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Key to species of the genus *Orthogonius* MACLEAY of Cambodia, with descriptions of four new species (Coleoptera: Caraboidea: Orthogoniini)

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Abstract

In this paper the *Orthogonius* species of Cambodia are reviewed. Eleven species in total are reported from Cambodia, among them four are new to science, i.e. *O. pseudomouhoti*, n. sp., *O. kirirom*, n. sp., *O. angkorensis*, n. sp. and *O. longilamella*, n. sp.. *O. pseudolongicornis* TIAN & DEUVE, 2006 is recorded from Cambodia for the first time. A checklist with distribution data and a key to species of Cambodian *Orthogonius* are also provided.

Key words: Coleoptera, Caraboidea, Orthogoniini, *Orthogonius*, Cambodia, new species, new record

Introduction

Cambodian fauna of the ground beetles Orthogoniini is still poorly known. CHAUDOIR (1871) described two species from Cambodia in his monograph: *Orthogonius picipennis* CHAUDOIR and *O. crenatricus* CHAUDOIR. Then the latter was considered as a junior synonym of *O. sulcatus* SCHMIDT-GÖBEL, 1846 by ANDREWES (1923). Four species were described by TIAN & DEUVE (2006), *viz.*, *O. smetsi* TIAN & DEUVE, *O. constanti* TIAN & DEUVE, *O. angkor* TIAN & DEUVE and *O. cambodgensis* TIAN & DEUVE.

Recently biodiversity surveys in Cambodia have been comprehensively carried out by the Department of Entomology, Royal Belgian Institute of Natural Sciences (IRSNB/RBINS). From the huge materials of the genus *Orthogonius* MACLEAY four new species are discovered and hereby described. In addition, *O. pseudolongicornis* TIAN & DEUVE, 2006 is found in Cambodia for the first time. Nevertheless it is believed that more species of *Orthogonius* will be found in Cambodia in the future.

Checklist of *Orthogonius* species of Cambodia

O. kirirom, n. sp.: Kampong Speu
O. angkorensis, n. sp.: Siem Reap
O. pseudomouhoti, n. sp.: Bantey Menchay and Siem Reap
O. longilamella, n. sp.: Siem Reap
O. pseudolongicornis TIAN & DEUVE, 2006: Cambodia (Siem Reap), Vietnam and Thailand
O. sulcatus SCHMIDT-GÖBEL, 1846: Cambodia (detail locality unknown), Myanmar and India.
O. picipennis CHAUDOIR 1871: Cambodia (detail locality unknown)
O. smetsi TIAN & DEUVE, 2006: Anlong Veng
O. constanti TIAN & DEUVE, 2006: Phnom Kulen
O. angkor TIAN & DEUVE, 2006: Siem Reap
O. cambodgensis TIAN & DEUVE, 2006: Cambodia (detail locality unknown)

Key to species of Cambodian *Orthogonius*

1. Elytra with even intervals much wider than odd ones, and always densely punctate 2
- Elytra with even and odd intervals subequal in width in middle, smooth and glabrous 4
2. Labrum straight at front margin, larger species (length 20.0 mm) .....*O. constanti*
- Labrum more or less emarginate at front margin, smaller species (15.0-16.0 mm in length) 3
3. Aedeagus almost straight, ventral margin expanded and bisinuate .....*O. angkor*
- Aedeagus arcuate, ventral margin concave, not expanded or bisinuate .....*O. cambodgensis*
4. Body very slender, head with only one pair of supraorbital setae, labial palpomere 2 asetose in inner margin .....*O. smetsi*
- Body stouter, head with two pairs of supraorbital setae, labial palpomere 2 bisetose in inner margin ...5
5. Hind leg with apical tibial spurs short and broad 6
- Hind leg with apical tibial spurs long and sharp 7
6. Legs with all tarsal claws simple .....*O. picipennis*
- All tarsal claws pectinate .....*O. sulcatus*

7. Body reddish brown .....*O. angkorensis* n. sp.
- Body dark brown to black.....8
8. Fore tibia with outer apical angle sharp, abdominal ventrite VII of male widely and deeply emarginate at apical margin .....*O. pseudomouhoti* n. sp.
- Fore tibia with outer apical angle more or less obtuse, Abdominal ventrite VII of male small or shallowly emarginate at apical margin 9
9. Abdominal ventrite VII of male shallowly emarginate at apical margin .....*O. longilamella* n. sp.
- Abdominal ventrite VII of male deeply emarginate at apical margin.....10
10. The median lobe of aedeagus stout, strongly bent at apex..... *O. kirirom* n. sp.
- The median lobe of aedeagus slender, slightly bent at apex .....*O. pseudolongicornis*

Orthogonius kirirom n. sp.
(Figs 1-4)

Holotype: male; length: 14.0 mm; width: 6.4 mm.

