); Malaysia: Pahang, Cameron Highlands, Gn. Jasar 1600-1700 m, 30.7.1993, leg. Schuh, 4 ♂♂ (ABCB); W. Malaysia: Pahang # 18b, Cameron Highls, 1550 m, Gunung Jasar, trail 11, Löbl & Calame, 24.3.93, 3 ♂♂ & 1 ♀ (MHNG); Malaysia W., Pahang: 30 km E of Ipoh, 1500 m, Cameron

Highlands, Tanah Rata, 20.II-3.III.1998, P. Čechovský leg., 2 ♂♂ & 1 ♀ (ABCB); Malaysia W., Pahang: 30 km E of Ipoh, 1500 m, Cameron Highlands, Tanah Rata, 22-26.I.1999, P. Čechovský leg. 1 ♂ (ABCB); Malaisie – Pahang, Tanah Rata, 24.III.77, tamisage, T. Jaccoud, 1 ♀ (MHNG); Malaysia, Pahang, Cameron Highlands, Tanah Rata, foothills of Gunung Beremban, degraded rainforest, beneath bark, no. 99, 29.III.1995, O. Merkl & G. Csorba, 1 ♂ (HNHM); Pahang, F. M. S. Cameron Highlands, Ginting Kial 5000 ft. May 25th 1939, H. M. Pendlebury Coll. F. M. S. Museum/ex F. M. S. Museum, B. M. 1955-354, 2 ♂♂ & 2 ♀♀ (BMNH); Pahang, F. M. S., Lubok Tamang [between Tanah Rata and Ringlet], 3500-4000 ft., 22.7.1938, H. M. Pendlebury, ex coll. F. M. S. Museum, 1 ♀ (MNHM); West Malaysia, Perak, 14.4.1996, Taiping, Bukit Larut (Maxwell Hill) lgt. S. Bečvář, 1 ♂ (ABCB).

**Description.** HL = 0.9-1.0 mm, HW = 1.6-1.7 mm, PL = 1.8-1.9, PW = 2.8-2.9 mm, EL = 3.0-3.1 mm, EW = 2.7-2.8 mm.

Large *Pterorthochaetes*, very shiny, black to dark brown, pubescence well developed.

**Head:** interocular distance about 11 times the maximum width of the dorsal ocular area, dorsal ocular areas medium sized, head surface distally covered by few coarse wrinkles, proximally and medially covered by medium sized horseshoe-shaped punctures, thick, opened backwards and inwards, setae short as the pronotal ones.

**Pronotum:** wider than long (W/L ratio = 1.6), fore angles normally shaped, marginal setae short (0.05 mm), slightly shorter than their distance, distinctly claviform, disc and sides with areolate surface (i.e. horseshoe-shaped punctures are "closed"), punctures slightly impressed, medium sized (subequal to the ones on head), their distance on disc inferior or equal to their diameter, at sides punctures very thick, slightly larger than the ones on disc, distance always inferior to their diameter, near margins some horseshoe-shaped punctures are opened outwards. Setae on pronotum slightly longer than marginal ones, claviform.

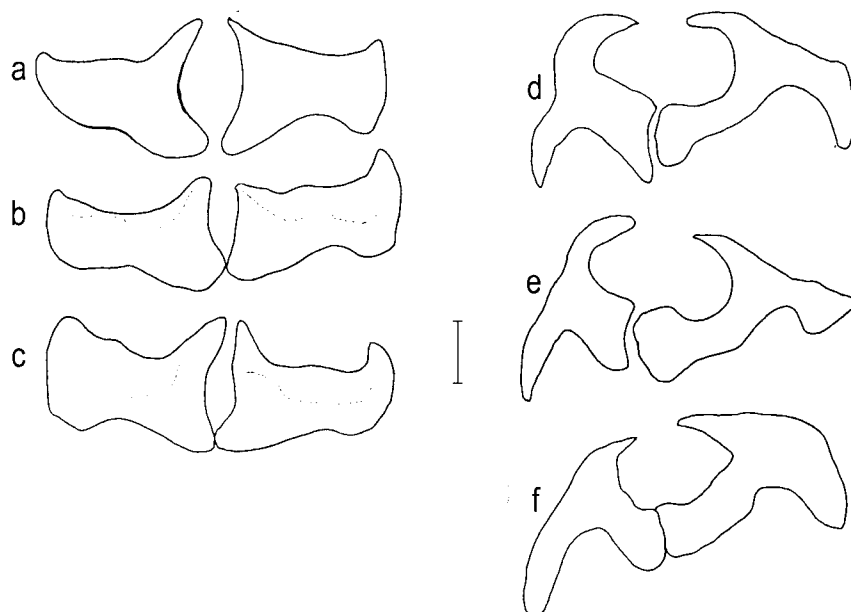
**Scutellum:** punctures horseshoe-shaped, very thick.

