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# Description of six new species of *Lederina* Nikitsky & Belov, 1982 (Coleoptera: Melandryidae: Melandryinae) from Taiwan

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**Abstract**
The genus *Lederina* Nikitsky & Belov, 1982 (Melandryidae: Melandryinae) is recorded for the first time from Taiwan with six new species: *L. armadillo* sp. nov., *L. formosa* sp. nov., *L. insula* sp. nov., *L. smetanai* sp. nov., *L. viti* sp. nov., and *L. yushanensis* sp. nov., which are described and illustrated. A key to the Taiwanese species is given. The lack of knowledge concerning the species of *Lederina* as well as the possible diversity of the genus in eastern Asia is briefly discussed.

**Keywords:** False darkling beetles - Orchesiini - taxonomy - Asia - endemic species.

## INTRODUCTION

*Lederina* is a genus of apterous Melandryidae living in floor litter (Nikitsky & Pollock, 2011). Nikitsky & Belov (1982) initially described *Lederina* as a subgenus of *Lederia* Reitter, 1879 before Nikitsky (1994) raised it to genus rank. *Lederina* is a member of the Orchesiini (Melandryinae) and can be distinguished from the other genera of the tribe by the following combination of morphological features (Nikitsky & Belov, 1982): the longer hind leg spur does not exceed the length of the first tarsal segment, the scutellar shield is completely or nearly completely lacking, the metanepisterna are separated from the metaventrite by a complete suture, the antennal club is distinct and formed by the three apical antennomeres, the lateral margins of the pronotum are edged, and the metacoxae are directed latero-anteriorly and narrowed.

*Lederina* comprises eighteen species occurring in Japan (8), Korea (1), China (1), Nepal (4), India (1), and Vietnam (3) (Nikitsky & Belov, 1982; Choi *et al.*, 2020; Nikitsky, 2020). However only the Japanese (Lewis, 1895; Sasaji, 1987, 1995; Ishikawa & Sakai, 2001, 2007) and the Nepalese (Nikitsky & Belov, 1982; Nikitsky, 1994) *Lederina* have been studied extensively. The present paper provides descriptions and illustrations of six new species from Taiwan based on material housed in the Muséum d'histoire naturelle, Geneva, and points to the need of further studies for this species-rich but poorly studied genus.

## MATERIAL AND METHODS

This work is based on the study of 265 specimens originating from Taiwan and housed in the Muséum d'histoire naturelle, Geneva (MHNG). They were compared with individuals from Japan and Mainland China (also housed in the MHNG) and descriptions given in the relevant literature (Nikitsky & Belov, 1982; Sasaji, 1987; 1995; Ishikawa & Sakai, 2001; 2007; Choi *et al.*, 2020). Images were acquired with a Leica DFC425 camera in conjunction with a Leica M205–C compound microscope, stacked using Zerene Stacker (version 1.04) and processed with GIMP (version 2.10.30.). Labels are reproduced verbatim. Unpublished field notes of Aleš Smetana (pers. comm. G. Cuccodoro) are reproduced between [ ].

## TAXONOMY

### *Lederina armadillo* sp. nov.

Figs 1-3, 19, 25, 28, 32

**Type material**

*Holotype*: MHNG-ENTO-0097437; 1♂; TAIWAN, Nantou Hsien, Meifeng, 2130 m, 12.V.1991, A. Smetana

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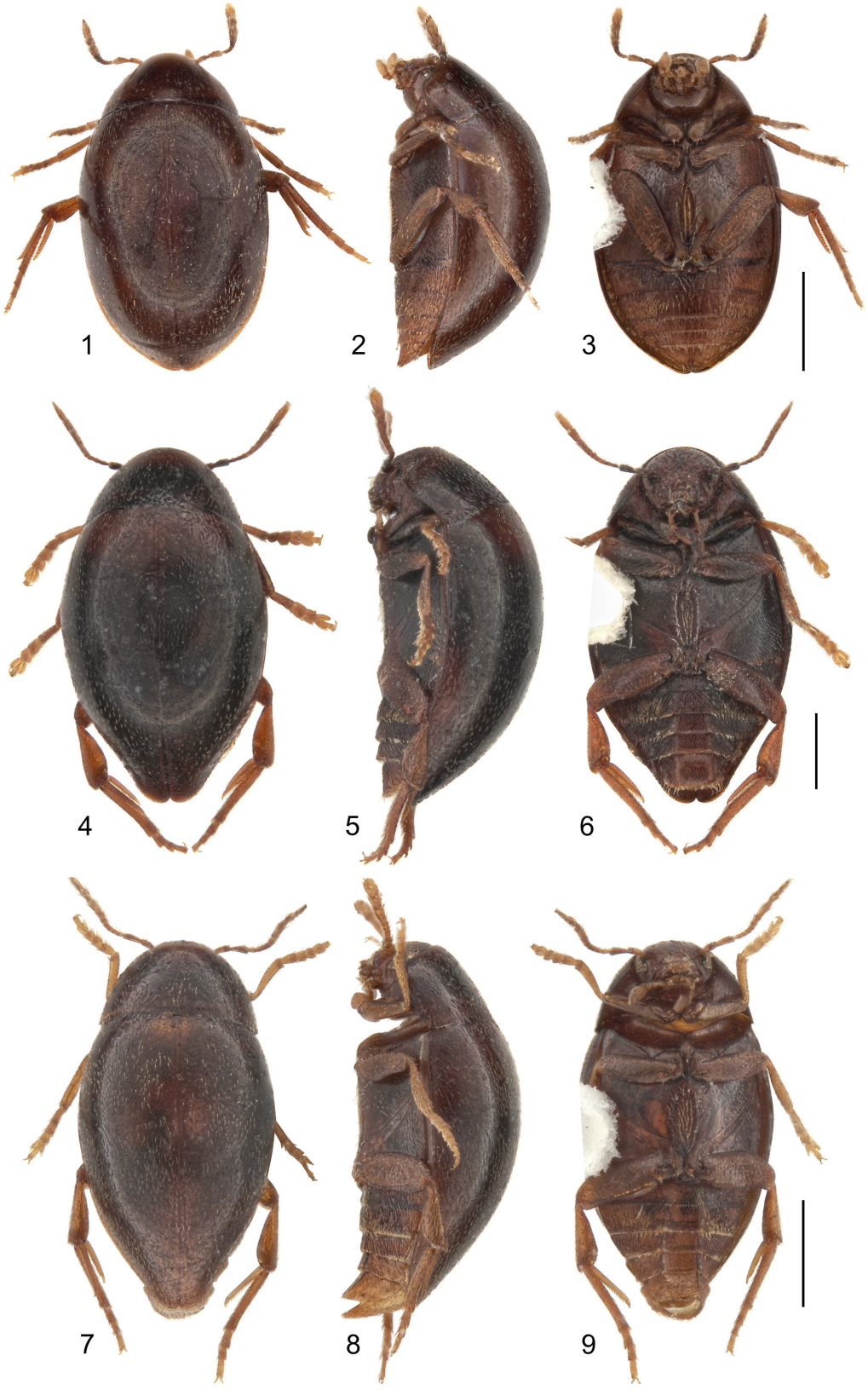
(T78) [original evergreen broadleaved, sift moss and humus underneath, on large, rotting fallen trees].
*Paratypes* (112): MHNG; 1♂; same data as holotype. – MHNG; 5♂, 2♀ and 5 unsexed; TAIWAN, Nantou Hsien, Meifeng, 2130 m, 3.V.1991, A. Smetana (T62) [original evergreen broadleaved forest, sift lush vegetation and debris and humus among it along a forest road]. – MHNG; 3♂ and 2♀; TAIWAN, Kaohsiung Hsien, Tengchih, 1700-1800 m, 24.IV.1990, A. Smetana (T21) [old evergreen broadleaved forest, sift forest floor debris]. – MHNG; 1 unsexed; TAIWAN, Kaohsiung Hsien, Tengchih, 1565 m, 23.IV.1990 (T18). – MHNG; 1♂ and 1♀; TAIWAN, Pingtung Hsien, Peitawushan, Kuai-Ku Hut, 2325 m, 21.V.1991, A. Smetana (T88) [original broadleaved evergreen forest with intermixed conifers here and there, sift dense vegetation and humus under it along forest trail]. – MHNG; 6♂, 4♀ and 2 unsexed; TAIWAN, Pingtung Hsien, Peitawushan, Kuai-Ku Hut, 2130 m, 27.IV.1992, A. Smetana (T101) [original broadleaved evergreen forest with intermixed conifers here and there, sift fallen leaves and other forest floor debris in shady, rather dark part of the forest]. – MHNG; 4♂ and 5♀; TAIWAN, Pingtung Hsien, Peitawushan Trail, 1500 m, 1.V.1992, A. Smetana (T110) [old broadleaved evergreen, almost subtropical, sift vegetation, fallen leaves and other debris among it on moist spots along the forest trail, this forest reminds me actually of the forest just above the headquarters of the Mt. Kinabalu National Park in Borneo]. – MHNG; 1♂ and 2♀; TAIWAN, Taichung Hsien, Anmashan, 2230 m, 1.V.1990, A. Smetana (T33) [original broadleaved evergreen forest with plenty of large, rotting fallen trees, sift humus, various debris and humus, mostly around bases of large trees and in small gullies of forest floor]. – MHNG; 8♂, 13♀ and 26 unsexed; TAIWAN, Taichung Hsien, Anmashan, 2225 m, 2.V.1990, A. Smetana (T37) [small clearing in an original broadleaved evergreen forest with many huge trees, sift layer of still green leaves and small twigs under a fallen broadleaved tree, very rich]. – MHNG; 3♂, 5♀ and 3 unsexed; TAIWAN, Taichung Hsien, Anmashan, 2225 m, 2.V.1990, A. Smetana (T38) [small clearing in an original broadleaved evergreen forest with many huge trees, sift rotten, moldy branches and twigs, various debris and fallen leaves around bases of big standing trees]. – MHNG; 1♀; TAIWAN, Taichung Hsien, Anmashan, 2225 m, 3.V.1990, A. Smetana (T42) [small clearing in an original broadleaved evergreen forest with many huge trees, sift debris and fallen leaves along large rotting fallen trees]. – MHNG; 2♀; TAIWAN, Taichung Hsien, Anmashan, 2230 m, 4.V.1990, A. Smetana (T43) [small clearing in an original broadleaved evergreen forest with many huge trees, sift rotting moldy wood along fallen large trees, also debris and fallen leaves of the forest floor]. – MHNG; 1♀; TAIWAN, Taoyuan Hsien, Takuanshan Forest, 1650 m, 17.IV.1990, A. Smetana (T5) [evergreen broadleaved forest, sift humus and debris among lush vegetation on wet spots along trail]. – MHNG; 1♂ and 2♀; TAIWAN, Fenchihu, 1400 m, 12.V.1977, J. Klapperich. – MHNG; 2♀; TAIWAN, Alishan, 2400 m, 10.VI.1977, J. Klapperich.

