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A new species group of the genus Olophrum ERICHSON, 1839 from China, with description of three new species

(Coleoptera: Staphylinidae: Omaliinae: Anthophagini)

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Abstract

Three new species of the genus *Olophrum* ERICHSON, 1839 (Coleoptera: Staphylinidae: Omaliinae) from China are described and illustrated: *O. hromadkai* (Yunnan), *O. laxum* (Sichuan, Shaanxi) and *O. pacei* (Sichuan). They represent a new species group: *Olophrum laxum* group. A key and distribution map for all species are provided.

Key words: Coleoptera, Staphylinidae, Omaliinae, *Olophrum*, taxonomy, new species, China, Palaearctic Region.

Introduction

The genus *Olophrum* ERICHSON, 1839 (Omaliinae: Anthophagini) contains 54 species distributed in the Holarctic Region (HERMAN 2001), with 38 species (and one nomen dubium) from the Palaearctic Region (SCHÜLKE & SMETANA 2015). The genus was revised by SCHEERPELTZ (1929) with erections of species groups and descriptions of a significant number of new species many of which were subsequently synonymized. Many species of the genus show notable variability in both external and internal characters. A revision of the genus dealing with this situation is badly needed. Only two species of *Olophrum* have been known until now from China: *O. scheerpeltzi* BERNHAUER, 1938 from Fujian Province and *O. sinense* SCHEERPELTZ, 1929 from Shanghai Province.

This paper presents descriptions of three new species of *Olophrum* collected by the junior author and by our colleagues from Canada and Czechia in Sichuan and Yunnan provinces of China. The species dealt with in this paper differ in a set of characters from their congeners, allowing establishment of a separate *O. laxum* species group. A key to the species of the group is provided.

Material and methods

The material examined is deposited in:

CAS collection of Alexey Shavrin, Daugavpils, Latvia

CNC Canadian National Collection, Ottawa, Canada (P. Bouchard, A.E. Davies, V. Grebennikov)

NMPC National Museum Prague, Czechia (J. Hájek)

NSMT collection of A. Smetana, deposited at the National Museum of Nature and Science, Toshiba, Japan (S.

Nomura)

The following measurements are used in this paper and abbreviated as follows:

AedL length of aedeagus (from phallobase to apex of parameres)

AL length of antenna

AW maximum width of abdomen

ESL sutural length of elytra (length of elytra from the apex of scutellum to the posterior margin of

sutural angle)

EW maximum width of elytra

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HL length of head (from base of labrum to neck constriction along head midline)

HW maximum width of head including eyes

MTbL length of metatibia
MTrL length of metatarsus
OL ocular length (longitudinal)
PL longitudinal length of pronotum

PML/PMW (3, 4) length/maximum width of segments 3 and 4 of maxillary palpi

PW maximum width of pronotum

TL total length (from anterior margin of clypeus to apex of abdomen)

In citing the type data (enclosed in quotes), labels are separated by a comma, different lines are separated by a vertical line. Morphological studies were carried out using Nikon SMZ 745T and Nikon Eclipse E200 stereomicroscopes. A digital camera (Sony Alpha DSLR-A300) was used for photographs and all figures were processed using Adobe Photoshop software. All figures were modified using Adobe Photoshop software. All measurements are given in millimeters and were made with a stereoscopic microscope equipped with an ocular micrometer. The distribution map was created using MapCreator 2.0 software.

Definition of the Olophrum laxum group

DIAGNOSIS: Head moderately narrow, with distinct occipital line behind ocelli, without or with very short fine or moderately long and deep grooves in front of ocelli; anterolateral portions of head between antennal insertion and anterior margin of eye with wide semicircular notch; postocular ridge distinct, obtuse or sharp. Pronotum transverse, widest near middle, with slightly explanate lateral portions; mediobasal portion of disc without or with transverse impression. Elytra slightly flattened in cross section, markedly dilated posteriad.

