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Seed beetles associated with Desmodieae in Vietnam (Coleoptera: Chrysomelidae: Bruchinae)

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Abstract. Six new species of Bruchinae are reported from Vietnam as feeding in seeds of members of leguminous tribe Desmodieae (Fabaceae-Faboideae). These species are described in genus *Bruchidius*: *B. christiae, B. dendrolobii, B. nebulatus, B. phuanensis, B. urariae,* and *B. vinhanensis*. Original biological data are given for six additional species: *B. anderssoni* Decelle, *B. brincki* Decelle, *B. desmodei* Arora, *B. meibomiaca* Arora, *B. mendosus* (Gyll.), *B. mussooriensis* Arora. A key to known Vietnamese species is provided.

Key words: entomology, taxonomy, Coleoptera, Bruchinae, new species, Desmodieae, *Alysicarpus, Christia, Dendrolobium, Desmodium, Phyllobium, Uraria*.

INTRODUCTION

Desmodieae is a leguminous tribe of Faboideae (or Papilionoideae) with numerous members in tropical regions; it is composed of 27 genera, of which *Desmodium* and *Lespedeza* are the largest. Most species are characterized by their loment, a particular type of indehiscent legume that breaks apart at constrictions between pod segments, each seed being dispersed individually enclosed in its segment of pod.

Only a small number of seed beetles have been reared from Desmodieae: Johnson (1981) recorded 12 species of *Acanthoscelides*, 10 *Meibomeius*, and 6 *Bruchidius* (including a probably misplaced species of *Bruchus*). Most of these species (*Acanthoscelides* and *Meibomeius*) were American, and only six (*Bruchidius*) were native to the Old World. The last figure was obviously less representative of the actual species richness than of our poor knowledge of African and Asian faunas.

In Asia, the following seed beetles may be considered with a reasonable degree of confidence as feeding in the larval stage in Desmodieae seeds: *Bruchidius desmodei*

Arora on *Phyllodium* (= *Desmodium*) *pulchellum* (Arora 1980); *B. meibomiaca* Arora on *Dendrolobium* (= *Meibomia*) *umbellatum* (Arora 1980); *B. minutissimus* Mots. on *Tadehagi* (= *Desmodium*) *triquetrum* (Vazirani 1975); *B. japonicus* (Harold) on *Lespedeza bicolor* (Morimoto 1990). Arora (1980) also recorded *B. mendosus* (Gyll.) (= *B. vulgaris* Arora) on *Alysicarpus monilifer*, but this needs confirmation. A small number of Indian species belonging to genera other than *Bruchidius* are associated with Desmodieae: *Callosobruchus anjaliae* Singal & Pajni feeds in *Desmodium* sp. seeds (Singal & Pajni 1990) and *Conicobruchus caerulens* (Champion) was bred from *Campylotropis* (= *Lespedeza*) *stenocarpa* (Champion 1919), *Desmodium elegans* (= *D. tiliaefolium*) (Zacher 1952), and *Desmodium* (?)*nutous* (Singal & Pajni 1986). Other reports of Bruchinae found on Desmodieae such as *B. nalandus* (Pic) on *Phyllodium pulchellum* (Mathur & Singh 1959) or *Spermophagus complectus* Sharp on *Lespedeza juncea* var. *sericea* (= *L. cuneata*) (Hao Zheng *et al*. 2006) obviously refer to adult catches rather than actual rearing records.

About 190 Desmodieae species are present in Vietnam according to Pham-Hoàng Hô (2002), but very little is known of their seed beetle fauna: *B. alacer* and *B. alysicarpi*, two species feeding in the seeds of *Alysicarpus vaginalis,* were recently described from the southern part of Vietnam, and *B. mussooriensis* Arora, described from India (Arora 1980), was recorded in the same area as a predator of the same host (Delobel 2010b). We report on fourteen *Bruchidius* species reared from pod samples of various Desmodieae collected in the southern part of Vietnam, mostly in and around the Ho Chi Minh City Province. Six of them are new to science and are described here. Techniques used for sample collection and rearing were similar to those described earlier (Delobel & Delobel 2003). Leguminous host plants were identified using the Flora of Vietnam (Pham-Hoàng Hô 2002), and botanical names were updated according to ILDIS (2010). Identification of Arora's species was made without examination of types, which are difficult to access; his descriptions and drawings of genitalia are however sufficiently precise to permit reasonably accurate identifications. Abbreviations used: MNHN, Muséum National d'Histoire Naturelle, Paris; CBAD, author's collection.

REVIEW OF SPECIES

Bruchidius anderssoni Decelle
(Fig. 1)

Bruchidius anderssoni Decelle, 1975: 188.

79 specimens, Bình Thuận Province: Thuận Nam, Mt Ta Kou, 08.i.2010, reared from *Desmodium gangeticum* seeds (Leguminoseae, Fabaceae, Desmodieae); this perennial herb is common throughout the tropical regions of the Old World, including Australia (ILDIS, 2010). *B. anderssoni* was described from Sri Lanka. New report for Vietnam, first host plant record.

Bruchidius brincki Decelle

Bruchidius brincki Decelle, 1975: 187.

12 specimens, Phú Quốc Island: Dương Đông, 12.ii.2007, reared from *Desmodium heterocarpon* seeds. The species was described from Sri Lanka. New report for Vietnam, first host plant record.

Bruchidius christiae n. sp.