**Diagnosis:** *Lederina armadillo* differs from the other Taiwanese species by the evenly convex body shape in lateral view, the uniform dark brown body color, the whole elytral surface covered with fine transverse microreticulation, and the metatarsal spurs distinctly shorter than metatarsomere 1. The males can be easily distinguished from *L. formosa*, *L. insula*, *L. smetanai*, *L. viti*, *L. koreana* Choi *et al.*, 2020, and from all the Japanese species (excepted *L. imdecorata* Ishikawa & Sakai, 2001) by the abdomen lacking a medial depression. The males also differ from *L. imdecorata* from Japan and *L. mozolevskayae* Nikitsky, 2001 from Continental China by the large and deep metaventral depression with sub-parallel lateral edges.

**Etymology:** This species is named in reference to its shape, resembling an armadillo.

**Description:** Length: 1.40-2.00 mm; width: 0.82-1.15 mm; thickness: 0.69-0.93 mm.
Body (Figs 1-3) in dorsal view oval, slightly elongated anteriorly and shortly rounded posteriorly, 1.7 times longer than wide, and widest at middle, evenly convex in lateral view. Body dark brown; legs reddish; antennae predominantly brown with basal articles and antennomere 11 lighter; maxillary palpi reddish, sometimes darkened distally; body pubescence yellowish. Dorsal surface dull; ventral surface brighter except abdomen dull.
Head with strong setiferous punctation forming weak transverse contiguous curved folds covered by transverse microreticulation. Antennae (Fig. 19) with very distinct club formed by wide antennomeres; relative length of antennomeres: 10-10-3-2-2-2-2-3-6-6-11: antennomeres 1 et 2 twice as long as wide, 3 to 5 approximately as long as wide, 6 to 8 slightly transverse, 9 and 10 slightly elongate, 11 twice as long as wide. Maxillary palpi with distal article 1.6 times longer than wide, with rounded internal margin, penultimate article as long as wide with sharp angular internal margin.
Pronotum uniformly very finely punctured and pubescent, ca. 0.4 times as long as wide, widest at base; posterior angle orthogonal, tip rounded. Elytra ca. 1.4 times longer than wide, widest at the anterior third; disc very finely and uniformly punctured, pubescence and transverse microreticulations as on pronotum. Metaventrite with stronger punctation and reticulation antero-laterally, evanescent posteriad, more shining than abdomen. Protarsi and mesotarsi not dilated; length of metatarsal spurs slightly different from each other, with longest spur ca. 0.8 times as long as metatarsomere 1; metatarsomere 2 as long as ¼ of 1, 4 slightly shorter than 2, 3 slightly shorter than 4.
Abdomen (Fig. 28) evenly convex, covered with dense pubescence, lacking depression; anterior sternites smooth




Figs 1-9. Habitus of *Lederina*. (1-3) *L. armadillo*. (4-6) *L. formosa*. (7-9) *L. insula*. Scale bar = 0.5 mm.

and very finely punctured; posterior sternites covered by transverse microreticulation.
*Male:* Metaventrite finely punctured and pubescent around metaventral depression. Metaventral depression (Fig. 25), 3.3 times longer than wide, widest near middle, with margins well-marked, sub-parallel, narrowed posteriad, rounded anteriorly, reaching anterior fifth of metaventrite; inner area deep, bearing long pubescence. Aedeagus (Fig. 32) small, ca. 0.4 mm long; median lobe shorter than parameres; phallobase ca. 0.23 mm long, somewhat longer than parameres.
*Female*: Metaventrite finely punctured and pubescent around metaventral depression; anterior half convex, slightly raised, very finely microreticulated. Metaventral depression short and narrow, shallow, almost reaching metaventral midlength; inner area lacking long pubescence.

**Distribution and natural history:** This species is known to occur in the Taiwanese southern and central counties of Chiai, Kaohsiung, Nantou, Pingtung, Taichung, Taoyuan at elevations ranging from 1400 to 2400 meters a.s.l. The individuals were found in sifted samples of moist soil litter (humus, twigs, fallen leaves, moss, and various debris) in coniferous or evergreen broadleaved forests, often with large trees.

**Comments:** *Lederina armadillo* differs from all its Taiwanese congeners by the absence of a medial depression on the abdomen and by the parameres not apposed to the aedeagal median lobe. In this respect it resembles more the Nepalese and Indian *Lederina*, and the Japanese *L. imdecorata*.