**Elytra:** elongate-oval, distinctly longer than wide (W/L ratio = 0.9), elytral punctures horseshoe-shaped, surface delimited by horseshoe plane, horseshoes opened backwards, very thick, their distance inferior to the diameter, setae very close to the bottom of horseshoe, slightly shorter than pronotal ones, apically horseshoe-shaped punctures almost closed, very few simple punctures among them.

**Male genitalia:** parameres asymmetrical, long, laterally distinctly flattened (Fig. 2), internal sac with a very large and long sclerite plus some lesser accessory sclerites (Fig. 3b), genital segment as in Fig. 4b.

**Female genitalia:** bursa copulatrix sclerites well sclerotized and fairly variable (Figs 5d, e, f)

**Differential diagnosis.** *P. montanus* sp. n. owing to the shape of the parameres cannot be mistaken for any other known *Pterorthochaetes*; the most distinctive outer characters are the shape and density of the pronotal punctures. It is quite isolated within the genus and presently it is not possible to state its closest affinities.



Figs 5. *Pterorthochaetes septentrionalis* sp. n. sclerites of bursa copulatrix (a, b, c), *P. montanus* sp. n. sclerites of bursa copulatrix (d, e, f), scale bar = 0.1 mm.

**Distribution.** *P. montanus* sp. n. seems to be restricted to the montane forests around Tanah Rata (Cameron Highlands) and Maxwell Hill, where it has been collected at light or under the bark of dead logs.

**E t y m o l o g y.** Montanus (= montane) because of its habitat.

### ***Pterorthochaetes insularis* Gestro, 1899**

**Material examined.** 1 ♂ (dissected): Nepal, 22-26.5.1990, Chitwan N. P., Saura, S. Bílý (DKCP).

**Remarks.** It is the first record of *P. insularis* for Nepal. I refer this specimen to *P. insularis*, mostly because of the shape of parameres and sclerite of internal sac, although it shows some interesting differences in the outer morphology. The slight differences in microsculpture and in the density of pronotal marginal setae probably fall within the wide range of variability of *P. insularis*: at the state of the art it is not clear whether this latter represents a superspecies formed by a number of local species or simply an extremely variable species. The available material doesn't allow a clarification.

The most noticeable features of the concerned specimen consist of a distinct short and sharp apophysis (directed forward) starting at the middle of fore margin

of pronotum, one distinct smooth symmetrical callosity at each side of pronotum and one sharp bent backwards spine at the base of each elytron between the scutellum and the humeral callus. Presence of such features has already been reported in the Ceratocanthidae (Paulian, 1945), leading to the description of *Pterorthochaetes armatus* Paulian, 1945, which Paulian himself regarded as a probable teratological individual of *P. coomani* Paulian, 1945 and which is characterized by a large hornlike apophysis directed forward and starting from the fore margin of pronotum. I have observed an individual of *P. andamanus* Paulian, 1937 from Southern Thailand (ABCB) with a similar horn, but very short. Interestingly all the apophysis and callosities which characterize the individual dealt with herein seem to correspond to the support projections of pupae, that are present at least in the pupae of *Pterorthochaetes* Gestro, 1899 and *Cyphopisthes* Gestro, 1899 (author's unpublished data). The specimen from Nepal therefore could be an interesting case of symmetrical teratology involving the permanence of pupal support projections in the adult.

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