

Research article

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(Coleoptera: Passalidae) from Vietnam,
with the first record of *L. loebli* Kon, Johki & Araya, 2003****Phu Van Pham^{1,*}, Masahiro Kon², Nhi Thi Pham³, Nga Quynh Thi Cao⁴ & Tru Hoang Vu⁵**^{1,3,4,5} *Institute of Ecology and Biological Resources, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet,
Cau Giay, Hanoi, Vietnam*² *Pressance Kyodai-Higashi 406, 116-3 Nishida-cho, Jodoji, Sakyo, Kyoto, 606-8417 Japan*^{*} *Corresponding author: Email: phupham.iebr@gmail.com*¹ [urn:lsid:zoobank.org:author:09B6F968-3B83-4052-89A1-1DB2D91933CF](https://zoobank.org/author:09B6F968-3B83-4052-89A1-1DB2D91933CF)² [urn:lsid:zoobank.org:author:A8D964E1-7B15-4C7B-BF63-555FD9FD966B](https://zoobank.org/author:A8D964E1-7B15-4C7B-BF63-555FD9FD966B)³ [urn:lsid:zoobank.org:author:34BE7CCE-9EE5-4F5E-A432-4467BA0101D4](https://zoobank.org/author:34BE7CCE-9EE5-4F5E-A432-4467BA0101D4)⁴ [urn:lsid:zoobank.org:author:97296616-B2E7-4108-88C0-4B2C2E92C5BB](https://zoobank.org/author:97296616-B2E7-4108-88C0-4B2C2E92C5BB)⁵ [urn:lsid:zoobank.org:author:9F907485-D2A5-44A3-8BB1-55B74DBCF5FB](https://zoobank.org/author:9F907485-D2A5-44A3-8BB1-55B74DBCF5FB)

Abstract. This overview of the passalid genus *Leptaulax* Kaup, 1868 in Vietnam is based on literature and examined specimens. A total of six species is recorded, of which *Leptaulax loebli* Kon, Johki & Araya, 2003 is recorded for the first time for the fauna of Vietnam. An identification key to all Vietnamese *Leptaulax* species is provided.

Keywords. Genus *Leptaulax*, new record, Vietnam.

INTRODUCTION

The genus *Leptaulax* Kaup, 1868 was established based on the type species *Passalus dentatus* Fabricius, 1792 and placed in the subfamily Passalinae. According to present literature, ca. 70 species have been recorded in this genus. Most of them occur in the Oriental region, relatively few species are known from the Australian and Palaearctic regions (Gravely 1918; Hincks & Dibb 1935; Boucher 2006; Iwase 1995, 1996a, 1996b, 1998a, 1998b, 1998c; Johki & Kon 2003; Johki et al. 2003; Kon et al. 2003; Kon & Bezdek 2016; Kon et al. 2017).

In Vietnam, the genus *Leptaulax* was first reported by Kuwert (1891) when the author described *L. saigonius* from Saigon (Ho Chi Minh City). After more than 20 years, Gravely (1914), who studied Oriental passalids based on the collection at the Indian Museum (Kolkata), synonymized *L. saigonius* with *L. dentatus* and added two species, *L. bicolor* and *L. cyclotaenius* for Vietnam's fauna. Iwase (1998) described *L. pacholatkoii* based on material collected from Lang Biang Mountain, Da Lat, Lam Dong Province (Vietnam). Recently, Kon et al. (2017) described *L. niisatoi* collected from Phia Oac–Phia Den National Park in 1992 in Northern Vietnam

and this species is currently known only from the type locality. Based on the passalid collections at the Museum für Naturkunde Berlin (MfN) and the Institute of Ecology and Biological Resources (IEBR), we provide an overview on this genus for the first time and record a further species, *L. loebli* Kon, Johki & Araya, 2003, as new for Vietnam. An identification key to *Leptaulax* species recorded so far from Vietnam is provided.