Black, but coxae, trochanters and femora of legs, middle portion of mesosternum, mouthparts palpi, labrum and antennae dark brown. Head densely and moderately wrinkled, with very small punctures; pronotum smooth and glabrous, with sparser and shallower striations or faint wrinkles, impunctate; elytra glabrous, odd intervals with fine and sparse punctures. Microsculptural meshes isodiametric.

Head stout, HL/HW=0.9, eyes very large and prominent; labrum straight at frontal margin, clypeus bisetose, frontal impressions small, pit-like form; ligula small, bisetose at apex; mentum edentate, asetose, submentum with one setae at each side; palpiger asetose. Antennae long, extending over base of elytra.

Pronotum transverse, PW/PL=1.6, disc very convex; lateral expanded margin wide, and somewhat wrinkled, hardly reflexed, basal foveae shallow.

Elytra elongate ovate, EL/EW=1.5, base well bordered, widest at about middle, sides parallel; apex roundly truncate, but reversely and obliquely truncate at tip (Fig. 2); striae fine and deep, intervals convex, even intervals slightly wider than odd ones; interval 3 with three setiferous pores; left interval 5 with a puncture near base; interval 7 normal, not carinated.

Legs stout; fore tibia moderately dilated at apex, slightly and obliquely truncate at apical margin (Fig. 1); middle tibia not dilated; middle coxae glabrous, hind femur with two setae; hind tibial spurs long and sharp, tarsomere 4 shorter than tarsomere 3, shallowly emarginate at apex; all tarsal claws strongly pectinate.

Prosternal process well bordered at apex. Abdominal ventrites IV-VI each with one pair, VII with two pairs of setae; ventrite VII of male widely emarginate at apical margin (Fig. 3).

Male genitalia (Fig. 4): The median lobe of aedeagus stout and robust, evidently bent at apex in lateral view, pointed at apex; apical lamella narrow, two times as long as wide.

Female: Unknown.

Etymology: The specific name of this new species is given after its type locality.

Distribution: Cambodia.

Holotype: male, "Coll. I. R. Sc. N. B. / Cambodia, Kirirom N. P., 21.IV.2005, Pine forest, light trap, Leg. K. Smets & I. Var", in RBINS.

Remarks: Close to *O. tikekee* Tian & Deuve, 2006, but setiferous pores on elytral interval 3 are not well marked, apical margin of fore tibia not emarginate, the median lobe of aedeagus evenly bent at apex, and the apical lamella narrower and longer.

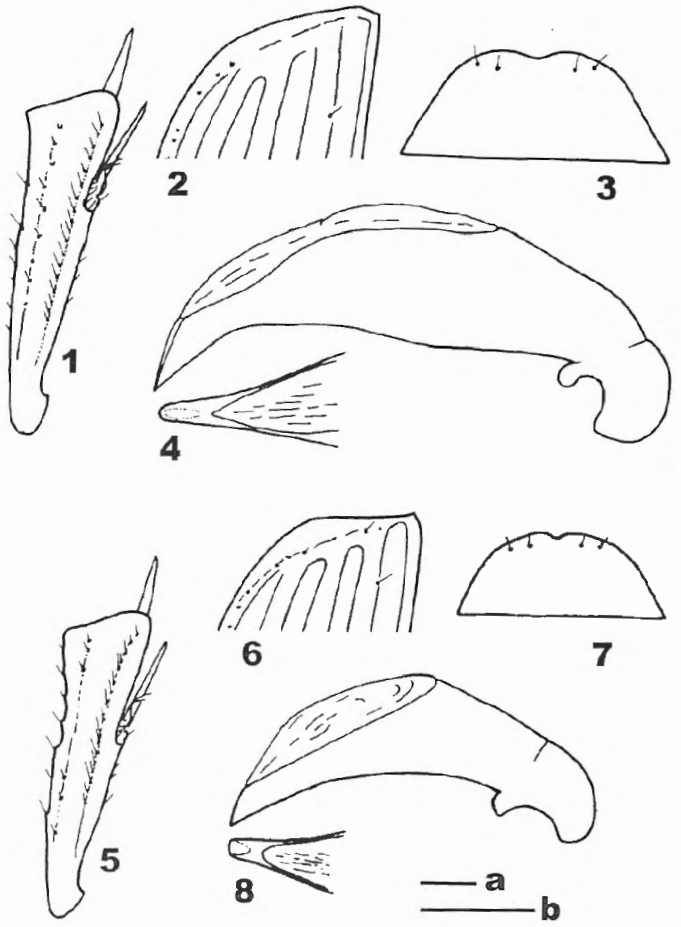
Orthogonius angkorensis n. sp.
(Figs 5-8)