### *Lederina formosa* sp. nov.

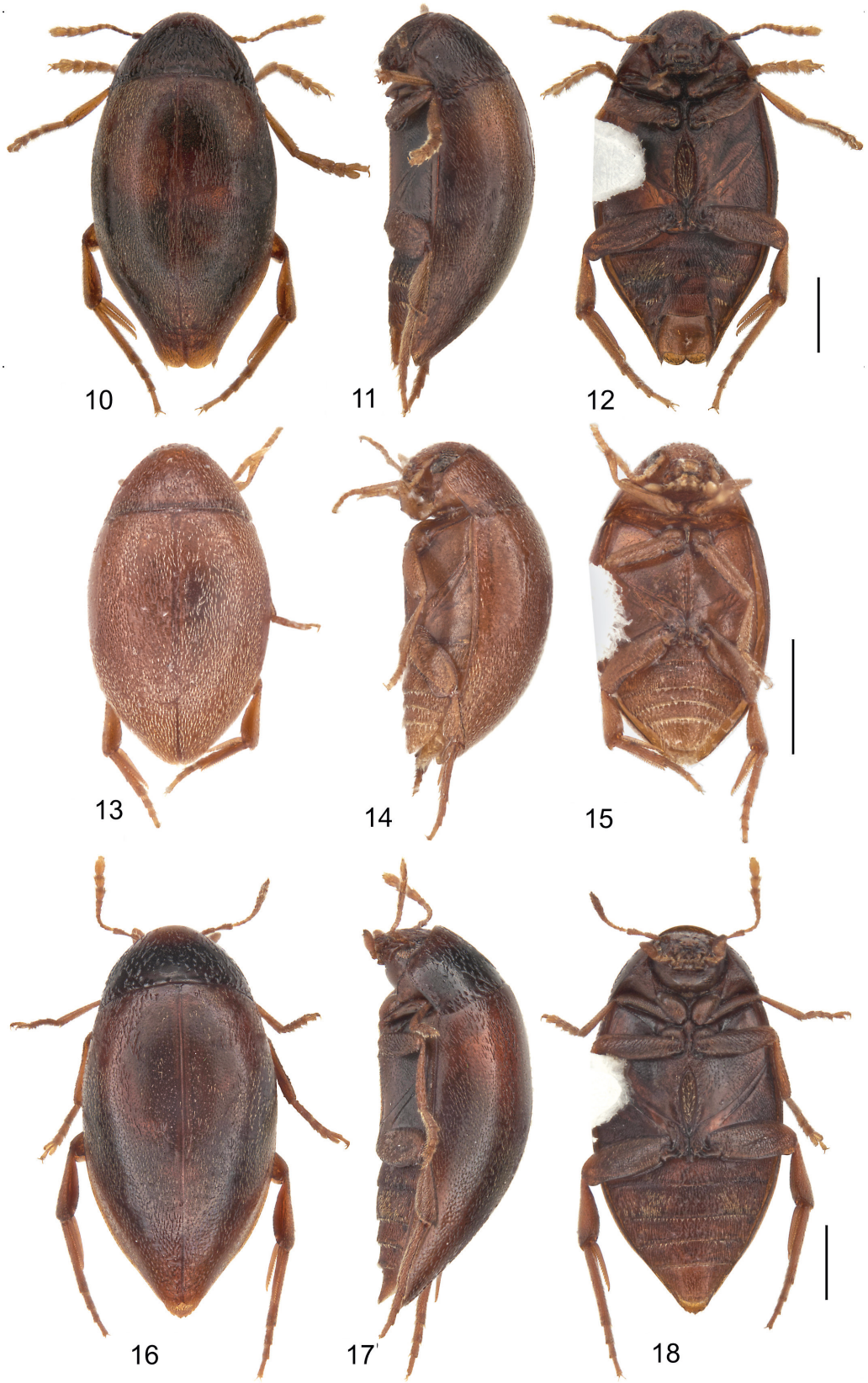
Figs 4-6, 20, 29, 33

**Type material**
*Holotype*: MHNG-ENTO-0097438; 1♂; TAIWAN, Pingtung Hsien, Peitawushan, Kuai-Ku Hut, 2125 m, 27.IV.1992, A. Smetana (T102) [Original broadleaved evergreen forest with intermixed conifers here and there. Sift vegetation mixed with fallen leaves and other debris].
*Paratypes* (11): MHNG; 1♂; TAIWAN, Pingtung Hsien, Peitawushan, Kuai-Ku Hut, 2325 m, 21.V.1991, A. Smetana (T88) [Original broadleaved evergreen forest with intermixed conifers here and there. Sift dense vegetation and humus under it along forest trail]. – MHNG; 3♂ and 4♀; TAIWAN, Pingtung Hsien, Peitawushan Ridge, 2800-2910 m, 28.IV.1992, A. Smetana (T105) [main ridge of Peitawushan, open *Abies* forest with rhododendron and juniper undergrowth, sift debris and fallen leaves under the undergrowth, relatively dry]. – MHNG; 1♀; TAIWAN, Pingtung Hsien, Peitawushan, above Kuai-Ku Hut, 2680 m, 29.IV.1992, A. Smetana (106) [seepage in a coniferous forest (*Abies*), sift fallen and slightly decaying rhododendron bloom on ground under two large rhododendron semitrees, ground under flower well moist]. – MHNG; 1♀; TAIWAN, Pingtung Hsien, Peitawushan, Kuai-Ku Hut, 2750 m, 22.v.1991, A. Smetana (T89) [seepage in a coniferous forest (*Abies*). Sift moss, debris and dense vegetation around seepage, rather wet]. – MHNG; 1♀; TAIWAN, Pingtung Hsien, Peitawushan, above Kuai-Ku Hut, 2680 m, 29.IV.1992, A. Smetana (106) [seepage in a coniferous forest (*Abies*), sift moss, debris and dense vegetation around seepage (rather wet)].

**Diagnosis:** *Lederina formosa* can be distinguished from its Taiwanese congeners by the following combination of features: evenly convex shape, bicolored elytra (in most specimens), whole elytral surface covered by fine transverse microreticulation, and antennal club formed by elongate antennomeres. Males have a medially depressed abdomen and a slightly dilated metatarsomere 1 as in most of the Japanese *Lederina* but can be distinguished from them by the presence of a deep and large metaventral depression, and their metatarsal spurs relatively long compared to metatarsomeres 1.

**Etymology:** The specific epithet of this species refers both to its colourfulness and a former name for Taiwan.

**Description:** Length: 1.78-2.07 mm; width: 0.97-1.17 mm; thickness: 0.83-0.95 mm.
Body (Figs 4-6) in dorsal view oval, equally rounded anteriorly and posteriorly and evenly convex in lateral view, 1.7 times longer than wide, body widest at middle. Body dark brown; elytra with reddish patch in the scutellar region; anterior third of pronotum and head reddish; palpi, tarsi and apex of antennae yellowish. Pubescence short, sparse and yellowish. Dorsal surface slightly less shining than ventral.
Head with setiferous punctation, slightly coarser anteriorly, not rough; transverse microreticulation distinct and homogenous on whole head. Antennae (Fig. 20) relatively narrow with distinct antennal club; relative length of antennomeres: 9-10-4-4-3-3-3-5-8-7-12; antennomeres 1 to 4 almost twice longer than wide, 5 to 7 slightly elongate, 8 and 9 almost twice longer than wide, 10 nearly as long as wide and 11 1.7 times longer than wide. Distal article of the maxillary palpi long, 1.75 times longer than wide with widely rounded internal margin; penultimate article slightly elongate. Pronotum 0.43 times as long as wide and widest at base; surface dull covered by a distinct reticulation formed of large transverse meshes becoming almost isodiametric anteriorly; punctation very fine and sparse. Elytra 1.6 times longer than wide, widest slightly before anterior third; surface uniformly dull covered by microreticulation formed of homogeneous transverse meshes, very superficial and sparse punctation; elytra elongated shortly before apex. Metaventrite completely shining, with fine punctation and microreticulation, stronger antero-laterally. Length of both metatarsal spurs slightly unequal, longest 0.75 times as long as metatarsomere 1, relative length of metatarsomeres: 42-9-7-12.




Figs 10-18. Habitus of *Lederina*. (10-12) *L. smetanai*. (13-15) *L. viti*. (16-18) *L. yushanensis*. Scale bar = 0.5 mm.

Abdomen surface covered by fine microreticulation, shining.
*Male:* Metaventrite with a row of hairs surrounding metaventral depression. Metaventral depression ca. 3 times longer than wide, rounded anteriorly, narrowing posteriad, margins straight posteriorly, reaching anterior third or quarter of metaventrite; well edged; central area deep, bearing dense pubescence. Protarsi and mesotarsi dilated; metatarsomere 1 dilated and curved. Abdomen (Fig. 29) medially depressed, sides straight to slightly divergent posteriorly; sternite 1 flattened, 2 slightly depressed posteriorly, 3 and 4 with flat depression, 5 with deep depression; sternites 3, 4 and 5 well edged laterally; abdominal posterior margin regularly rounded. Aedeagus (Fig. 33) 0.9 mm long, phallobase representing two third of its length; parameres parallel in basal half and strongly convergent distally, apposed to median lobe but shorter; sides of median lobe regularly convergent; insertion point of parameres and median lobe in phallobase very wide.
*Female*: Metaventrite with a row of hairs surrounding posterior part of metaventral depression, anterior three quarter to two third flattened, shining, and sparsely pubescent. Metaventral depression not deep but well edged posteriorly, reaching posterior quarter or third of metaventrite, bearing few rows of hairs. Protarsi and mesotarsi not dilated. Abdomen not depressed but weakly flattened medially.