MATERIAL AND METHODS

The specimens in this study were collected by light trap and by hand collecting. Male genitalia were extracted and then cleaned in 10% KOH for 24 hours. After cleaning, they were glued to pinned cards. The photographs of morphological details of the species were taken with a Nikon DS-Fi3 camera attached to a Nikon SMZ800N stereomicroscope (Fig. 1A–T) and a Canon 700D combined with Sigma 100 mm macro lens (Fig. 1U–Y). Afterwards, images were stacked with Combine ZP and subsequently edited (Photoshop ver. CS6).

We follow Gravely (1914) and Neumann et al. (2013) for the terms used in the key and diagnoses.

RESULTS

Genus *Leptaulax* Kaup, 1868

Leptaulax Kaup, 1868: 11.

Type species (by original designation): *Passalus dentatus* Fabricius, 1792.

Key to *Leptaulax* species of Vietnam

1. The 5th visible abdominal sternite emarginated at posterior margin (Fig. 1J) 2
 - The 5th visible abdominal sternite not emarginated at posterior margin (Fig. 1G-I) 3
2. Pronotum strongly and densely punctate in lateral portion; lateral striae of elytron with large punctates *L. niisatoi* Kon, Johki & Pham, 2017
 - Pronotum weakly and sparsely punctate in lateral portion (Fig. 1S); lateral striae of elytron finely punctate *L. pacholatkoii* Iwase, 1998
3. Last abdominal sternite widely hairy (Fig. 1H); pronotum with few punctures (Fig. 1R); anterior lower tooth bidentate
 - *L. loebli* Kon, Johki & Araya, 2003
 - Last abdominal sternite hairless or rugose (Fig. 1G, I); pronotum with a few punctures on lateral portion (Fig. 1Q, T); anterior lower tooth simple 4
4. Lateral striae of elytron with normal, more or less rounded punctures (Fig. 1L)
 - *L. bicolor* (Fabricius, 1801)
 - Lateral striae of elytron with more or less scalariform punctures (Fig. 1K) 5
5. Mesosternum with very obvious, strong punctures, metasternum with irregular punctures in the middle (Fig. 1M); hypostomal process with distinct longitudinal groove on ventral surface
 - *L. cyclotaenius* Kuwert, 1891
 - Mesosternum and metasternum glabrous, without punctures (Fig. 1O); hypostomal process without distinct groove on ventral surface
 - *L. dentatus* (Fabricius, 1792)

Leptaulax bicolor (Fabricius, 1801)

(Fig. 1A–C, I, L, T, Y)

Passalus bicolor Fabricius, 1801: 256.

Leptaulax bicolor Kaup, 1868: 14.

Type specimens in the Copenhagen Museum (Arrow 1910).

Diagnosis. Parietal ridge extending to supraorbital ridge, anterior marginal groove of pronotum more pronounced and broader in dorsal view, always with many large, distinct punctures; lateral margin with strong punctures, particularly in the anterior portion very closely lined up in pairs; hypostomal process without longitudinal groove on ventral surface; male genitalia moderately

robust, basal piece longer than parameres in ventral view, paramere projected straightly.

Material examined. 1 ♂, 1 ♀ (IEBR), Bac Kan Province, Ba Be National Park, light trap, 8.v.2014, H.T. Pham leg. – 1 ♂, 1 ♀ (IEBR), Cao Bang Province, Phia Oac-Phia Den National Park, light trap, 11.v.2011, 1160 m a.s.l., V.T. Hoang leg. – 1 ♂ (IEBR) Cao Bang Province, Phia Oac-Phia Den National Park, light trap, 7.v.2013, V.T. Hoang leg. – 1 ♂ (IEBR) Hoa Binh Province, Hang Kia–Pa Co Nature Reserve, light trap, 19–28.vi.2002, 1100–1200 m a.s.l. – 5 ♂♂, 4 ♀♀ (MfN), Tonkin, Montes-Mauson (Lang Son Province, Mau Son mountain), April–May, 2–3000 ft, H. Fruhstorfer leg.

Distribution. Australia, Cambodia, Eastern Himalayas, India, Indonesia (Borneo, Java, Moluccas, Sulawesi, Sumatra), Laos, Malaysia, Myanmar, New Guinea, Philippines, Sri Lanka, Thailand (Kon et al. 2001; Neumann et al. 2013) and Vietnam (Lang Son,) (Gravely 1914). This species is recorded from Bac Kan, Cao Bang and Hoa Binh provinces for the first time.