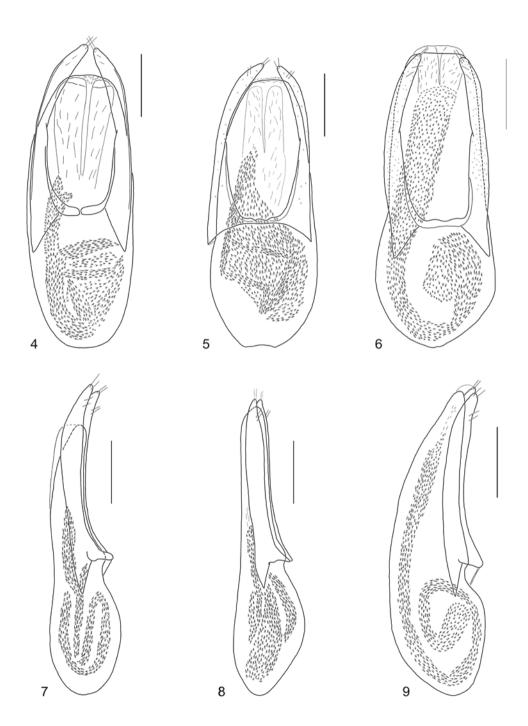
SPECIES INCLUDED: Olophrum hromadkai, O. laxum, O. pacei.

REMARKS: Based on the body shape and the punctation of the pronotum and elytra, on the presence of grooves, shapes of postocular ridges and posterolateral angles of the pronotum, the *O. laxum* group is similar to the *O. fuscum* and *O. sinense* groups (SCHEERPELTZ 1929), from which it differs in the moderately narrow head, in the variable short to long grooves, in the elytra slightly flattened and markedly dilated posteriad, with smaller and denser punctation. From all groups of *Olophrum* it differs in the presence of a well-defined occipital line behind the ocelli.

Key to species of *Olophrum laxum* group



Figs. 1–3: Habitus of *Olophrum*: 1) *O. laxum* (paratype), 2) *O. hromadkai* (paratype), 3) *O. pacei* (paratype). Scale bars = 1.0 mm.



Figs. 4–9: Aedeagus of *Olophrum* (4, 7: *O. laxum* (paratype); 5, 8: *O. hromadkai* (holotype); 6, 9: *O. pacei* (holotype): 4–6) parameral view, 7–9) lateral view. Scale bars = 0.1 mm.

Olophrum laxum sp.n. (Figs. 1, 4, 7, 10)

TYPE LOCALITY: China, Sichuan Province (Gongga Shan).

TYPE MATERIAL: Holotype &: "CHINA Sichuan, Gongga | Shan, Hailuogou, above | Camp 3, 3200m 7.VII.[19]96 | 29°35N 102°00E C54" <rectangular label, printed>, "collected by A. Smetana, J. Farkač | and P. Kabátek" <rectangular label, printed>, "HOLOTYPE | Olophrum | laxum sp.n. | Shavrin A. & Smetana A. des. 2017" <red rectangular label, printed> (NSMT). Paratypes (16 specimens): 1 2: same data as the holotype (NSMT); 1 g: "CHINA Sichuan, Gongga | Shan, Hailuogou, above | Camp 3, 3000m 6.VII.[19]96 | 29°35N 102°00E C53" <rectangular label, printed>, "collected by | A. Smetana, J. Farkač | and P. Kabátek" <rectangular label, printed> (CAS); 1 o: "CHINA, Sichuan, Gongga | Shan, Lake abv. Camp 2 | 2750m, 24.VII.1994 | A. Smetana [C20]" <rectangular label, printed> (NSMT); 1 σ : "CHINA, Sichuan, Gongga | Shan, Lake abv. Camp 2 | 2750m, 25.VII.1994 | A. Smetana [C23]" <rectangular label, printed> (NSMT); 6 ♂ ♂ [2 exs. were dissected; plastic plate with aedeagus and apical abdominal segments in Canada balsam pinned under the plate with the beetle; genital segment glued to the same plate under the beetle], 1 o: "P.R. CHINA, Sichuan, | NE slope Gongga Shan | N29°52'10" E102°02' | 01", 12.vi.2011, 3620m, | sift16, V.Grebennikov" <rectangular label, printed> (2 ♂ ♂: CAS; 4 ♂ ♂, 1 o: CNC); 3 ♂ ♂: "P.R. CHINA, Sichuan, | NE slope Gongga Shan | N29°50'05" E102°02' | 53", 11.vi.2011, 3019m, | sift15, V.Grebennikov" <rectangular label, printed> (CNC); 2 ⋄ ∘: "CHINA: Shaanxi Daba | Shan mtn. Range N pass | 22km NW Zhenping" <rectangular label, printed>, "32°01'N 109°21'E | 2850m 14.VII.2001 | A. Smetana [C103]" <rectangular label, printed> (NSMT). All paratypes with red rectangular printed label: "PARATYPE | Olophrum | laxum sp.n. | Shavrin A. & Smetana A. des. 2017".