**Distribution and natural history:** This species is only known from the southern county of Pingtung, Taiwan. The individuals were caught by sifting soil floor debris (moss, fallen leaves, decaying rhododendron blooms, humus and various debris) in coniferous or evergreen broadleaved forests (intermixed with conifers) often presenting an undergrowth of rhododendrons and junipers at elevations ranging from 2125 to 2910 meters a.s.l.

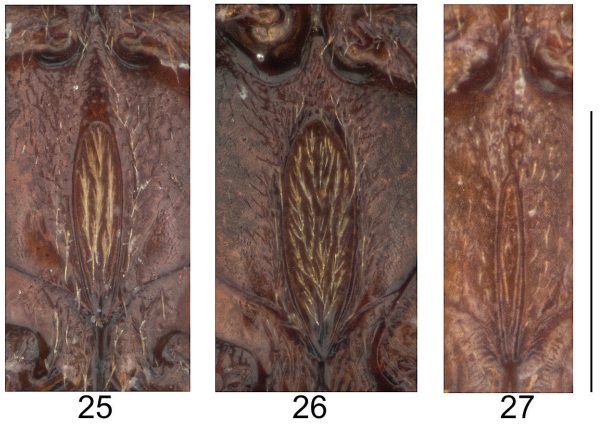

Figs 19-24. Antennae of *Lederina*. (19) *L. armadillo*. (20) *L. formosa*. (21) *L. insula*. (22) *L. smetanai*. (23) *L. viti*. (24) *L. yushanensis*. Scale bar = 0.5 mm.

**Comments:** The small and shining females of *L. formosa* are similar to those of *L. insula*. Males are well characterized by their abdominal depression and their slightly dilated and curved metatarsomere 1. This species seems to be related to *L. insulae*, *L. smetanai* and most of the Japanese *Lederina* by its aedeagus, on which the parameres are apposed to the median lobe, and its abdominal medial depression.

### *Lederina insula* sp. nov.

Figs 7-9, 21, 30, 34

**Type material**
*Holotype*: MHNG-ENTO-0097439; 1♂; TAIWAN, Pingtung Hsien, Peitawushan, Kuai-Ku Hut, 2125 m, 27.IV.1992, A. Smetana (T102) [original broadleaved evergreen forest with intermixed conifers here and there, sift vegetation mixed with fallen leaves and other debris]. *Paratypes* (16): MHNG; 1♂; TAIWAN, Pingtung Hsien, Peitawushan, Kuai-Ku Hut, 2325 m, 21.V.1991, A. Smetana (T88) [original broadleaved evergreen forest with intermixed conifers here and there, sift dense vegetation and humus under it along forest trail]. – MHNG; 1♂ and 5♀; TAIWAN, Pingtung Hsien, Peitawushan, Kuai-Ku Hut, 2125 m, 27.IV.1992, A. Smetana (T102) [original broadleaved evergreen forest with intermixed conifers here and there, sift vegetation mixed with fallen leaves and other debris]. – MHNG; 2♂ and 1♀; TAIWAN, Pingtung Hsien, Peitawushan, Kuai-Ku Hut, 2130 m, 27.IV.1992, A. Smetana (T101) [original broadleaved evergreen forest with intermixed conifers here and there, sift fallen leaves and other forest floor debris in shady, rather dark part of the forest]. – MHNG; 1♂ and 3♀; TAIWAN, Pingtung Hsien, Peitawushan, Kuai-Ku Hut, 2136 m, 30.IV.1992, A. Smetana (T108) [original broadleaved evergreen forest with intermixed conifers here and there, sift vegetation, fallen leaves and other debris among it on moist spots along the




Figs 25-27. Male metaventral depression of *Lederina*. (25) *L. armadillo*. (26) *L. smetanai*. (27) *L. viti*. Scale bar = 0.5 mm (25-26) and 0.25 (27).

forest trail]. – MHNG; 1♀; TAIWAN, Pingtung Hsien, Peitawushan, above Kuai-Ku Hut, 2325 m, 22.V.1991, A. Smetana (T90) [original broadleaved evergreen forest with intermixed conifers here and there, sift dense vegetation and humus under it along forest trail]. – MHNG; 1 ♀; TAIWAN, Taichung, Hsien, Anmashan, 2225 m, 2.V.1990, A. Smetana (T37) [small clearing in an original broadleaved evergreen forest with many huge trees, sift layer of still green leaves and small twigs under a fallen broadleaved tree, very rich].

**Diagnosis:** This species can be distinguished from the other Taiwanese *Lederina* by the following combination of features: small size, posteriorly elongated shape, microsculpture of the elytra, and distinctly shorter metatarsal spurs in comparison to metatarsomere 1. Males of *L. insula* have a medially depressed abdomen like *L. smetanai* and *L. formosa* but the shape of the depression is different in each of these species (straight to slightly convergent in *L. insula*, and with rounded apical margin). *L. insula* differs from the Japanese *Lederina*, which also have a medially depressed abdomen (with exception of *L. imdecorata*) by the straight and thin metatarsomere 1, and the deep and large metaventral depression.

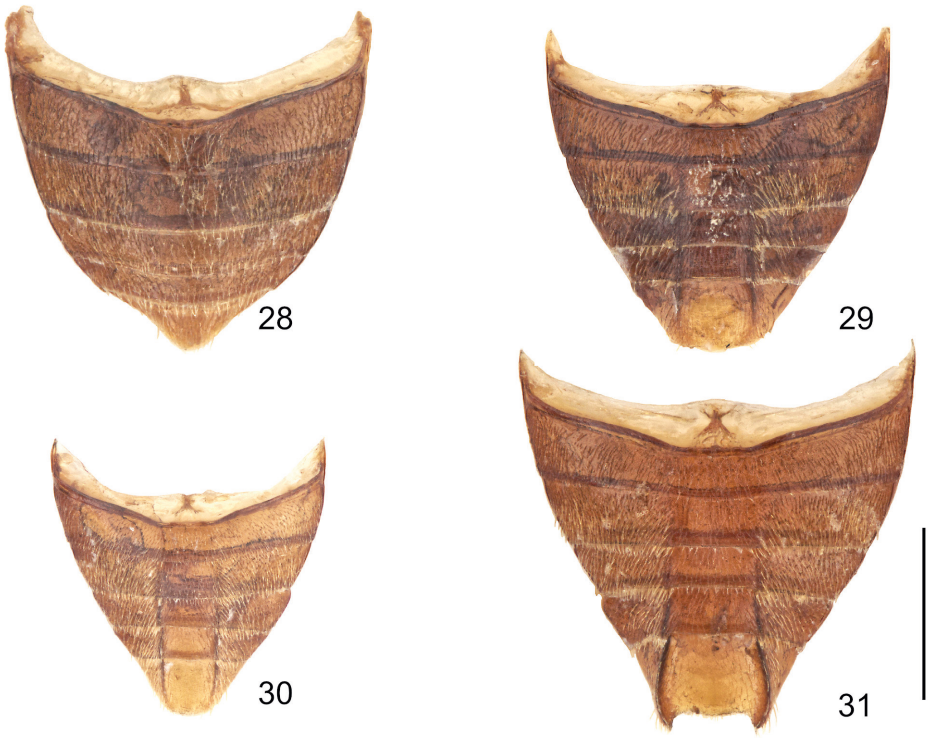
**Etymology:** This species is named according to its insular geographical distribution.

**Description:** Length: 1.45-1.62 mm; width: 0.75-0.88 mm; thickness: 0.64-0.73 mm.

Body (Figs 7-9) oval, slightly more elongated posteriorly than anteriorly, 1.9 times longer than wide, body widest at middle. Body reddish or dark brown with exception of tarsi and two basal antennomeres, sometimes slightly lighter. Pubescence short, sparse and yellowish. Dorsal and ventral surface uniformly slightly shining.