Leptaulax cyclotaenius Kuwert, 1891

(Fig. 1G, K, M, Q, V)

Leptaulax cyclotaenius Kuwert, 1891: 188.

Type specimens in the Museum Histoire Naturelle, Paris (R. Oberthur's collection; Arrow 1910).

Diagnosis. Body more or less small, head and side of pronotum strongly punctures. Sides of elytra with strong scalariform punctures; mesosternum and the middle of metasternum distinctly punctate; hypostomal process with longitudinal groove on ventral surface.

Material examined. 5 ♂♂, 4 ♀♀ (IEBR), Kon Tum Province, Ngoc Linh Nature Reserve, hands, 6.iii.2019, 1700 m a.s.l., P.V. Pham leg. – 3 ♂♂ (IEBR), Lam Dong Province, Bi Doup-Nui Ba National Park, light trap, 3.vi.2013, T.V. Hoang leg. – 1 ♀ (IEBR), Lam Dong Province, Bi Doup-Nui Ba National Park, light trap, 4.vi.2013, D.T. Tran leg. – 1 ♀ (MfN), Tonkin, Montes-Mauson (Lang Son Province, Mau Son Mountain), April–May, 2–3000 ft, H. Fruhstorfer leg.

Distribution. Cambodia, India, Indonesia (Borneo, Sulawesi, Sumatra), Laos, Malaysia, Myanmar, Thailand and Vietnam (Lang Son) (Gravely 1914). This species is reported from the Central Highlands of Vietnam for the first time (Kon Tum and Lam Dong provinces).

Leptaulax dentatus (Fabricius, 1792)

(Fig. 1D–F, O, W)

Passalus dentatus Fabricius, 1792: 24.

Leptaulax dentatus Kaup, 1868: 14.

Type specimens: may be preserved in Copenhagen Museum, but not confirmed yet.

Diagnosis. Parietal ridge not extending to supraorbital ridge; side of elytra with distinct scalariform punctuation, but unclear and strong as *L. cyclotaenius*; mesosternum and metasternum almost glabrous; hypostomal process