ADDITIONAL MATERIAL EXAMINED: Four specimens with abdomen partly or fully destroyed by dermestids are not included in the type series: 2 exs.: same data as the holotype (CAS); 1 ex.: "CHINA, Sichuan, Gongga | Shan, above Camp 3 | 3050m, 22.VII.1994 | A. Smetana [C18]" <rectangular label, printed>, "near #2 [handwritten] | *Anthobium* [handwritten] | M.K.Thayer det. 1998" <rectangular label, printed> (NSMT); 1 ex.: "CHINA, Sichuan, Gongga | Shan, abv. Camp. 3, 3300- | 3350m, 23.VII.1994 | A. Smetana [C19]" <rectangular label, printed> (NSMT). All specimens with rectangular printed label: "*Olophrum* | *laxum* sp.n. | Shavrin A. & Smetana A. des. 2017".

DIFFERENTIAL DIAGNOSIS: Based on the presence of long grooves in front of ocelli and wide elytra, the new species is similar to *O. hromadkai*, from which it differs, in addition to the differently shaped aedeagus, in the smaller body and narrower head.

DESCRIPTION: Measurements (n=17): HW: 0.64–0.72; HL: 0.47–0.52; AL (holotype): 1.65; OL: 0.22–0.25; PML/PMW (holotype): 3: 0.07/0.04; 4: 0.17/0.04; PL: 0.70–0.77; PW: 1.25–1.41; ESL: 1.74–2.06; EW: 1.83–2.21; MTbL (holotype): 0.97, MTrL: 0.50 (MTrL 1–4: 0.33; MTrL 5: 0.17); AW: 1.34–1.88; AedL: 0.70–0.72; TL: 3.70–4.25 (holotype: 3.95).

Body yellowish brown to reddish brown; ocelli, mouthparts, antennomeres, lateral portions of pronotum and paratergites yellow to yellowish brown (reddish-brown specimens with paler antennomeres 1–2 and base of antennomere 2). Head with variable irregular deep and large punctation denser on infraorbital ridges and in middle part of head, with impunctate short transverse portions along inner sides of grooves; neck with irregular to regular punctation; punctation of pronotum as that on head, denser in middle and basal portions, sparser laterally, with small impunctate portions in mediobasal third; scutellum without or with several small punctures; punctation of elytra slightly larger and deeper than that on pronotum, distinctly denser in sutural area behind scutellum, middle part of each elytron with very indistinct, sometimes very tangled, seven to eight longitudinal rows of serial punctures, punctures of three sutural rows located very close together, remaining rows separated by impunctate interspaces of variable width, lateral punctures not serially arranged, irregularly scattered; tergite VIII and genital segment with fine punctation. Habitus as in Fig. 1.

Head 1.3 times as wide as long, with distinct occipital line behind ocelli, with elongated moderately deep straight grooves in front of ocelli, reaching midlength of eye, or slightly shorter; head gradually narrowed toward neck behind obtuse postocular ridges; surface between postocular ridge and posterior margin of eye as long as three nearest facets; anterolateral portion between

antennal insertion and anterior margin of eye with wide, indistinct semicircular notch. Eyes large and convex. Ocelli large, equal to diameter of three nearest punctures; distance between ocelli 1.5 times as long as distance between ocellus and posterior margin of eye. Apical segment of maxillary palpi more than twice as long as preceding segment. Antenna with elongated antennomeres 1–9, reaching basal third of elytra when reclined; antennomeres 1–2 and basal part of antennomere 3 glabrous, remaining antennomeres sparsely pubescent; measurements of antennomeres (length/width, holotype): 1: 0.17×0.07 ; 2: 0.12×0.05 ; 3–7: 0.15×0.06 ; 8–9: 0.15×0.07 ; 10: 0.12×0.07 ; 11: 0.19×0.07 .

Pronotum 1.7–1.8 times as wide as long, about twice as wide as head, widest near middle, markedly more narrowed anteriad than posteriad, with slightly explanate lateral portions; anterior angles widely rounded, posterior angles obtuse; mediobasal portion of disc with indistinct to distinct and deep transverse impression; lateral portions with oval pits around middle.

Elytra slightly flattened, nearly as wide as long, significantly widened posteriad, extending to apical margin of abdominal tergite IV or V, with broadly explanate lateral portions.