Type material

Holotype: Male, VIETNAM, Khánh Hòa Province, Hòn Miểu, 4.ii.2007, ex *Christia pierrei*, H. & A. Delobel coll., MNHN. Paratypes: 1 male, 3 females, same data as holotype, male dissected (slide 01107), MNHN (2), CBAD (2).

1-6. Habitus of male (scale: 1mm): 1 − *Bruchidius anderssoni*; 2 − *B. christiae*; 3 − *B. dendrolobii*; 4 − *B. phuanensis*; 5 − *B. urariae*; 6 − *B. vinhanensis*

Description

Length (pronotum-pygidium): 1.4-1.6 mm; width: 0.9-1.0 mm.

Body (Fig. 2) stout, rather thick, pygidium subvertical.

Integument of head, thorax and basal ventrites black; rest of abdomen reddish, last visible tergite and elytra reddish, variously blackened or entirely black; antennae and four anterior legs testaceous (except coxae black); posterior legs reddish-brown with basal half of femur and sometimes also extreme base of tibia, black. Vestiture made of scaly setae, long and well covering integument. Setae mainly whitish, on pronotum also yellowish; the following areas are dark brown: two longitudinal stripes on pronotal disc, on elytra two squarish spots at basal 0.2 and 0.6 of interstria 3, a transverse triangular patch at about 0.5 of interstriae 5 to 10.

Male. Head moderately short; eyes strongly bulging, maximum head width 1.4 times width behind eyes; eyes separated by 0.3 times head width including eyes; face long and narrow, with distance between posterior rim of eyes and apex of clypeus / distance between eyes = 2.5; eye deeply cleft, width at bottom of sinus composed of 6-7 ommatidia; maximum width of postocular lobes equal to 2-3 ommatidia; carina on frons well defined, shining, interocular tubercle indistinct. Punctation of face shallow and irregular, almost absent from clypeus. Antenna (Fig. 9) measuring slightly more than half body length excluding head; antennal segments 1 to 4 submoniliform, 2 as long as 3, 4 slightly widened apically, longer than wide, 5-10 eccentric, wider than long, 11 oval, pointed (L/W = 1.4). Length of antennomeres: 1.3; 1.0; 1.0; 1.2; 1.6; 1.4; 1.5; 1.5; 1.4; 1.3; 2.5.

Pronotum trapezoidal, with greatest width at base (W/L = 1.37), its sides almost straight, not expanded behind eyes, with very shallow oblique impression on sides of basal lobe. Pronotum with punctures strong, irregular, coalescent, ocellate. Elytra 1.1 times longer than combined width; disc flattened; a minute tooth at base of interstria 4, tooth at base of interstria 3 inconspicuous. Striae on disc narrow and shallow; interstriae with strong transverse microsculpture.

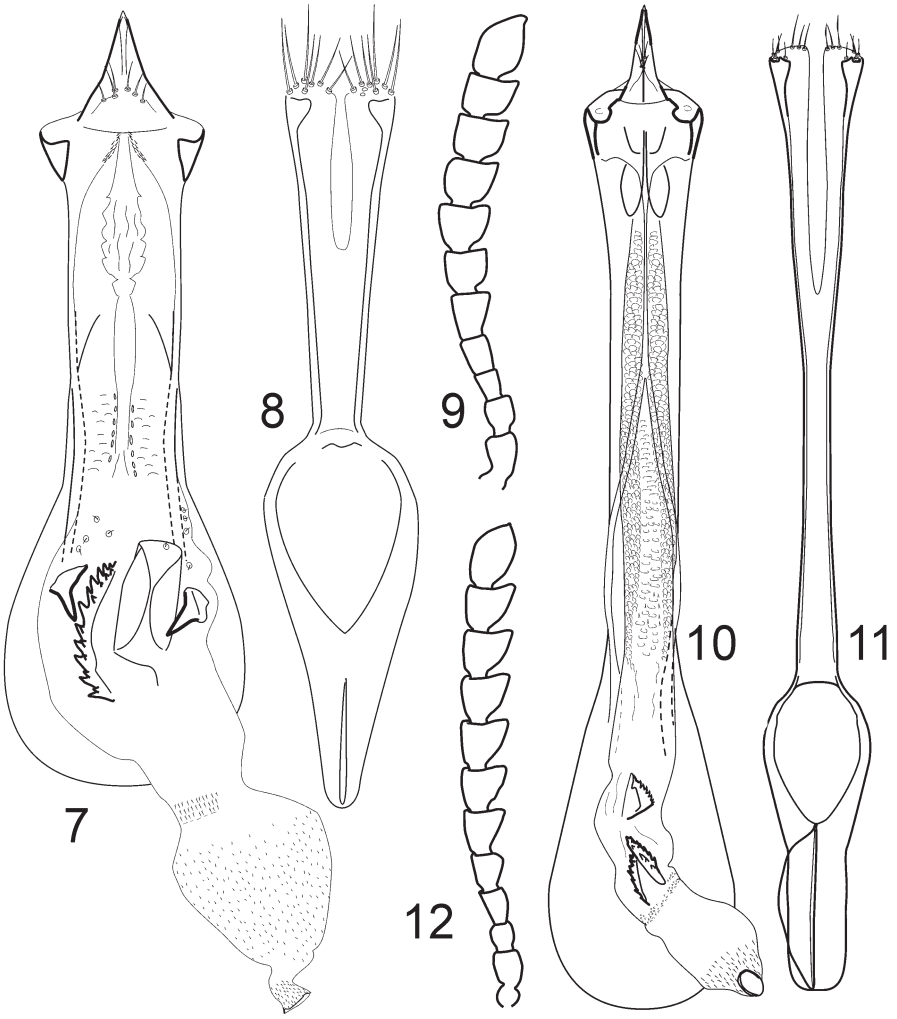
Hind femora moderately incrassate, at their widest 1.8 times wider than mid femora; mesoventral margin with small triangular preapical denticle; hind tibia short, strongly widened apically, with dorsomesal and ventral carinae complete, lateral not reaching base; apex of tibia with mucro about as long as width of tarsomere 1 at base; lateral denticle about half mucro length, and dorsal denticles short and acute, less than half of lateral denticle.