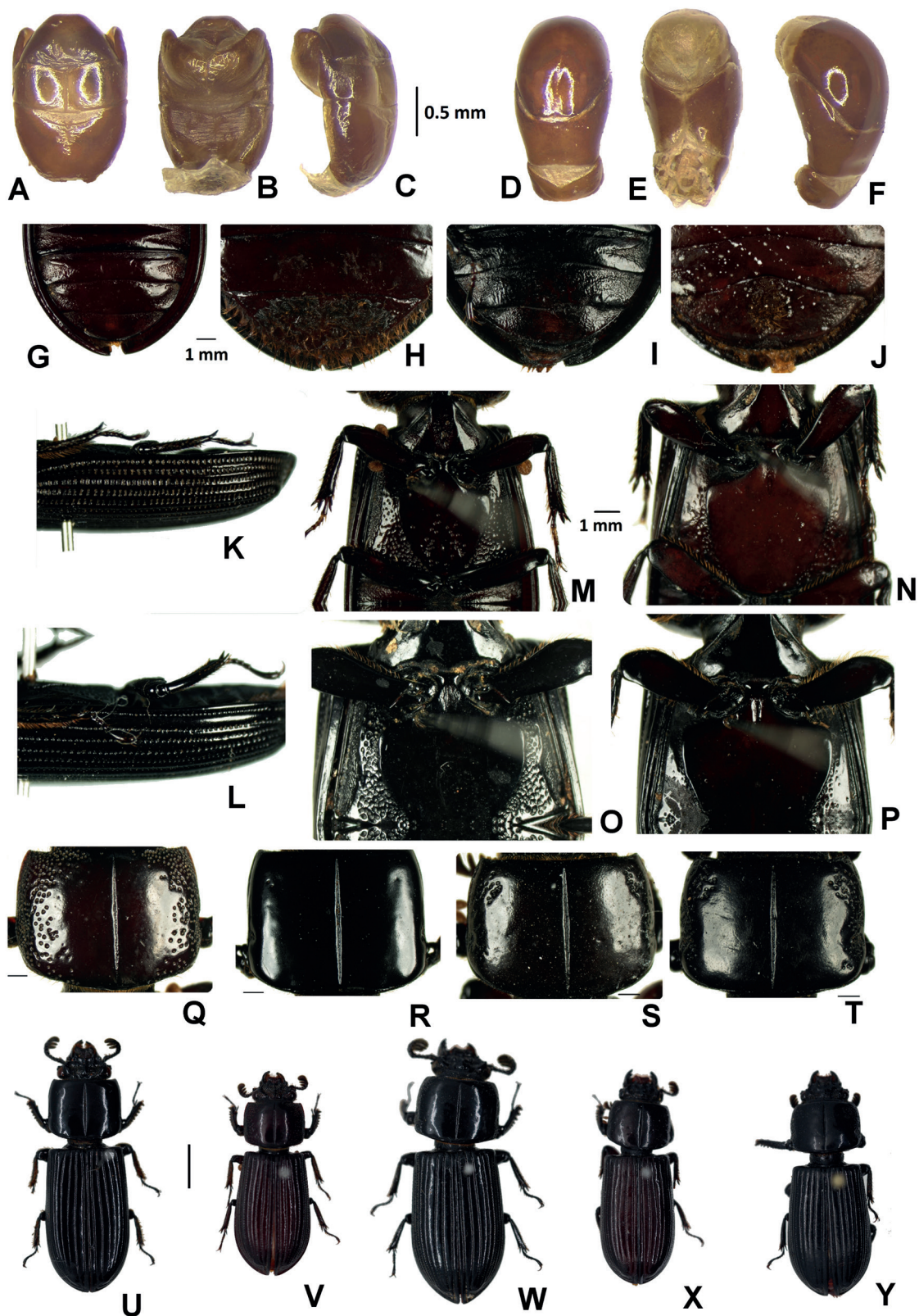


Fig. 1. A–F. Male genitalia. G–J. 5th visible abdominal sternite and last abdominal sternite. K–L. Lateral striae of elytron. M–P. Meso- and metasternum. Q–T. Pronotum. U–Y. Habitus (scale bar: 0.5 cm). A–C, I, L, T, Y. *Leptaulax bicolor*. D–F, O, W. *L. dentatus*. G, K, M, Q, V. *Leptaulax cyclotaenius*. H, P, R, X. *L. loebli*. J, N, S, U. *L. pacholatkoii*.

either without longitudinal groove or with weak depression in anterior portion; male genitalia robust and cylindrical in dorsal view.

Material examined. 1 ♀ (IEBR), Bac Kan Province, Ba Be National Park, light trap, 6.viii.2002 – 1 ♂ (IEBR), Gia Lai Province, KBang District, Dak Roong Commue, Kon Ka Kinh National Park, 06.vi.2011, 1060 m, light trap – 2 ♂, 1 ♀ (IEBR), Hoa Binh Province, Ngoc Son-Ngo Luong Nature Reserve, hands, 18.ix.2016, P.V. Pham leg. – 1 ♂, 1 ♀ (IEBR), Kon Tum Province, Dak Ha, Dak Man, light trap, 18.vii.2012, V.T. Hoang leg. – 1 ♂ (IEBR), Ninh Thuan Province, Phuoc Binh National Park, light trap, 13.xi.2008 – 7 ♂♂, 5 ♀♀ (MfN), Tonkin, Montes-Mauson (Lang Son Province, Mau Son mountain), April–May, 2–3000 ft, H. Fruhstorfer leg. – 1 ♀ (IEBR), Vinh Phuc Province, Tam Dao National Park, light trap, 16–24.vi.2011, V.T. Hoang leg. – 1 ♀ (IEBR), Vinh Phuc Province, Tam Dao National Park, light trap, 18.v.2014 – 6 ♂♂, 1 ♀ (IEBR), Vinh Phuc Province, Tam Dao National Park, light trap, 12–16.ii.2014.