Metatibia about twice as long as metatarsus.

Abdomen in general appearance similar to that of *O. hromadkai* but with tergites significantly more tapering toward apex.

Male. Apical margin of abdominal tergite VIII rounded. Apical margin of abdominal sternite VIII straight. Aedeagus (Fig. 4) similar to that of *O. hromadkai*, but slightly longer, apices of parameres markedly exceeding apex of median lobe. Aedeagus laterally as in Fig. 7.

Female. Apical margin of abdominal tergite VIII straight. Apical margin of abdominal sternite VIII rounded.

ETYMOLOGY: The specific epithet is the Latin adjective *laxus*, -a, -um (wide, large), referring to the widened elytra.

ECOLOGY: Specimens were taken in an original *Abies* forest with *Rhododendron* undergrowth (C18), old *Abies* forest with broadleaved shrubs undergrowth (C19), in an original forest with *Betula*, *Acer*, etc. (C20), in a primary deciduous forest (C23) and a primary *Abies* forest with rich undergrowth of rhododendrons (C53) by sifting of: mushrooms, moss and debris under a fallen *Abies* tree (C18), layers of fallen leaves in deep crevices between large rocks (C19), deep wet layers of mosses with intermixed grasses at edges of a shallow lake (C20), wet moss and grassy vegetation on large fallen trees close to the water (C23), various debris, leaf litter and moss accumulated on sandy flats of a creek (C53), various wet debris, vegetation and needles accumulated under a pile of branches of a recently fallen *Abies* tree (C54). The species was recorded from elevations between 2750 and 3620 m a.s.l.

DISTRIBUTION: The species is known from Gongga Shan range in Sichuan and Daba Shan range in Shaanxi (China) (Fig. 10).

Olophrum hromadkai sp.n. (Figs. 2, 5, 8, 10)

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TYPE LOCALITY: China, Yunnan, Xue-Shan.

TYPE MATERIAL: **Holotype** σ [posterolateral margin of right elytron slightly damaged]: "CHINA: N-Yunnan Diqing Tibet. | Aut.Pr.Zhongdian Co. Xue Shan | 23km Z Zhongdian 27°38.3'N 99°41.5'E 3675-3725m | 2.VI.2005 A.Smetana [C149]" <rectangular label, printed>, "HOLOTYPE | *Olophrum* | *hromadkai* sp.n. | Shavrin A. & Smetana A. des. 2017" <red rectangular label, printed> (NSMT). **Paratype** σ [A plastic card with aedeagus, abdominal tergite VIII, sternite VIII and apical genital segment in Canada balsam is pinned under the card with the

specimen]: same data as the holotype, with red rectangular, printed label: "PARATYPE | Olophrum | hromadkai sp.n. | Shavrin A. & Smetana A. des. 2017" (CAS).

DIFFERENTIAL DIAGNOSIS: Based on the presence of long grooves in front of ocelli and wide elytra, the new species is similar to *O. laxum*, from which it differs, in addition to the differently shaped aedeagus, in the larger body and wider head.

DESCRIPTION: Measurements (n=2): HW: 0.70–0.72; HL: 0.57–0.59; AL (holotype): 1.69; OL: 0.25–0.27; PML/PMW (holotype): 3: 0.07/0.05; 4: 0.20/0.05; PL: 0.77–0.81; PW: 1.32–1.44; ESL: 1.75–1.80; EW: 1.97–2.20; MTbL (holotype): 1.00, MTrL: 0.50 (MTrL 1–4: 0.33; MTrL 5: 0.17); AW: 1.77–1.86; AedL (paratype): 0.70; TL: 4.20–4.50 (holotype).

Forebody yellowish brown, with brown middle parts of head, neck, disc of pronotum, scutellum and elytra (holotype with more contrasting, dark brown disc of elytra with yellowish brown lateral and sutural margins); abdomen red brown, with yellowish brown apical part of abdomen; ocelli, mouthparts, antennae and legs yellow. Head and neck with sparse irregular moderately deep and large punctation, distinctly denser between eyes; punctation of pronotum as that on head, small oval area in basal middle third and lateroapical portions of pronotum without punctation; scutellum with several small punctures; punctation of elytra slightly larger and denser than that on pronotum, coarser near sutural area behind scutellum, middle part of each elytron with six vague longitudinal rows of serial punctures, remaining elytral punctures more or less irregularly scattered. Habitus as in Fig. 2.