Head with uniform sparse setiferous punctation and uniform weak transverse reticulation. Antennae (Fig. 21) with distinct club; relative length of antennomeres: 8-9-3-2-2-2-3-3-3-6-10; antennomere 1 twice as long as wide, 2 three times longer than wide, 3 to 8 and 10 almost as long as wide, 9 and 11 twice longer than wide. Distal article of the maxillary palpi long, almost twice as long as wide with largely rounded internal margin; penultimate article slightly longer than wide with internal margin rounded.

Pronotum ca. 0.45 times as long as wide, widest at base; whole surface with uniform microsculpture, punctation less distinct than transverse microreticulation, very fine and sparse. Elytra 1.5 times longer than wide, widest at anterior third; elytral surface more shining at apex than basis: punctation fine at base becoming stronger and rougher apically, and microreticulation stronger at base becoming weaker until tip of elytra; elytra regularly elongated in posterior third. Metaventrite with weak reticulation and extremely fine punctation, more pubescent antero-laterally. Length of both metatarsal spurs slightly unequal, longer 0.8 times as long as metatarsomere 1; length of metatarsomeres 2 and 4




Figs 28-31. Male abdomen of *Lederina*. (28) *L. armadillo*. (29) *L. formosa*. (30) *L. insula*. (31) *L. smetanai*. Scale bar = 0.5 mm.

comparable, ca. 4.4 x shorter than 1, 3 slightly shorter than 2 and 4.
Abdominal surface densely pubescent, shining, microreticulation lacking or very fine.
*Males*: Metaventrite with extended pubescence and strong punctation in anterior quarter, and a row of hairs surrounding the metaventral depression. Metaventral depression large, almost 3 times longer than wide, rounded anteriorly and narrowed posteriad, reaching anterior quarter of metaventrite, lateral margins straight to slightly rounded and well edged; central area deep, bearing dense pubescence. Protarsi and mesotarsi weakly dilated. Abdomen (Fig. 30) with medial depression; sternites 1 and 2 flattened and slightly depressed posteriorly, 3 with flat depression, 4 with slightly deeper depression, 5 with deep depression and rounded apical margin; depression sides edged from posterior part of sternite 2 to apex of 5, straight to slightly convergent posteriad. Aedeagus (Fig. 34), 0.76 mm long, phallobase 0.52 mm and median lobe 0.24 mm long; parameres parallel at basis, convergent in apical third, shorter than median lobe and apposed to it; junction of phallobase with parameres and median lobe widened.
*Female*: Metaventrite with flat central area sparsely but distinctly punctured and pubescent, slightly depressed posteriorly and edged in posterior quarter; whole length of structure as long as metaventral depression of males. Protarsi and mesotarsi not dilated at all. Abdomen evenly convex, lacking medial depression.

**Distribution and natural history:** This species is known from the southern and central counties of Pingtung and Taichung, Taiwan. The individuals were caught by sifting floor litter (fallen leaves, humus, twigs, and various debris) in original evergreen broadleaved forests intermixed with conifers at elevations ranging from 2125 to 2325 meters a.s.l.

**Comments:** Some females of *L. insula* are similar to small specimens of *L. smetanai* or *L. formosa* and cannot always be distinguished from them. However, males of *L. insula* are well characterized by their abdominal depression. This species seems to be related to *L. formosa* and *L. smetanai* and most of the Japanese *Lederina* by its abdominal depression and the features of the aedeagus, on which parameres are apposed to the median lobe.

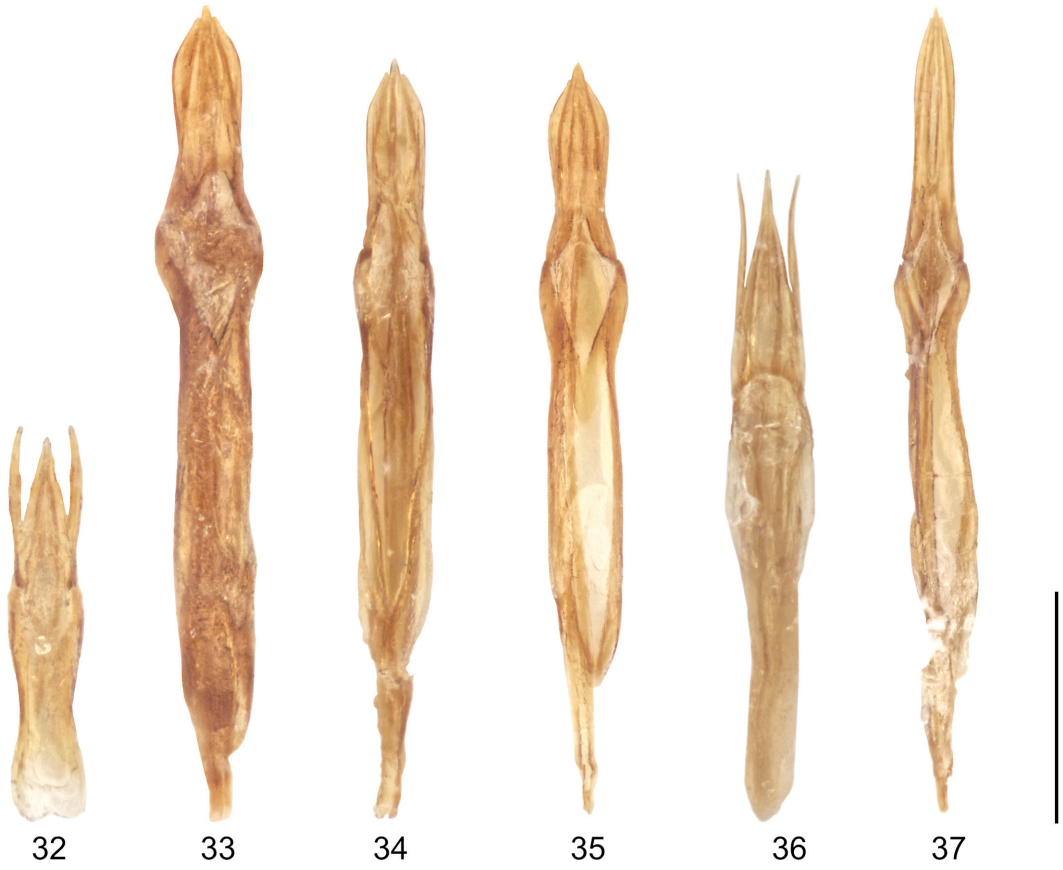
### *Lederina smetanai* sp. nov.
Figs 10-12, 22, 26, 31, 35

**Type material**
*Holotype*: MHNG-ENTO-0097440; 1♂; TAIWAN, Nantou Hsien, Nenkaoshan, 2.5 km SW Tenchi Hut, 2720 m, 6.V.1992, A. Smetana (T115) [original *Abies* forest with dense bamboo undergrowth, sift rotting wood and bark, moss and other debris mostly along bases of huge standing *Abies* trees].