Abdomen strongly telescoped with ventrite 5 slightly emarginate, its length medially a little less than sternite 4; ventrite 1 basally with a small patch of short and thin setae. Last visible abdominal tergite subtriangular, 1.05 times longer than wide at base, with central preapical bulge and apex slightly turned under.

Genitalia: Median lobe (Fig. 7) moderately stout (maximum width excluding basal hood / total length = 0.21), apically widened; basal hood small, subcircular, not emarginate; ventral valve acutely triangular, moderately sclerotized, with apex acute, bearing two lateral groups of 3 setae; dorsal valve membranous; no hinge sclerites; internal sac basally almost smooth; saccus with two strong spines, a large dented crescent, and a thin, weakly sclerotized plate; distal bulb with sparse needles, gonopore

surrounded by dense needles. Basal strut (Fig. 8) with a small keel; lateral lobes fused on 54 % their length; apex of parameres with 7 long setae.

Female. Similar to male, but last visible tergite not bulging, less convex than in male; ventrite 5 two to three times longer than ventrite 4. Genitalia: ovipositor short, vagina membranous, with only two spines at entrance of bursa copulatrix; spherical vesicles of the bursa copulatrix large, without detectable circular sclerites; spermathecal body slim, unwrinkled, U-shaped, with apical diverticulum long, thin; opening of spermathecal duct not protruding, distinct from gland duct opening, both lateral.



7-12. Genitalia of male: 7-9 − *Bruchidius christiae*; 10-12 − *B. dendrolobii*; 7, 10 − median lobe; 8, 11 − lateral lobe and tegminal strut; 9, 12 − antenna

Etymology

Latin genitive (feminine) of the host plant generic name.

Host plants

Larvae develop in the seeds of *Christia pierrei* (Leguminoseae, Fabaceae, Desmodieae); in addition to Vietnam, this host is present in Cambodia, Indonesia, and Thailand (ILDIS 2010).

Discussion

Externally *B. christiae* is quite similar with other species (in particular *B. dendrolobii*) bred from Desmodieae, but male genital morphology is not clearly related to any of them.

Distribution

Vietnam.

Bruchidius dendrolobii n. sp.

Type material

Holotype: Male, VIETNAM, Lâm Đồng Province, Phú An, route Pongour, 02.ii.2007, ex *Dendrolobium rugosum,* H. & A. Delobel coll., MNHN. Paratypes: 5 males, 4 females, same data as holotype, 1 male dissected (slide 00607), MNHN (5), CBAD (4).

Description

Length (pronotum-pygidium): 1.9-2.1 mm; width: 1.3-1.4 mm.

Body (Fig. 3) stout, rather thick, pygidium subvertical.

Integument mainly reddish brown, with markings on pronotum, meso and metathoracic sternites entirely, sides of elytra, sometimes base of first ventrite and lower part of face, black; antennae and four anterior legs testaceous, posterior legs reddish brown. Vestiture scaly, well covering integument, mainly yellowish-white, whiter on thoracic sternites and scutellum; dark setae form squarish dots on interval 3 (one spot at apical third), 6 (three spots), 9, 10 (one spot around middle), and subapical markings; pygidium with dense white pubescence on basal fourth, and along midline.

Male. Head moderately short; eyes strongly bulging, maximum head width about 1.4 times width behind eyes; eyes separated by 0.25 times head width including eyes; face long and narrow, with distance between posterior rim of eyes and apex of clypeus / distance between eyes = 3.0; eye deeply cleft, width at bottom of sinus composed of seven ommatidia; maximum width of postocular lobes equal to two ommatidia; carina on frons well defined, shining, interocular tubercle distinct. Punctation of face irregular, shallow, clypeus alutaceous, distinctly marginate. Antenna (Fig. 12) long, measuring 0.6 times body length excluding head; segments 1 to 3 moniliform, 4 slightly widened apically, 5-10 subtriangular, strongly eccentric, 5 as wide as long, 6-10 wider than

long, 11 long oval (L/W = 1.8). Length of antennomeres: 1.3; 1.0; 1.2; 1.3; 1.5; 1.5; 1.6; 1.6; 1.5; 1.5; 2.5.

Pronotum subtrapezoidal, with greatest width at base (W/L = 1.72), its sides slightly concave, inconspicuously bulging centrally, not expanded behind eyes; with very shallow oblique impression on sides of basal lobe. Pronotum disc with small, dense punctures, on alutaceous background. Elytra 1.06 times longer than combined width, their sides convex; post-scutellar area depressed, disc flattened; a conspicuous tubercle at base of interstriae 3 and 4, without distinct teeth (or teeth fused into a large blunt tooth). Striae on disc shallow and narrow, with thin punctures; interstriae flat, with strong microsculpture and small punctation.