Head 1.2 times as wide as long, with moderately long grooves in front of ocelli, reaching level of middle length of eye; head sharply narrowed toward neck behind sharp postocular ridges; distance between postocular ridge and posterior margin of eye as long as two nearest facets; anterolateral portion of head between antennal insertion and anterior margin of eye with evenly wide moderately deep notch; distance between ocelli twice as long as distance between ocellus and posterior margin of eye. Apical segment of maxillary palpus three times as long as preceding segment. Antenna with elongated antennomeres 1-9; measurements of antennomeres (length/width, holotype): $1: 0.17 \times 0.07$; $2: 0.14 \times 0.05$; $3: 0.17 \times 0.05$; $4-7: 0.15 \times 0.06$; $8: 0.14 \times 0.06$; $9: 0.14 \times 0.07$; $10: 0.13 \times 0.07$; $11: 0.20 \times 0.09$.

Pronotum 1.7 times as wide as long, about twice as wide as head, widest near middle, evenly narrowed anteriad and posteriad; anterior angles widely rounded, posterior angles indistinctly obtuse; mediobasal portion of disc with vague transverse impression.

Elytra 1.1–1.2 times as long as wide, significantly widened posteriad, extending to apical margin of abdominal tergite IV, with broadly explanate lateral portions.

Metatibia about twice as long as metatarsus

Abdomen distinctly narrower than elytra, with a pair of very small oval tomentose spots in middle of tergite V; intersegmental membranes between tergites IV–VI narrow, covered by brickwall-like sculpture; tergite VII with very short palisade fringe on apical margin.

Male. Apical margins of abdominal tergite VIII and sternite VIII slightly sinuate. Aedeagus (Fig. 5) very wide, median lobe narrowed toward widely rounded apex; parameres slightly exceeding apex of median lobe. Aedeagus laterally as in Fig. 8.

Female unknown.

ETYMOLOGY: Patronymic – the species is named in honor of the renowned Czech staphylinidologist Lubomír Hromádka (1931–2016).

ECOLOGY: The specimens were collected in devastated mixed forest (*Abies, Larix, Betula, Rhododendron*) by sifting layers of needles and various debris under piles of branches of a recently cut down *Abies* tree ([C149]).

DISTRIBUTION: The new species is at present known only from the type locality (Fig. 10) in Xue-Shan range in Yunnan (China).

Olophrum pacei sp.n. (Figs. 3, 6, 9, 10)

TYPE LOCALITY: China, Sichuan, Emeishan.

TYPE MATERIAL: **Holotype** $\[Inserting]$ [specimen without left and right antennomeres 9–11; a plastic plate with aedeagus in Canada balsam is pinned under the plate with the beetle; abdominal tergite VIII and genital segment glued on the same plate under the beetle]: "CHINA: Sichuan Prov., | Emeishan Mt., 8. –9.VI.2014 | Leidongping, 2420 m | 29°32'25"N 103°19'52"E" <rectangular label, printed>, "Individually, on vegetation flowering *Rosa*, mixed forest, J. Hájek, J. Růžička & M.Tkoč | leg." <rectangular label, printed>, "HOLOTYPE | *Olophrum* | *pacei* sp.n. | Shavrin A. & Smetana A. des. 2017" <red rectangular label, printed> (NMPC). **Paratypes**: 1 $\[Inserting]$: same data as the holotype (NMPC); 2 $\[Inserting]$: "CHINA: Sichuan Prov., | Emeishan Mt., 10.VI.2014, | Taiziping Temple, 2820 m, | 29°31'50"N 103°19'36"E" <rectangular label, printed>, "sift # 11, mixed forest | with *Abies*, | bamboo undergrowth, | J. Hájek & J. Růžička leg." <rectangular label, printed> (1 $\[Inserting]$: CAS; 1 $\[Inserting]$: NMPC). All paratypes with red rectangular printed label: "PARATYPE | *Olophrum* | *pacei* sp.n. | Shavrin A. & Smetana A. des. 2017".

DIFFERENTIAL DIAGNOSIS: Based on the body size, shape of the pronotum and punctation of the elytra, the new species is similar to *O. laxum*, from which it differs, in addition to the differently shaped aedeagus, in the head without or with very short grooves in front of ocelli.