*Paratypes* (93): MHNG; 1♂ and 6♀; same data as holotype. – MHNG; 1♂ and 7♀; TAIWAN, Nantou Hsien, Houhuanshan, Kuenyang, 3050 m, 29.IV.1990, A. Smetana (T30). – MHNG; 1♂ and 2♀; TAIWAN, Nantou Hsien, Yushan National Park, 2 km W Pai-Yun Hut, 3350 m, 16.V.1991, A. Smetana (T84) [original *Abies* forest with dense bamboo undergrowth, sift rotting wood, floor debris and vegetation along large rotting trees]. – MHNG; 1♂ and 3♀; TAIWAN, Nantou Hsien, Houhanshan, Kuenyang, 3050 m, 4.V.1991, A. Smetana (T63). – MHNG; 1♂ and 1♀; TAIWAN, Nantou Hsien, Houhuanshan, Kuenyang, 3050 m, 27.IV.1990, A. Smetana (T29) [*Abies kawakamii* forest with bamboo, sift various debris, fallen leaves and moss along a small creek, all rather wet]. – MHNG; 4♂ and 7♀; TAIWAN, Nantou Hsien, Houhuanshan, 3100 m, 20.IV.1990, A. Smetana (T12). – MHNG; 2♀; TAIWAN, Nantou Hsien, Yushan National Park, Mun-Li Cliff, 2700 m, 13.V.1991, A. Smetana (T79) [original coniferous forest with intermixed broadleaved trees, one of the best forests I have seen in Taiwan (unfortunately only a small remnant), sift moss, old vegetation on forest floor, on large rocks, also debris (bark and wood) around old standing trees]. – MHNG; 4♀; TAIWAN, Nantou Hsien, Yushan National Park, 1.8 km W Pai-Yun Hut, 3375 m, 17.V.1991, A. Smetana (T85) [original *Abies* forest with dense bamboo undergrowth, sift broken (splintered) wood, bark, moss and other debris (dead bamboo) along a huge fallen tree (small clearing in the forest created by the fall down of the tree). – MHNG; 1♀; TAIWAN, Nantou Hsien, Nenkaoshan, Tenchi Hut, 2900 m, 5.V.1992, A. Smetana (T114) [original *Abies* forest with dense bamboo undergrowth, sift moss, grasses and various debris along fallen trees and under groups of broadleaved bushes]. – MHNG; 3♀; TAIWAN, Nantou Hsien, Meifeng, 2130 m, 3.V.1991, A. Smetana (T62) [original evergreen broadleaved forest, sift lush vegetation and debris and humus among it along a forest road]. – MHNG; 2♂ and 1♀; TAIWAN, Chiai Hsien, Yushan N. P., Mun-Li Cliff, 2700 m, 27.IV.1990, A. Smetana (T28). – MHNG; 2♂ and 1♀; TAIWAN, Hualien Hsien, Taroko N. P., Nanhushi Hut, 2700 m, 11.V.1990, A. Smetana (T52) [old primary, mostly coniferous forest, sift various debris, rotting bark and wood, fallen leaves along huge, rotting fallen tree]. – MHNG; 3♂ and 2♀; TAIWAN, Kaohsiung Hsien, Kuanshan trail, above Kaunshanchi Riv., 2650 m, 21.V.1992, A. Smetana (T95). – MHNG; 2♂ and 5♀; TAIWAN, Kaohsiung Hsien, Kuanshan, Kuhanoshing Hut, 3020 m, 18.IV.1992, A. Smetana (T92). – MHNG; 2♂; TAIWAN, Kaohsiung Hsien, Kuanshan Trail at Kaunshanshi River, 2400 m, 20.IV.1992, A. Smetana (T94) [sift humus, moss and old dead vegetation under dense bushes along the Kaunshanchi river]. – MHNG; 3♂ and 3♀; TAIWAN, Kaohsiung Hsien, Kuanshan, Kuhanoshing Hut, 2950 m, 18.IV.1992, A. Smetana (T93) [original *Abies* forest, dark, sift forest floor litter (mainly old needles and

rotting twigs) along fallen trees]. – MHNG; 1♂ and 2♀; TAIWAN, Kaohsiung Hsien, Kuanshan trail, above Kaunshanchi Riv., 2550 m, 21.IV.1992, A. Smetana (T96). – MHNG; 1♂ and 1♀; TAIWAN, Kaohsiung Hsien, Tengchih, 1580 m, 24.IV.1990, A. Smetana (T19) [sift debris and humus along base of a stone wall in forest clearing (houses)]. – MHNG; 2♂ and 3♀; TAIWAN, Pingtung Hsien, Peitawushan, Kuai-Ku Hut, 2130 m, 27.IV.1992, A. Smetana (T101) [original broadleaved evergreen forest with intermixed conifers here and there, sift fallen leaves and other forest floor debris in shady, rather dark part of the forest]. – MHNG; 2♂ and 2♀; TAIWAN, Pingtung Hsien, Peitawushan Ridge, 2800-2910 m, 28.IV.1992, A. Smetana (T105) [main ridge of Peitawushan, open *Abies* forest with rhododendron and juniper undergrowth, sift debris and fallen leaves under the undergrowth, relatively dry]. – MHNG; 1♀; TAIWAN, Pingtung Hsien, Peitawushan, Kuai-Ku Hut, 2120 m, 27.IV.1992, A. Smetana (T104). – MHNG; 1♂ and 1♀; TAIWAN, Taichung Hsien, Hsuehshan, above Shan-Liu-Gieu Hut, 3200 m, 8.V.1991, A. Smetana (T72) [original coniferous forest, sift moss, humus and other debris under undergrowth bushes and also some debris along fallen trees]. – MHNG; 1♂ and 2♀; TAIWAN, Taichung Hsien, Anmashan, 2230 m, 1.V.1990, A. Smetana (T33) [original broadleaved evergreen forest with plenty of large, rotting fallen trees, sift humus, various debris and humus, mostly around bases of large trees and in small gullies of forest floor]. – MHNG; 1♂; TAIWAN, Taichung Hsien, Hsuehshan, near Hsuehshan-Tun-Feng, 3170 m, 7.V.1991, A. Smetana (T68). – MHNG; 1♀; TAIWAN, Taichung Hsien, Anmashan, 2225 m, 3.V.1990, A. Smetana (T42) [small clearing in an original broadleaved evergreen forest with many huge trees, sift debris and fallen leaves along large rotting fallen trees].

*Additional material* (22): MHNG; 6♀; TAIWAN, Kaohsiung Hsien, Kuanshan trail, above Kaunshanchi Riv., 2650 m, 21.V.1992, A. Smetana (T95). – MHNG; 2♀; TAIWAN, Kaohsiung Hsien, Kuanshan, Kuhanoshing Hut, 3020 m, 18.IV.1992, A. Smetana (T92). – MHNG; 1♀; TAIWAN, Kaohsiung Hsien, Kuanshan, Kuhanoshing Hut, 2950 m, 18.IV.1992, A. Smetana (T93) [original *Abies* forest, dark, sift forest floor litter (mainly old needles and rotting twigs) along fallen trees]. – MHNG; 1♀; TAIWAN, Kaohsiung Hsien, Tengchih, 1565 m, 23.IV.1990, A. Smetana (T18). – MHNG; 1♀; TAIWAN, Nantou Hsien, Houhuanshan, Kuenyang, 3050 m, 4.V.1991, A. Smetana (T64) [original *Abies kawakamii* forest with dense bamboo




Figs 32-37. Aedeagus of *Lederina*. (32) *L. armadillo*. (33) *L. formosa*. (34) *L. insula*. (35) *L. smetanai*. (36) *L. viti*. (37) *L. yushanensis*. Scale bar = 0.5 mm (32-36) and 1 mm (37).

undergrowth, sift piles of cut mouldy bamboo]. – MHNG; 1♀; TAIWAN, Nantou Hsien, Meifeng, 2130 m, 12.V.1991, A. Smetana (T78) [original evergreen broadleaved, sift moss and humus underneath, on large, rotting fallen trees]. – MHNG; 3♀; TAIWAN, Pingtung Hsien, Peitawushan Trail, 1500 m, 1.V.1992, A. Smetana (T110) [old broadleaved evergreen, almost subtropical, sift vegetation, fallen leaves and other debris among it on moist spots along the forest trail, this forest reminds me actually of the forest just above the headquarters of the Mt. Kinabalu National Park in Borneo]. – MHNG; 3♀; TAIWAN, Pingtung Hsien, Peitawushan, Kuai-Ku Hut, 2125 m, 27.IV.1992, A. Smetana (T102) [original broadleaved evergreen forest with intermixed conifers here and there, sift vegetation mixed with fallen leaves and other debris]. – MHNG; 1♀; TAIWAN, Pingtung Hsien, Peitawushan, Kuai-Ku Hut, 2136 m, 30.IV.1992, A. Smetana (T108) [original broadleaved evergreen forest with intermixed conifers here and there, sift vegetation, fallen leaves and other debris among it on moist spots along the forest trail]. – MHNG; 1♀; TAIWAN, Taichung Hsien, Hsuehshan, above Shan-Liu-Gieu Hut, 3150 m, 8.V.1991, A. Smetana (T71) [original coniferous forest, sift mouldy pieces of bark, wood and other debris at bases of trees]. – MHNG; 2♀; TAIWAN, Taichung Hsien, Anmashan, 2225 m, 2.V.1990, A. Smetana (T38) [small clearing in an original broadleaved evergreen forest with many huge trees, sift rotten, moldy branches and twigs, various debris and fallen leaves around bases of big standing trees].