Hind femora strongly incrassate, at their widest 2.1 times wider than mid femora; mesoventral margin with small triangular preapical denticle; hind tibia short, strongly widened apically, with dorsomesal and ventral carinae complete, lateral not reaching base, ventrolateral not reaching apex; apex of tibia with mucro 1.3 times width of tarsomere 1 at base; lateral denticle less than half mucro length, and dorsal denticles less than half lateral denticle.

Abdomen strongly telescoped, ventrites 3-5 very short medially, 5 emarginate; ventrite 1 basally without any particular arrangement of setae. Last visible abdominal tergite shield-shaped, 1.1 times longer than wide at base, its disc strongly convex longitudinally, with apex turned under.

Genitalia: Median lobe (Fig. 10) elongated (maximum width excluding basal hood / total length = 0.12), slightly widened apically; basal hood narrowly ovate, not emarginate; ventral valve large, acutely triangular, well sclerotized, with apex acute, bearing four setae; dorsal valve braced by a narrow sclerotized ring; no hinge sclerites; internal sac lined basally with weakly sclerotized tubercles; saccus bearing three small sclerites, proximal one triangular with 6-7 minute teeth, distal pair rod-like; apical part of distal bulb with minute needles oriented towards gonopore. Basal strut (Fig. 11) elongated, with strong keel; lateral lobes fused on 60% their length; apex of parameres with six short setae.

Female. Similar to male, but pygidium almost flat, not turned under, slanted about 10°, about three times longer than ventrite 4; antenna shorter, with segments 1-4 moniliform.

Etymology

Latin genitive (neuter) of the host plant generic name.

Host plants

Larvae develop in the seeds of *Dendrolobium rugosum* (Leguminoseae, Fabaceae, Desmodieae); the distribution of this host is restricted to Southeast Asia, from Myanmar to Malaysia (ILDIS 2010).

Discussion

Seeds of *D. rugosum* harbour another species, *B. phuanensis*; the latter is a smaller species, with a well defined elytral dark spot, with a shorter median lobe, and no

sclerite in the saccus. The median lobe in *dendrolobii* is slender and elongated, much as in *desmodei, japonicus* and *lautus* (Sharp), and the proximal sclerite of the saccus is triangular as in *alysicarpi, nalandus* (Pic) and *vinhanensis,* but it differs markedly from each of these species by other morphological attributes.

Distribution
Vietnam.

Bruchidius desmodei Arora

Bruchidius desmodei Arora, 1980: 42.

34 specimens, Bà Rịa-Vũng Tàu Province: Vũng Tàu, 14.iii.2009, reared from *Phyllodium vestitum* seeds. Recorded in the Indian states of Orissa, Himachal Pradesh and Tamil Nadu on *Phyllodium pulchellum* (Arora 1980). New record for Vietnam, first record on *P. vestitum*.

Bruchidius meibomiaca Arora

Bruchidius meibomiaca Arora, 1980: 52.

32 specimens, Bà Rịa-Vũng Tàu Province: Long Hải, 22.iii.2009; reared from *Dendrolobium umbellatum* seeds. The same species was collected by Arora from two Desmodieae, namely *Tadehagi triquetrum* (as "*Meibomia triguetru*") and *Dendrolobium umbellatum* (as "*Meibomia ambellata*") in the state of Karnataka (India), but only *D. umbellatum* is mentioned as a host plant (Arora 1980). New record for Vietnam.

Bruchidius mendosus (Gyllenhal)

Bruchus mendosus Gyllenhal, 1839: 72.
Bruchus minimus Motschoulsky, 1858: Decelle, 1975.
Bruchus decretus Walker, 1859: Decelle, 1975.
Bruchidius mendosus (Gyllenhal): Decelle, 1975.
Bruchidius vulgaris Arora, 1977: Decelle, 1985.

Eight specimens, Hồ Chí Minh City Province: Nhà Be, 19.ii.2009, reared from *Desmodium triflorum* seeds. Arora (1980) records *Alysicarpus monilifer* as a host of *B. vulgaris*, but there is no mention of its having been reared from seeds of this plant. New record for Vietnam, first record of this host plant.

Bruchidius nebulatus n. sp.

Type material
Holotype: Male, VIETNAM, Đồng Nai Province, Vĩnh Cửu, forêt Vĩnh An, pk8 DT761, 19.i.2010, ex *Desmodium heterocarpon*, H. & A. Delobel coll., MNHN. Pa-

ratypes: 7 males, 2 females, same data as holotype, 1 male dissected (slide 08409); 1 male, Đồng Nai Prov., Mã Đà, entrance to Cát Tiên Biosphere Reserve, 19.i.2010, ex *Pycnospora lutescens,* H. & A. Delobel coll., MNHN (6), CBAD (4)

Description

Length (pronotum-pygidium): 1.20 mm; width: 0.75 mm.

Body stout, thick, pygidium subvertical.

Integument almost entirely black; antennae (except segments 5-8 darkened apically and dorsally), anterior and median legs (except base of femur 1, and femur 2 almost entirely), testaceous. Vestiture made of whitish and blackish (or dark brown) setae; white setae are denser on basal lobes of pronotum, on a short fascia in middle of third elytral interval and on a small triangular area at pygidium base. Pronotum and pygidium are mainly white, with a few dark areas. On elytra, dark setae form a wide transverse stripe a little behind middle on interstriae 5 to 10, and two circular spots before and beyond white fascia of third interstria; at least a few whitish scales on interstria 4 separate the large dark stripe from the posterior dark spot on interstria 3.