DESCRIPTION: Measurements (n=4): HW: 0.72–0.75; HL: 0.43–0.53; AL (paratype): 2.23; OL: 0.22–0.25; PML/PMW (holotype): 3: 0.09/0.05; 4: 0.17/0.04; PL: 0.75–0.79; PW: 1.30–1.33; ESL: 1.80–1.87; EW: 1.97–2.11; MTbL (holotype): 0.95, MTrL: 0.55 (MTrL 1–4: 0.38; MTrL 5: 0.17); AW: 1.65–1.74; AedL: 0.72; TL: 3.79(holotype)–4.15.

Body reddish-brown; posterolateral portion and portions of head between antennal insertion and anterior margin of eye, ocelli, antennomeres 4–11, lateral and basal portions of pronotum and paratergites yellowish brown; antennomeres 1–3 and legs yellow. Head with dense deep punctation, distinctly denser and coarser between ocelli; neck with irregular punctation somewhat sparser than that on head; punctation of pronotum moderately regular, sparser than that on head, smaller on lateral portions; scutellum with several small punctures; punctation of elytra slightly larger and deeper than that on pronotum, deeper in medioapical portions, middle part of each elytron with indistinct and vague longitudinal rows of serial punctures similar to those in *O. laxum*. Habitus as in Fig. 3.

Head 1.4–1.6 times as wide as long, slightly elevated in middle portion, without or with indistinct, small, very short grooves in front of ocelli; head markedly narrowed toward neck behind moderately sharp or obtuse postocular ridges; distance between postocular ridge and posterior margin of eye as long as two nearest facets; anterolateral portion of head between antennal insertion and anterior margin of eye with wide, semicircular indistinct notch; distance between ocelli twice as long as distance between ocellus and posterior margin of eye. Apical segment of maxillary palpus about twice as long as preceding segment. Antenna with elongated antennomeres 1–9; measurements of antennomeres (paratype, length/width): 1: 0.20×0.07 ; 2: 0.15×0.05 ; 3: 0.15×0.04 ; 4: 0.15×0.05 ; 5: 0.15×0.06 ; 6–7: 0.13×0.06 ; 8–9: 0.13×0.07 ; 10: 0.11×0.07 ; 11: 0.20×0.07 .

Pronotum 1.6–1.7 times as wide as long, 1.7–1.8 times as wide as head, widest near middle, evenly narrowed apicad and posteriad; anterior angles widely rounded; disc of pronotum slightly convex, without basal impressions; lateral portions with moderately deep oval pits around middle.

Elytra about as wide as long, significantly widened posteriad, extending to apical margin of abdominal tergite V, with explanate lateral portions.

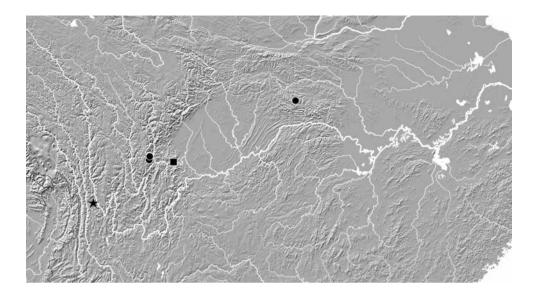


Fig. 10: Distribution of Olophrum in China: O. hromadkai (star), O. laxum (circles), O. pacei (square).

Metatibia about 1.7 times as long as metatarsus.

Abdomen distinctly narrower than elytra, with pair of oval tomentose spots in middle of tergite V; intersegmental membranes between tergites IV–VI narrow, covered by brickwall-like sculpture; tergite VII with fine palisade fringe on apical margin.

Male. Apical margins of abdominal tergite VIII and sternite VIII slightly sinuate. Aedeagus (Fig. 6) with median lobe long and very wide, with apex subtruncate, apices of parameres about reaching apex of median lobe. Aedeagus laterally as in Fig. 9.

Female. Apical margins of abdominal tergite VIII and sternite VIII straight.

ETYMOLOGY: Patronymic, the species was named in honor of the renowned Italian staphylinid specialist Roberto Pace (1935–2017).

ECOLOGY: The specimens were collected from elevations of about 2420–2820 m a.s.l. by sifting litter in mixed forest with *Abies* and bamboo undergrowth. Label data of the holotype and one paratype, suggesting that they were collected from flowering *Rosa*, are questionable.

DISTRIBUTION: The species is known from the type locality on Emeishan, Sichuan (China) (Fig. 10).

Acknowledgements

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