Holotype: male; length: 12.5-13.0 mm; width: 5.5-6.0 mm.

Red brown, head darker, antennomeres 4-11 and palpi yellow. Head and pronotum moderately wrinkled and striate, frons with a few small punctures, pronotum punctured only on lateral expanded margins, all intervals of elytra with a few fine punctures. Microsculptural meshes isodiametric, clear on elytra, rather faint on head and pronotum.

Head stout, slightly longer than wide, HL/HW=1.1-1.2; eyes very large and prominent; frons and vertex slightly convex; frontal impressions faint, clypeus bisetose, surface almost even; labrum sexsetose, straight at front margin, sides round; ligula small, bisetose at apex; palpi slender and subcylindrical, maxillary palpomeres 3 and 4 subequal in length; labial palpomere 3 glabrous, as longer as palpomere 2, palpomere bisetose in inner margin, with one or two additional setae at apex; palpiger asetose, mentum asetose, submentum with one pair of setae; mentum edentate. Antennae long, extending over two-fifths of elytra from base; pubescent from about basal one-fourth of antennomere 4.

Pronotum transverse, PW/PL=1.6-1.7, widest at



Figs 1-8 — *Orthogonius* n. spp. Figs 1-4. *O. kiririom*, n. sp. Figs 5-8. *O. angkorensis*, n. sp.
1, 5. left fore tibia; 2, 6. apex of right elytron; 3, 7. abdominal ventrite VII of male; 4, 8. aedeagus (lateral and dorsal views) (scale: 1 mm, a for 1, 4, 5 and 8; b for 2, 3, 6 and 7).

about middle; disc slightly and evenly convex; fore and hind angles round; lateral expanded margin narrow, surface uneven, well bordered and flat throughout; fore and hind transversal impressions rather faint, basal foveae deep and rather long; a faint fovea-like impression on each side of disc at front one-fourth.

Elytra elongate ovate, EL/EW=1.4-1.5; surface rather flat, basal border complete, shoulders square; sides slightly expanded at middle, widest at about middle; apex faintly sinuate, inner angle pointed at apex (Fig. 6); striae very deep, intervals strongly convex, subequal each other in width in middle; interval 3 with three setiferous pores, well marked, interval 7 normal.

Legs moderate; fore tibia moderately expanded at apex, apical outer angle obtuse, but nearly rectangular (Fig. 5); middle tibia of male not expanded in middle, but dilated at apex; hind tibia slightly dilated at apex, apical spurs long and sharp; hind femur moderately dilate, with 3 setae at hind margin, tarsomere 3 longer than tarsomere 4; tarsomere 4 shallowly emarginate at apex; all tarsal claws strongly pectinate.

Prosternal process well bordered at apex. Apical margin of abdominal ventrite VII of male with a small emargination at middle (Fig. 7).

Male genitalia (Fig. 8): The median lobe of aedeagus stout and evenly arcuate in middle; the apical lamella longer than wide, broad at apex.

ETYMOLOGY: The specific name of this new species refers to its type locality.

DISTRIBUTION: Cambodia.

HOLOTYPE: male, "Coll. I.R.Sc.N.B. / Cambodia-Siem Reap, Angkor Thom, Chasse de nuit, 26. V. 2003, IG 30. 192, leg. Daniel R. JUMP", in RBINS; Paratypes, 2 females, IBID, in RBINS and Muséum National d'Histoire Naturelle, Paris (MNHN) respectively.