**Diagnosis:** This species can be distinguished from all the other Taiwanese species (except *L. yushanensis*, which is larger and more elongate) by the elytra bearing a rugose punctation, the elongate shape and the distinctly shorter metatarsal spurs compared to metatarsomere 1. The males can be easily identified and separated at once from all the other *Lederina* by the combination of the strongly divergent edges of the abdominal medial depression, their dentiform prolongation, the large and deep metaventral depression, and the straight metatarsomere 1.

**Etymology:** This species is named after Aleš Smetana, who collected most of the specimens studied in this work. Also, his detailed notes added greatly to the knowledge about the microhabitats of the species described herein.

**Description:** Length: 1.70-2.50 mm; width: 0.90-1.30 mm; thickness: 0.78-1.10 mm.
Body (Figs 10-12) oval, elongated anteriorly and posteriorly, 1.85 times longer than wide, widest slightly before middle. Elytra reddish with dark brown poorly delimited transverse zone between middle and last third of elytra; pronotum dark brown with more or less large reddish margins; head, maxillary palpi, hind legs, and femora reddish, rest of the legs reddish to yellow; antennae reddish, antennomere 11 clearer apically; pubescence yellowish. Dorsal and ventral surface dull.
Head dull as rest of dorsal surface; setiferous punctation fine posteriorly and slightly coarser anteriorly; transverse reticulation weak but dense. Antennae (Fig. 22) with distinct club, formed by elongated articles; antennomeres relative length: 9-10-6-4-4-3-4-4-8-8-11; antennomere 1 two third as long as wide, 2, 4, 5 and 6 twice as long as wide, 3 three times longer than wide, 7 and 8 almost as long as wide, 9, 10 and 11 ca. 1.5 x wider than long. Distal segment of maxillary palpi wide, 1.4 times longer than wide with sub-angular internal margin; penultimate segment as long as wide with rounded internal margin.
Pronotum ca. 0.37 as long as wide, widest at base; punctation and reticulation very fine. Elytra 1.57 times longer than wide, widest in first third; punctation not very marked but slightly rough, contrasting with pronotum microsculpture; apex of elytra elongated. Metaventrite entirely microreticulated and therefore not particularly shining, more punctured and pubescent antero-laterally. Metatarsal spurs slightly unequal in length, longer spur 0.8 as long as metatarsomere 1; 2 and 4 equal in length, 3.8 times shorter than 1 and slightly longer than 3.
Abdominal surface pubescent, shining, and covered with very fine microreticulation.
*Male*: Metaventrite around metaventral depression strongly punctured, and pubescent on its anterior two thirds. Metaventral depression (Fig. 26) 2.5 as long as wide, widest between middle and anterior third, more narrowing posteriad than anteriorly, reaching anterior quarter of the metaventrite; sides sub-parallel to slightly rounded and well edged; inner area deep, bearing dense pubescence. Protarsi and mesotarsi dilated. Abdomen (Fig. 31) with distinct medial depression; sternite 1 flattened, 2 anteriorly flattened and posteriorly slightly depressed, 3 distinctly depressed, 4 depressed with divergent edges projected posteriorly as little teeth, 5 with deep spherical and almost hairless depression, sides strongly edged forming dentiform projections exceeding apical margin of abdomen. Aedeagus (Fig. 35) big, 1.1 mm long; phallobase ca. ¾ of total length of aedeagus; parameres parallel in first half of their length and strongly convergent apically, apposed to median lobe; median lobe sharpened at apex and longer than parameres; insertion zone of parameres and median lobe in phallobase widened.
*Female*: Metaventrite with a flat to slightly depressed, shining, and pubescent medial area. Metaventral depression well delimited posteriad, with distinct edges and strongly pubescent inner area, but diffuse anteriorly, reaching first quarter of metaventrite. Protarsi and mesotarsi not dilated. Abdomen uniformly convex, lacking medial depression.

**Distribution and natural history:** This species is recorded from Taiwan in the central and southern counties of Nantou, Chiai, Hualien, Kaohsiung,

Pingtung, and Taichung. The specimens were collected by sifting floor litter debris (rotting wood and bark, fallen leaves, moss, grasses, needles, twigs, humus) in various coniferous or evergreen broadleaved forests, sometimes with bamboo or (more rarely) rhododendron and junipers undergrowth at elevations ranging from 1500 to 3375 meters a.s.l., but mostly above 2000 m.

**Comments:** This species shows a wide size range, and coloration variation, with a few individuals lighter and others uniformly dark. Further, it is not always possible to identify females of *L. smetanai*: the larger females can barely be distinguished from *L. yushanensis*, while small and shining females look like *L. insulae*. Still, *L. smetanai* is well characterized and easy to identify by the abdominal projections of the males, which are usually well developed but can be reduced in some rare cases. The combination of features of the aedeagus and of the abdomen suggests that this species is closely related to *L. formosa*, *L. insula*, *L. koreana*, *L. yushanensis*, *L. mozolevskayae* and the Japanese *Lederina*.

### *Lederina viti* sp. nov.

Figs 13-15, 23, 27, 36

**Type material**

*Holotype*: MHNG-ENTO-0097441; 1♂; TAIWAN merid., Taitung Co., bfr. Wulu, Rd. no. 2.0, km. 184, 10.IV.2007, leg. S. Vit; mount. frst. litter (alt. ± 600 m).
*Paratype* (1): MHNG-ENTO-0097442; 1♀; same data as holotype.

**Diagnosis:** *Lederina viti* is the only Taiwanese *Lederina* species having a metatarsal spur almost as long as metatarsomere 1. It differs from the Vietnamese *L. kaszai* and *L. topali* by the presence of a metaventral depression and from the Indian *L. indica*, the Vietnamese *L. minima*, and the Nepalese *L. similis* by the very narrow shape of the metaventral depression.

**Etymology:** This species is dedicated to Stanislas Vit, who collected the two specimens known.

**Description:** Length: 1.25 mm; width: 0.68 mm; thickness: 0.52 mm.
Body (Figs 13-15) oval, equally rounded anteriorly and posteriorly, 1.7 times longer than wide, body widest approximately at middle. All body reddish, with darker pronotum basis; legs, maxillary palpi, apex of antennae yellowish, and pubescence yellowish. Dorsal and ventral surface uniformly shining.
Head with fine setiferous punctation, slightly coarser and rougher anteriorly; transverse microreticulation distinct. Antennae (Fig. 23) short and partially formed of transverse antennomeres; antennal club very distinct; relative length of the antennomeres: 6-6-2-2-2-1-1-1-4-4-8; antennomeres 1, 2 and 4 twice as long as wide, 3 and 5 as long as wide, 6, 7 and 8 transverse, 9 and 10 as long as wide and 11 twice as long as wide. Distal article of maxillary palpi 0.6 times as long as wide, internal margin regularly rounded; penultimate article slightly longer than wide.
Pronotum 0.36 times as long as wide, widest at base; microreticulation formed of large transverse meshes clearly visible anteriorly; punctation very fine; lateral margins sinuated posteriorly. Elytra 1.5 times longer than wide, widest at anterior third; punctation fine basally, stronger and rougher apically; whole surface covered by very fine microreticulation. Metaventrite slightly pubescent, uniformly shining, very finely punctured, and microreticulated; anterior half of central area of metaventrite convex, without microreticulation, distinctly punctured, and pubescent. Both metatarsal spurs almost equal in length; longer almost as long as metatarsomere 1; length of metatarsomeres 2, 3 and 4 comparable, four times shorter than 1.
Abdomen evenly convex, lacking medial depression; shining, slightly punctured, without any trace of microsculpture; sparsely pubescent.
*Male*: Metaventral depression (Fig. 27) very elongated and narrow, 8 times longer than wide; anterior margin exceeding slightly middle of metaventrite; inner area deep and glabrous; sides well edged. Protarsi and mesotarsi strongly dilated, very pubescent on ventral surface. Aedeagus (Fig. 36) very elongated, 0.76 mm long, phallobase 0.51 mm long, parameres 0.25 mm long; parameres filiform and slightly divergent, as long as median lobe; median lobe regularly narrowing.
*Female*: Metaventral depression extremely narrow, more than in males, less distinctly edged. Protarsi and mesotarsi not dilated.