Distribution. Cambodia, China, Eastern Himalayas, India, Indonesia (Borneo, Java, Lesser Sunda, Moluccas, Sulawesi, Sumatra), Laos, Malaysia, Myanmar, New Guinea, Philippines, Taiwan, Thailand and Vietnam (Ho Chi Minh, Lang Son,) (Gravely 1914; Kon et al. 2001). This species is recorded from Bac Kan, Gia Lai, Hoa Binh, Kon Tum, Ninh Thuan and Vinh Phuc provinces for the first time.

***Leptaulax loebli* Kon, Johki & Araya, 2003**

(Fig. 1H, P, R, X)

Leptaulax loebli Kon, Johki & Araya, 2003: 181.

Type specimens in Muséum d'Histoire Naturelle Genève, Switzerland (Kon et al. 2003).

Diagnosis. Anterior lower of mandible tooth bidentate; last abdominal sternite with an expanded and densely hairy and punctate area, 5th visible abdominal sternite not emarginated at posterior margin; hypostomal process without longitudinal groove.

Material examined. 1 ♀, 1 ♂ (MfN), Annam, Phuc Son (Quảng Nam Province, Phuoc Son?), xi–xii, H. Fruhstorfer leg. – 1 ♂ (IEBR), Gia Lai Province, Kon Ha Nung, Buon Lui, light trap, 22.vi.1980, HTHCT.

Distribution. Previously known from Laos, Myanmar and Thailand (Kon et al. 2003; Neumann et al. 2013). These are the first records of this species from Vietnam.

***Leptaulax niisatoi* Kon, Johki & Pham, 2017**

Leptaulax niisatoi Kon, Johki & Pham, 2017: 97.

Type specimens in Vietnam National Museum of Nature, Hanoi (Kon et al. 2017).

Diagnosis. Parietal ridge extending to supraorbital ridge; hypostomal process smooth, shiny and hairless; mesosternum impunctate; metasternum entirely hairless, central area shiny and impunctate; lateral striae of elytron with large and somewhat oblong punctures; pronotum

strongly and densely punctate in lateral portion; posterior margin of 5th visible abdominal sternite gently emarginated.

Material examined. None.

Distribution. Currently known only from Vietnam (Kon et al. 2017).

***Leptaulax pacholatko* Iwase, 1998**

(Fig. 1J, N, S, U)

Leptaulax pacholatko Iwase, 1998: 157.

Type specimens in Natural History Museum Vienna (Iwase 1998c).

Diagnosis. Anterior lower tooth simple; frontal area more distinctly transverse; pronotum weakly and sparsely punctate; last abdominal sternite more or less hairy punctures, 5th visible abdominal sternite emarginated at posterior margin.

Materials examined. 1 ♀ (IEBR), Lam Dong Province, Bidoup-Nui Ba National Park, Da Chais commune, 04.vi.2013, light trap, T.V. Hoang leg. – 1 ♀ (IEBR), Gia Lai Province, KBang District, Dak Roong Commue, Kon Ka Kinh National Park, 06.vi.2011, 1060 m, light trap.

Distribution. Cambodia, Laos and Vietnam (type locality: Lam Dong) (Neumann et al. 2013).

Remarks. Currently, two subspecies are recognized, *L. pacholatko pacholatko* and *L. pacholatko mutoniatus*. They differ by the difference of punctures in particular behind anterior margin and around lateral scar of pronotum, the width of wrinkles at posterior border of pronotum, and punctures and hairs on 6th abdominal segment. The female specimen in this study is closer to *L. pacholatko pacholatko*, however, its lateral scar of pronotum is smaller and less punctate.

CONCLUSIONS

The present study added *Leptaulax loebli* to the *Leptaulax* fauna of Vietnam with the result that Vietnam harbors now six known species of this genus. Additionally, we updated the information on the distribution for three species: *L. bicolor*, *L. cyclotaenius* and *L. dentatus* in the country. Especially, the knowledge of the distribution range of *L. cyclotaenius* is extended to the Central Highlands of Vietnam.

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