Male. Head elongated; eyes moderately bulging, maximum head width 1.3 width behind eyes; eyes separated by 0.22 times head width including eyes; face long and narrow, with distance between posterior rim of eyes and apex of clypeus / distance between eyes = 3.1; eye deeply cleft, width at bottom of sinus composed of five ommatidia; postocular lobes narrow, not wider than diameter of one ommatidium; carina on frons strong and wide, interocular tubercle shining. Punctation of face dense, rather shallow, clypeus strongly alutaceous, except apical rim shining. Antenna (Fig. 15) long, measuring about 3/4 body length (excluding head); antennal segments 1 to 4 submoniliform, 3 longer than 4, 5 widened apically, about as long as wide, 6-10 slightly eccentric, a little wider than long, 11 oval (L/W = 1.67). Length of antennomeres: 1.3; 1.0; 1.5; 1.1; 1.5; 1.5; 1.6; 1.7; 1.7; 1.7; 3.1.

Pronotum slightly campaniform, with greatest width at base (W/L = 1.41), its sides almost straight, not expanded behind eyes; moderately bulging, with shallow oblique impression on sides of basal lobe. Pronotum disc with punctures strong, ocellate, coalescent. Elytra 1.1 times longer than combined width, their sides convex; disc flattened; a tubercle at base of striae 3 and 4, with a minute tooth visible at base at base of stria 4. Striae on disc wide, with strong punctures; interstriae with strong microsculpture.

Hind femora moderately incrassate, at their widest 1.8 times wider than mid femora; mesoventral margin with minute blunt preapical denticle; hind tibia strongly widened apically, its carinae hardly discernible; apex of tibia with mucro about 2/3 width of tarsomere 1 at base; lateral denticle about half mucro length, and dorsal denticles minute.

Abdomen strongly telescoped, with ventrite 5 emarginate, as long medially as sternite 4; ventrite 1 basally without patch of short setae. Last visible abdominal tergite shield-shaped, slightly longer than wide, with apex not turned under.

Genitalia: Median lobe (Fig. 13) moderately stout (maximum width excluding basal hood / total length = 0.20), subcylindrical, strongly widened apically; basal hood small, not emarginate; ventral valve subtriangular, moderately sclerotized, with apex obtuse,

bearing two lateral groups of 3 setae; dorsal valve braced by a wide sclerotized ring; no hinge sclerites; internal sac basally lined with ctenoid scales surrounded by two strands of blunt tubercles; saccus smooth, with an elongated sclerite ending proximally in four teeth, followed distally by two sclerites with 4-6 long teeth; gonopore large, V-shaped. Basal strut (Fig. 14) with large keel; lateral lobes fused on 80% their length; apex of parameres with 8-9 setae.

Female. Similar to male, but ventrite 5 not emarginate, longer than ventrite 4; last visible tergite slanted 20° from vertical. Antennae shorter and darker than male.

Etymology

The specific epithet *nebulatus* is from Latin meaning darkened, a reference to the colour of antennae.

Host plants

Reared from seeds of *Desmodium heterocarpon* and *Pycnospora lutescens* (Leguminoseae, Fabaceae, Desmodieae). Both species are common in Southern and Southeast Asia, and in Australia (ILDIS 2010); *P. lutescens* is also widespread in Central and Eastern Africa. Both species produce early dehiscent pods, with seeds that remain attached to the pod for a period of time before shedding. Eggs are laid directly on the seeds when still inside the pods, and development seems to be completed before seed dispersal by wind and/or plant decay. The small size of the adult is connected with that of the seed: seeds measure 2.0 x 1.4 x 0.9 mm (*D. heterocarpon*) or 1.7 x 1.1 x 0.8 mm (*P. lutescens*), and larval development occurs within a single seed. Movement of immature larvae from one seed to the other is apparently prevented by the lack of protection offered by the open pod. Pupation takes place within the seed, and adult emergence occurs through a circular hole in seed coat.

Discussion

External and genital morphology are quite similar with *B. brincki*. The elytral pattern of *nebulatus* is more greyish, less strikingly black and white than *brincki*; details of male genitalia are also distinctive.

Distribution

Vietnam.

***Bruchidius phuanensis* n. sp.**

Type material

Holotype: Male, VIETNAM, Lâm Đồng Province, Phú An, route Pongour, ex *Dendrolobium rugosum*, 02.ii.2007, H. & A. Delobel coll., MNHN. Paratypes, 7 males, 8 females, same data as holotype, 1 male dissected (slide 00707); 2 males, one female, same data as holotype but ex *Dendrolobium* sp., MNHN (12), CBAD (6).