**Distribution and natural history:** This species was only recorded from a single locality in Taitung County, in southern Taiwan. The two specimens known were caught by sifting mountain forest litter at an elevation of 600 m.

**Comments:** This species can be easily distinguished from the other Taiwanese *Lederina* by the length ratio between metatarsomere 1 and metatarsal spurs (>0.9) and by its very narrow metaventral depression. These two features suggest that *L. viti* is more closely related to the Vietnamese and Indian *Lederina* than to its Taiwanese congeners.

### *Lederina yushanensis* sp. nov.

Figs 16-18, 24, 37

**Type material**

*Holotype*: MHNG-ENTO-0097443; 1 ♂; TAIWAN, Taichung Hsien, Anmashan, 2225 m, 2.V.1990, A. Smetana (T37) [small clearing in an original broadleaved evergreen forest with many huge trees, sift layer of still green leaves and small twigs under a fallen broadleaved tree, very rich].

*Paratypes* (4): MHNG; 3 ♂ and 1 ♀; same data as holotype.

**Diagnosis:** This species is larger than any other *Lederina* of Taiwan and has a very elongated shape posteriorly. *Lederina yushanensis* is highly similar to large individuals of *L. smetanai* but the males can be easily distinguished by their abdomen lacking a medial depression. The combination of the large size, the elongate shape, the deep and large metaventral depression, and the evenly convex abdomen allows distinguishing *L. yushanensis* from all other *Lederina* species.

**Etymology:** This large species is named after the highest mountain of Taiwan, Yu Shan.

**Description:** Length: 2.20-2.60 mm; width: 1.10-1.30 mm; thickness: 0.90-1.32 mm.
Body (Figs 16-18) oval, elongated anteriorly and particularly posteriorly, almost twice as long as wide, body widest approximately at midlength. Elytra reddish with a dark brown transverse patch between middle and posterior third, apex reddish; pronotum dark brownish with anterior margin widely reddish, basal and lateral margins finely reddish or dark; legs, maxillary palpi, and antennae brownish to yellowish; pubescence yellowish. Dorsal and ventral surface dull. Head with very fine setiferous punctation, slightly coarser anteriorly; very fine transversal microreticulation. Antennae (Fig. 24) formed by elongate antennomeres; antennal club distinct; relative length of antennomeres: 9-10-6-4-4-3-4-4-8-8-11; antennomeres 1 and 2 two third as long as wide, 3, 4 and 5 twice as long as wide, 6, 7 and 8 as long as wide, 9 and 10 1.4 times longer than wide and 11 1.6 times longer than wide. Distal article of the maxillary palpi 1.3 times longer than wide, sub-angular internal margin; penultimate article as long as wide with regularly rounded internal margin.
Pronotum ca. 0.4 times as long as wide, widest at base; punctation and reticulation very sparse and weak. Elytra 1.6 times longer than wide, widest in the first third or quarter, stretched posteriorly; punctation weakly rough in the middle, weaker and sparser at base and apex, apex slightly shining. Metaventrite completely microreticulated, stronger punctured and pubescent laterally. Metatarsal spurs slightly unequal in length; longer 0.7 times as long as metatarsomere 1; relative length of metatarsomeres: 50-13-10-11.
Abdomen evenly convex, lacking medial depression; whole surface covered with pubescence and transverse microreticulation.
*Male*: Metaventrite pubescent and punctured around metaventral depression, with exception of very posterior part. Metaventral depression 3.6 times longer than wide, narrowing progressively posteriad and abruptly anteriorly, reaching anterior quarter of metaventrite; sub-parallel well edged sides; inner area deep, bearing a dense pubescence. Protarsi and mesotarsi dilated. Aedeagus (Fig. 37) very long, 1.4 to 1.7 mm long; phallobase ca. $^2/_3$ of aedeagus total length; parameres weakly sinuated basally and convergent on apical third, apposed to the median lobe; median lobe regularly narrowing and longer than parameres; insertion zone of parameres and median lobe in phallobase widened.
*Female*: Metaventrite with a central shining, flat, and slightly pubescent anterior half. Metaventral depression well delimited posteriorly, with distinct lateral edges, a central edge and two lines of yellow hairs, vanishing

**Key to the Taiwanese species of *Lederina*:**

1A Longer metatarsal spur almost as long as metatarsomere 1 (>0.9) ..... ***L. viti*** sp. nov.
1B Longer metatarsal spur distinctly shorter than metatarsomere 1 (0.7 to 0.85) ..... 2
2A Elytra broadly rounded posteriorly, whole body hemispherical (Fig. 2) or well rounded (Fig. 5) in lateral view; whole elytral surface covered with homogenous transverse microreticulation and very finely punctured ..... 3
2B Elytra elongated apically (Figs 8, 11, 17); punctation strong or rough on elytral disc or apex ..... 4
3A Body completely brown (Fig. 1); antennomeres 6 to 8 transverse (Fig. 19); males with evenly convex abdominal sternites (Fig. 28) ..... ***L. armadillo*** sp. nov.
3B Body brown, with a reddish scutellar patch (Fig. 4); antennomeres 6-8 elongate (Fig. 20); males with distinct medial depression on abdominal sternites (Fig. 29) ..... ***L. formosa*** sp. nov.
4A Small species (<1.7 mm); elytral base with transverse microreticulation, apex more shining and strongly punctured; body usually unicolorous (Fig. 7); abdomen of the males with medial ventral depression; last abdominal sternite regularly rounded apically (Fig. 30) ..... ***L. insula*** sp. nov
4B Larger species (>1.7 mm); elytra completely microreticulated and dull, punctation rougher; body usually brownish with posterior margin of the pronotum and scutellar elytra areas reddish (Figs 10, 16) ..... 5
5A Abdomen of males medially depressed; apical sternite with edges extended in dentiform prolongations posteriorly (Fig. 31); parameres rounded laterally (Fig. 35) ..... ***L. smetanai*** sp. nov.
5B Abdomen of males not depressed medially; apical abdominal sternite evenly rounded posteriorly, without dentiform prolongations; parameres straight (Fig. 37) ..... ***L. yushanensis*** sp. nov.

in middle of metaventrite. Protarsi and mesotarsi not dilated.

**Distribution and natural history:** This species is known from a single locality in central Taiwan in Taichung County, at an elevation of 2225 m, where it was collected by sifting soil litter (still green leaves and small twigs) under a fallen broadleaved tree in a small clearing in an original broadleaved evergreen forest with many huge trees.

**Comments:** This species is easy to identify by its size, its elongated shape, and for the males by their evenly convex abdomen and the aedeagus form. However, females strongly resemble large *L. smetanai* and cannot always be unambiguously identified. Features of the aedeagus of *L. yushanensis* suggest that it is closely related to *L. formosa*, *L. insula*, *L. smetanai*, *L. mozolevskayae* and the Japanese *Lederina*.

## DISCUSSION

The first six Taiwanese species of *Lederina* are described in the present study. This work significantly increases the species richness of this poorly studied genus by raising the global species number from 18 to 24.

All the Taiwanese species are apparently endemic of this island. Most of them (*L. armadillo*, *L. formosa*, *L. insula*, *L. smetanai*, and *L. yushanensis*) seem to be related to the Japanese and Korean *Lederina* fauna by having a distinctly shorter metatarsal spur than the first metatarsal tarsomere and by three of the species (*L. formosa*, *L. insula*, and *L. smetanai*) in which males have a medially depressed abdomen. Moreover, the aedeagus of *L. formosa*, *L. insula*, *L. smetanai*, and *L. yushanensis* have parameres apposed to the median lobe like in many Japanese species and in *L. mozolevskayae* from Yunnan, China (Nikitsky, 2001). It seems that the deep and large metaventral depression of the males is characteristic of the Taiwanese *Lederina*, except for *L. viti* in which this depression is very narrow. This last species also has the longer metatarsal spur almost as long as the first metatarsomere like the Indian, the Nepalese and the Vietnamese *Lederina*.

Most of the *Lederina* presented in this work are alpine species captured between 1400 m and 3375 meters a.s.l. Indeed, the material housed in the Muséum d'histoire naturelle of Geneva originates mostly from higher elevations of Taiwan, while the lowlands of the island are much less represented. It is probable that other *Lederina* species will be discovered in Taiwan, particularly in its lowland, but also generally in eastern Asia.

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