REMARKS: The new species can be distinguished from other *Orthogonius* species by the structure of aedeagus, fore tibia, apex of elytron and abdominal ventrite VII of male.

Orthogonius pseudomouhoti n. sp.
(Figs 9-12)

HOLOTYPE: male; length:13.0-17.0 mm; width: 6.0-8.0 mm.

Dark brown, underside, legs, antennae and mouthparts palpi lighter. Head fine and denser striate, pronotum faintly striate, both smooth and impunctate; each elytral interval with small punctures. Microsculptural meshes densely isodiametric on surface.

Head as long as wide, eyes moderate, frons and vertex convex, frontal impressions small but well marked, clypeus bisetose, rather even, labrum sexsetose, straight at apical margin; ligula short and slightly expanded at apex, bisetose; palpi slender, subcylindrical, maxillary palpomere 3 as long as palpomere 4, glabrous but with two short hairs near apex; labial palpomere 2 slightly longer than 3, bisetose in inner margin, and with two additional setae at subapex; labial palpomere 3 sparsely pubescent; palpiger asetose, mentum and submentum each with one pair of setae, mentum edentate. Antennae slender, reaching beyond basal one-fourth of elytra, pubescent from apical half of antennomere 4; antennomere 3 slightly longer than antennomere 4, as long as antennomere 1; antennomeres 1-2 brown, others darker; evidently and laterally expanded on apical part of antennomere 4.

Pronotum transverse, PW/PL=1.5-1.6, sides evenly rounded, widest at middle, both basal and fore margins beaded, lateral expanded margins well defined, wide and flat, fore angle broader than hind one; disc moderately convex, fore and hind transversal impressions faint, basal foveae quite large.

Elytra elongate ovate, EL/EW=1.4-1.5, convex, basal border complete, sides parallel in middle, striae deep, intervals slightly convex; interval 6 widest, intervals 2-5 subequal in width; apex broad, inner angle nearly rectangular, obtuse (Fig. 10); interval 3 with three setiferous pores; interval 7 normal.

Legs moderate; middle and hind coxa glabrous; fore tibia with outer angle rear rectangular, slightly protrude, outer margin sinuate, subserrate (Fig. 9); middle tibia slightly curve, dilated at apex, hind tibia with apical spurs long and rather blunt; hind tarsomere 3 longer than tarsomere 4, tarsomere 4 bilobed at apex; all tarsal claws strongly pectinate.

Prosternal process well bordered at apex. Apical margin of abdominal ventrite VII of male widely emarginate (Fig. 11).

Female: Unknown.

Male genitalia (Fig. 12): The median lobe of aedeagus rather slender, bent at about apical one-fourth, the apical lamella very long, two and half times longer than wide.

Etymolohy: The specific name of the new species is an adjective, combined by Latin prefix "*pseudo-*" and word "*mouhoti*", based on its similarity to *O. mouhoti* Chaudoir, 1871.

Distribution: Cambodia.