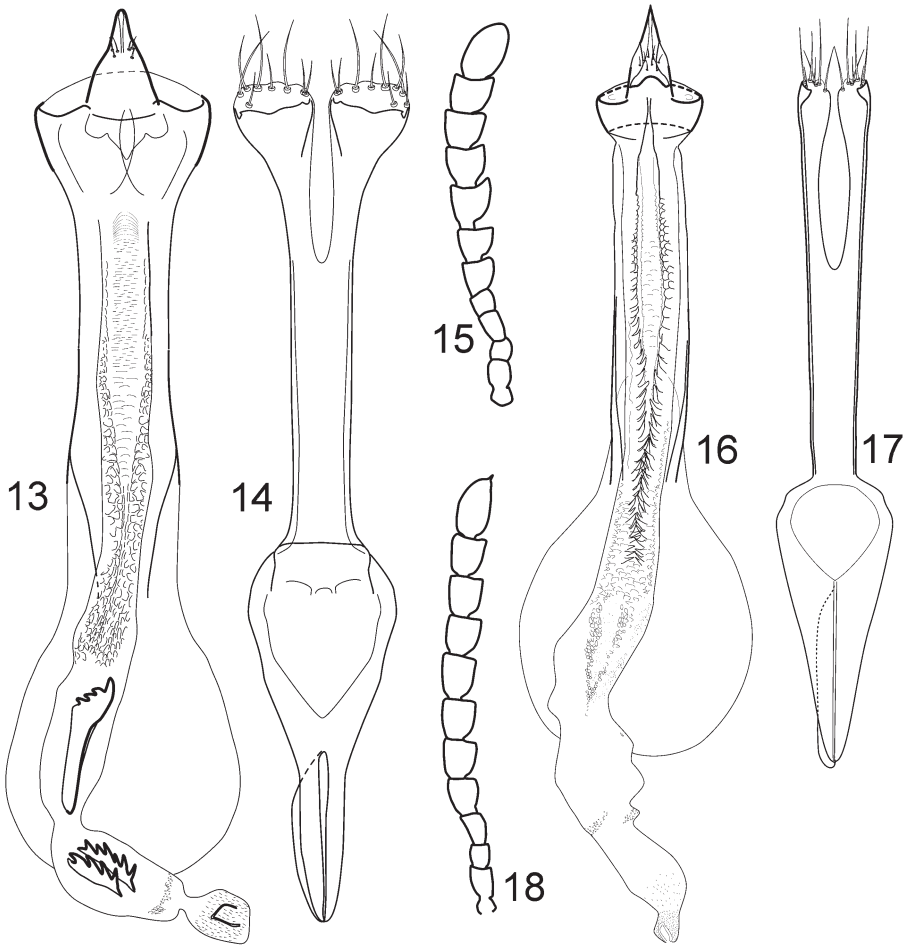
Description

Length (pronotum-pygidium): 1.9-2.3 mm; width: 1.2-1.4 mm.

Body (Fig. 4) stout, rather thick, pygidium subvertical.

Integument black except antennae and four anterior legs, testaceous, but antennomeres 5-11 darkened apically, last tarsomeres black; posterior legs black except tarsomeres 3-4 reddish.Vestiture of dorsal side whitish, yellowish and dark brown, completely covering integument; general ground colour of elytral disc light grey, with well defined dark spots (two in third and seventh intervals, one in interval 9, apex of intervals 2, 4-5, 8-10); extreme apex of elytra black; ventral side with white setation.

Male. Head short; eyes strongly bulging, maximum head width about 1.6 times width behind eyes; eyes separated by 0.18 times head width including eyes; face long



13-18. Genitalia of male: 13-15 − *Bruchidius nebulatus*; 16-18 − *B. phuanensis*; 13, 16 − median lobe; 14-17 − lateral lobe and tegminal strut; 15-18 − antenna

and very narrow, with distance between posterior rim of eyes and apex of clypeus / distance between eyes = 4.0; eye moderately cleft, width at bottom of sinus composed of 7-8 ommatidia; maximum width of postocular lobes equal to two ommatidia; carina on frons well defined, shining, interocular tubercle distinct. Punctation of face dense, clypeus alutaceous. Antenna (Fig. 18) long, measuring 3/4 body length; antennal segments 1 to 3 submoniliform, 4 subtriangular, as long as segment 3, widened apically, following segments subrectangular, a little longer than wide, almost symetrical, 11 long oboval (L/W = 1.8). Length of antennomeres: 1.3; 1.0; 1.4; 1.4; 1.7; 1.6; 1.8; 1.6; 1.6; 1.6; 2.5.

Pronotum subtrapezoidal, with greatest width at base (W/L = 1.36), its sides slightly bulging in the middle, not expanded behind eyes; regularly arched in profile, with very shallow oblique impression on sides of basal lobe. Pronotum disc with punctures small, dense, irregular, well separated, on shining background.

Elytra 1.1 times longer than combined width, their sides convex, maximum width near middle; disc flattened; two teeth at base of interstriae 3 and 4, as close to each other as to elytral base. Striae on disc shallow and narrow, with closely spaced punctures.

Hind femora moderately incrassate, at their widest 1.7 times wider than mid femora; mesoventral margin with well defined, acute preapical denticle; hind tibia apically strongly widened, with dorsomesal and ventral carinae complete, lateral not reaching base, ventrolateral not reaching apex; apex of tibia with mucro about as long as width of tarsomere 1 at base; lateral denticle about 1/3 mucro length, and dorsal denticles very short, less than half as long as lateral denticle.

Abdomen with ventrites 2-5 telescoped, 5 emarginate, slightly longer medially than sternite 4; ventrite 1 basally with a small elongated patch of dense white setae. Last visible abdominal tergite shield-shaped, as wide at base as long, with apex convex but not turned under.