Holotype: male, "Coll. I. R. Sc. N. B./ Cambodia, Bantey Menchay Province, Ang Trapeang Thom, IX-XI. 2005, Malaise traps, Leg. Local Rangers", in RBINS; Paratypes: 25 males and 1 female, IBID, all in RBINS except 4 males in MNHN and 3 males in South China Agricultural University (SCAU); 2 males, "Coll. I. R. Sc. N. B./ Cambodia, Siem Reap Province, Preah Khan Temple, 16-V-2006, Malaise traps, Leg. Oul Yothin"; 2 males and 1 female, IBID, except for "1-7. V. 2005 "; 6 males, IBID except for "20-VI-2006"; 11 males and 1 female, IBID except for "18-VII-2006"; 5 males, IBID except for "11-VII-2006"; 4 males, IBID except for "26-VI-2006"; 14 males, IBID, except for "VI-2006"; 5 males, IBID except for "31-V-2006"; 3 males, IBID except for "06-VI-2006"; 6 males, IBID except for "11-VII-2006"; 1 male, IBID except for "20-VI-2006"; 1 male, IBID except for "1-7.V.III. 2006"; 1 male, IBID except for "6-14.V.III. 2005"; 1 male, IBID except for "14-21.VIII. 2006", 1 male, IBID except for "30-VI-2006", all in RBINS, except 9 males in MNHN and 9 males in SCAU; 2 males, "Coll. I. R. Sc. N. B./ Cambodia, Phnom Kulen N. P., Kbal Spean (ACCB), Piège mailaise, 8-15. VII. 2004, Leg. K. O. Krüger", in RBINS; 5 males and 1 female, "Coll. I. R. Sc. N. B./ Cambodia, Ban Teay Men Chey, Ang Tropeang Thmo, Malaise traps, III-2006, Leg. Tak Sour (ranger)", in RBINS except 1 male in SCAU; 8 males, "Coll. I.R.Sc.N.B/ Cambodia. Siem Reap Province, Angkor Preah Kahn Tple- Malaise Trap, 28/III-05/IV/2005, Leg. I. Var", in RBINS except 1 in MNHN and 1 in SCAU; 5 males, "Coll. I.R.Sc.N.B/ Cambodia. Siem Reap Prov., ACCB Kbal Srey, Banteay Srey, Malaise Trap, 01-08. VIII. 2004, Leg. Kai Olaf Krüger", in RBINS, but 1 in SCAU; 9 males,"Coll. I.R.Sc.N.B/ Cambodia. Banteay Mean Chey Province, Ang Tropeang Thmor (ATT), Malaise Trap, 9-XI-2005, Leg. Rangers", in RBINS except 1 in MNHN and 1 in SCAU.

Remarks: This new species is allied to *O. monhoti* Chaudoir, 1871, but the median lobe of aedeagus less bent than in *O. mouhoti* and the apical lamella shorter.

Variation: Size is from 13 to 17 mm in length, the front margin of labrum straight (in most specimens) or slightly emarginate (in a few specimens). Colouration from more or less brownish dark to black.

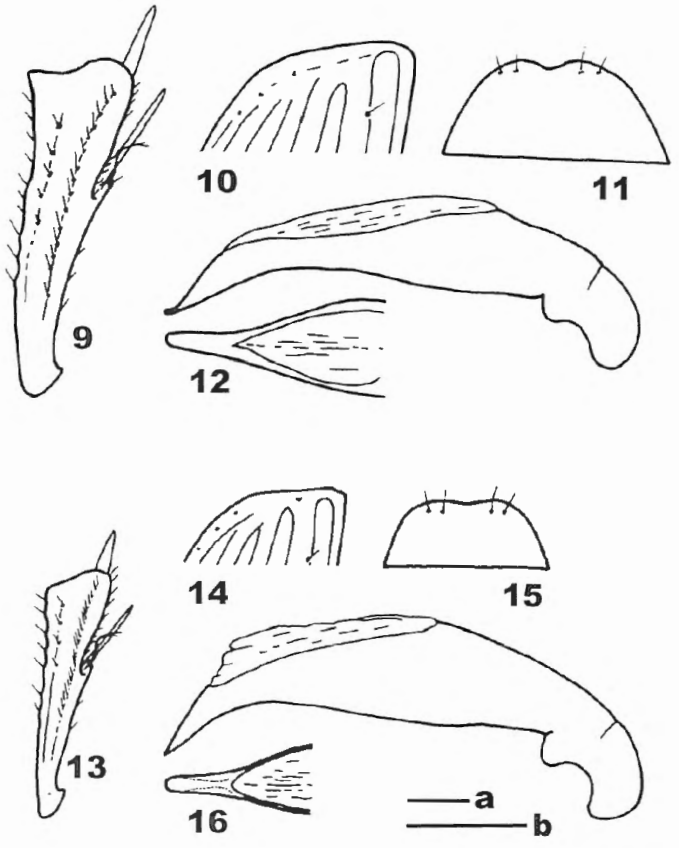
***Orthogonius longilamella* n. sp.**

(Figs. 13-16)

Holotype: male; length: 10.5-13.0 mm; width: 4.5-6.0 mm

Dark brown to black, underside, legs, antennae and mouthparts palpi lighter. Head and pronotum fine striate, faintly and sparsely punctured; odd intervals of elytra with fine punctures. Microsculptural meshes densely isodiametric on surface.