Genitalia: Median lobe (Fig. 16) slender (maximum width excluding basal hood / total length = 0.14), apically widened; basal hood subcircular, not emarginate; ventral valve acutely triangular, moderately sclerotized, elongated, with apex acute, bearing a central group of 9 setae; dorsal valve braced by a wide sclerotized ring; no hinge sclerites; internal sac basally lined with weakly sclerotized tubercles of increasing size and sclerorization, and gradually transformed into strong curved teeth; saccus lined with numerous small rounded tubercles, followed by a smooth zone; distal bulb with minute needles. Basal strut (Fig. 17) with long and narrow keel; lateral lobes fused on slightly more than half their length; apex of parameres with three long and four smaller setae.

Female. Similar to male, but last visible tergite less convex, slanted about 30° from vertical; base of ventrite 1 without patch of white setae; ventrite 5 twice longer than ventrite 4.

Etymology

Specific epithet derived from the locus typicus, Phú An village in Lâm Đồng Province; samples were collected along the road to the Pongour waterfalls (11°40’42”N 108°17’24”E, 849 m. a.s.l.).

Host plants

Larvae develop in the seeds of two species of *Dendrolobium* (Leguminoseae, Fabaceae, Desmodieae).

Discussion

Like *B. phuanensis, B. meibomiaca* is characterized by the absence of sclerite in the saccus, but in the latter species, the basal half of the internal sac is lined with strands of strong sclerotized teeth instead of weakly sclerotized tubercles (compare external morphologies in the key below).

Distribution

Vietnam.

***Bruchidius urariae* n. sp.**

Type material

Holotype: Male, VIETNAM, Đồng Nai Province, Vĩnh Cửu, forêt Vĩnh An, 26.ii.2009, ex *Uraria crinita,* H. & A. Delobel coll., MNHN. Paratypes: 5 males, 6 females, same data as holotype, 1 male dissected (slide 02309), MNHN (7), CBAD (4).

Description

Length (pronotum-pygidium): 1.7-1.8 mm; width: 1.2-1.3 mm.

Body (Fig. 5) stout, rather thick, pygidium slanted about 10° from vertical. Integument black; antennal segments 1-4(5) testaceous, (5)6 partly darkened, 7-11 brown to black, four anterior legs brown basally, tibiae and tarsi testaceous, posterior legs black except tarsi, reddish. Vestiture dark brown and whitish, with a few yellowish setae on pronotal midline and on first two elytral intervals; pygidium with dense white pubescence on basal fourth, less dense and greyish on rest of tergite; ventral side with short and greyish setae, upper parts of mesepimeron, metepisternum and metepimeron with dense white setation.

Male. Head elongated; eyes strongly bulging, maximum head width about 1.5 times width behind eyes; eyes separated by 0.28 times head width including eyes; face long and moderately narrow, with distance between posterior rim of eyes and apex of clypeus / distance between eyes = 2.8; eye moderately cleft, width at bottom of sinus composed of 7-8 ommatidia; maximum width of postocular lobes equal to two ommatidia; carina on frons well defined, shining, interocular tubercle distinct. Punctation of face irregular, dense and shallow, apical half of clypeus smooth. Antenna (Fig. 21) long, measuring a little more than half body length; segments 1 to 4 submoniliform, 4 and 5 of equal length, slightly widened apically, 6-10 moderately eccentric, 7-10 slightly wider than long, 11 oval (L/W = 1.6). Length of antennomeres: 1.5; 1.0; 0.8; 1.3; 1.4; 1.5; 1.5; 1.5; 1.5; 1.4; 2.6.

Pronotum conical, with greatest width at base (W/L = 1.62), its sides straight, not expanded behind eyes; rather strongly bulging, without oblique impression on sides of

basal lobe. Pronotum disc with small, dense, coalescent punctures, not ocellate. Elytra 1.05 times longer than combined width, their sides convex; disc flattened; two blunt, closely spaced teeth at base of interstriae 3 and 4. Striae on disc deep and wide, with strong punctures; interstriae flat, with strong microsculpture and punctation.

Hind femora strongly incrassate, at their widest 2.0 times wider than mid femora; mesoventral margin with small triangular preapical denticle; hind tibia short, apically strongly widened, with dorsomesal and ventral carinae complete, lateral not reaching base; apex of tibia with mucro 1.2 times width of tarsomere 1 at base; lateral denticle less than half mucro length, and dorsal denticles short.

Abdomen with ventrite 5 emarginate, its length medially a little less than half of sternite 4; ventrite 1 basally with a large patch of short, thin, erect setae. Last visible abdominal tergite shield-shaped, 1.1 times wider at base than long, its disc strongly convex, with apex turned under.

Genitalia: Median lobe (Fig. 19) stout (maximum width excluding basal hood / total length = 0.22), apically widened; basal hood ovate, not emarginate; ventral valve triangular, short and wide, its apex acute, bearing two lateral groups of 4-5 setae; dorsal valve braced by a sclerotized ring; no hinge sclerites; internal sac lined basally with weakly sclerotized semicircular tubercles; saccus smooth, with a few sensillae and three moderately elongated sclerites, each with 7-8 strong thorns; constriction at apex of saccus with minute short denticles, apical part of distal bulb with minute needles oriented towards gonopore. Basal strut (Fig. 20) elongated, without keel; lateral lobes fused on 70% their length; apex of parameres with six setae of various sizes.

Female. Similar to male,but last ventrite is bout 2 to 3 times longer than ventrite 4; the last visible tergite is not turned under, less convex than in male; it is almost devoid of setation in the centre, which leaves a shining and slightly shagreened, heart-shaped or triangular area on the disc.