Head stout, HL/HW=0.8-0.9, eyes large, frons and vertex convex, frontal impressions small, pit-like, clypeus bisetose, surface rather even, labrum sexsetose, straight at apical margin; ligula short and slightly expanded at apex, bisetose; palpi slender, subcylindrical, maxillary palpomere 3 as long as 4, glabrous but with two short hairs at subapex; labial palpomere 2 slightly longer than palpomere 3, bisetose in inner margin, and with two additional setae at subapex; labial palpomere 3 sparsely pubescent; palpiger asetose, mentum edentate and asetose; submentum with one pair of setae. Antennae slender, reaching beyond basal one-third of



Figs 9-16 — *Orthogonius* n. spp. Figs 9-12. *O. pseudomouhoti*, n. sp. Figs 13-16. *O. longilamella*, n. sp. 9, 13. left fore tibia; 10, 14. apex of right elytron; 11, 15. abdominal ventrite VII of male; 12, 16. aedeagus (lateral and dorsal views) (scale: 1 mm, a for 9, 12, 13 and 16; b for 10, 11, 14 and15).

elytra, pubescent from apical two-thirds of antennomere 4; antennomere 3 slightly shorter than antennomere 4; apical part of antennomere 4 evidently and laterally expanded.

Pronotum transverse, PW/PL=1.5-1.6, sides evenly rounded, widest at about middle, lateral expanded margins well defined, flat and wide, uneven; fore and hind angles rounded; disc moderately convex, fore transversal impressions faint, hind one well marked; basal foveae small.

Elytra elongate ovate, EL/EW=1.4, convex, basal border complete, sides parallel in middle, striae deep, intervals convex; intervals subequal in width in middle; apex broad, inner angle nearly rectangular, obtuse (Fig. 14); interval 3 with three setiferous pores, not well marked; interval 7 normal.

Legs moderate; middle and hind coxae glabrous; fore tibia with outer apical angle nearly rectangular and obtuse, outer margin sinuate, subserrate (Fig. 13); middle tibia slightly curved in median portion, dilated at apex; hind tibia slender, apex hardly dilated, apical spurs long and sharp, tarsomere 3 longer than tarsomere 4, tarsomere 4 shallowly emarginate at apex; all tarsal claws strongly pectinate. Prosternal process well bordered at apex. Apical margin of abdominal ventrite VII of male widely but shallowly emarginate (Fig. 15).

Male genitalia (Fig. 16): The median lobe of aedeagus moderately sized, bent near apex in profile; the apical lamella strongly elongate, two and half time longer than wide.

ETYMOLOGY: The specific name of the new species is an adjective, combined by Latin prefix "*long-*" and word "*lamella*", referring to its long apical lamella of aedeagus.

DISTRIBUTION: Cambodia.

HOLOTYPE: male, "Coll. I.R.Sc.N.B/ Cambodia. Siem Reap Province, Angkor Preah Kahn Temple- Malaise Trap, 28/III-05/IV/2005, Leg. I. VAR", in RBINS; Paratypes: 1 male, idem, in RBINS; 5 male and 1 female, "Coll. I.R.Sc.N.B/ Cambodia. Siem Reap Province, Preah Khan Temple, malaise trap, 31-V-2006, Leg. Oul YOTHIN" 1 female, idem, except 26-VI-2006", in RBINS; 1 female, "Coll. I.R.Sc.N.B/ Cambodia. Near Siem Reap, 2005, malaise trap, Leg. I.VAR", all in RBINS except 2 males in MNHN and SCAU, respectively.

REMARKS: Allied to *O. pseudolongicornis* TIAN & DEUVE, 2006, but smaller, the median lobe of aedeagus with apical portion more elongate in profile, and in dorsal view the apical lamella much longer than in *O. pseudolongicornis*.

VARIATION: In some specimens the apical lamella of aedeagus a little shorter, but distinctly longer in *O. pseudolongicornis*.

Orthogonius pseudolongicornis TIAN & DEUVE

TIAN & DEUVE, 2006: 106

This species occurs in Vietnam and Thailand and is reported in Cambodia for the first time.

SPECIMENS EXAMINED: 3 males, "Coll. I. R. Sc. N. B./ Cambodia, Siem Reap Province, Preah Khan Temple, 31-V-2006, Malaise traps, Leg. Oul YOTHIN"; 2 males, IBID but collected at 23-V-2006, all in RBINS except 1 in MNHN.

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