Etymology

Latin genitive (feminine) of the host plant generic name.

Host plants

Larvae develop in the seeds of *Uraria crinita* (Desmodieae); the species is widespread in tropical Asia, from Southern China and the Ryukyu Islands to Southern India and Java (ILDIS 2010).

Discussion

External morphology is similar with *B. anderssoni*, but the latter is smaller (1.2-1.3 mm compared with 1.7-1.8 mm for *urariae*); its internal sac shows two crescent-shaped sclerites and two strands of long denticles; its basal strut has a large keel, a feature that is completely absent in *urariae*.

Distribution

Vietnam.

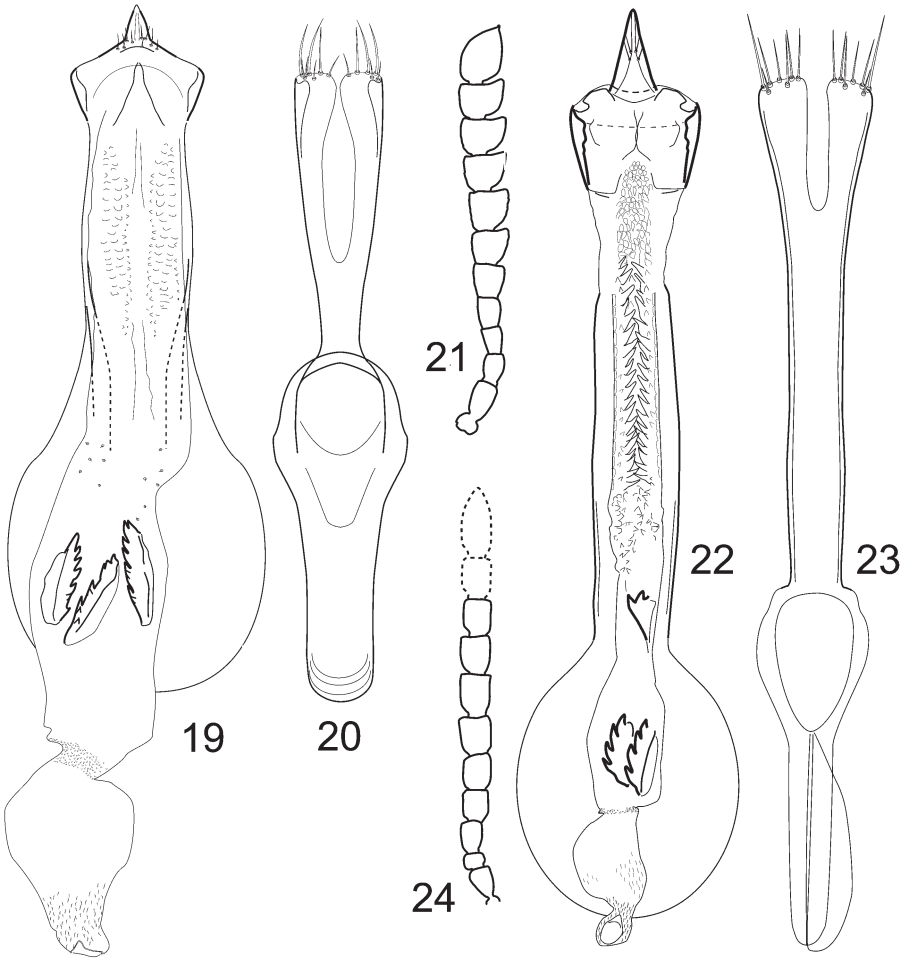
Bruchidius vinhanensis n. sp.

Type material

Holotype: Male, VIETNAM, Đồng Nai Province, Vĩnh Cửu, forêt Vĩnh An, 19.i.2006, ex *Desmodium styracifolium*, A. Delobel coll., MNHN. Paratypes, 2 males, 4 females, same data as holotype, 1 male dissected (slide 02007), MNHN (4), CBAD (2).

Description

Length (pronotum-pygidium): 1.2-1.4 mm; width: 0.8 mm.



19-24. Genitalia of mal: 19-21 − *Bruchidius urariae*; 22-24 − *B. vinhanensis*; 19, 22 − median lobe; 20-23 − lateral lobe and tegminal strut; 21-24 − antenna

Body (Fig. 6) stout, rather thick, pygidium subvertical. Integument black; antennae light brown (segments 10-11 missing in all three male specimens), four anterior legs testaceous, with femora and last tarsomeres brown to black, posterior legs black. Vestiture made of thin setae, not concealing integument; whitish to grey setae are intermixed with yellowish setae over pronotum and elytra, while dark brown setae form an incomplete transverse stripe between half and two third of elytra; white setae are denser on basal lobes and sides of pronotum, on upper part of meso and metasternites, also on two elongated spots on 3rd elytral interval, and form a lateral triangular area before midlength of elytra.

Male. Head short, wide; eyes strongly bulging, maximum head width about 1.5 times width behind eyes; eyes separated by 0.25 times head width including eyes; face wide, with distance between posterior rim of eyes and apex of clypeus / distance between eyes = 2.6; eye deeply cleft, width at bottom of sinus composed of 4-5 ommatidia; maximum width of postocular lobes equal to a single ommatidia; carina on frons well defined, shining, interocular tubercle distinct. Punctation of face small, dense, clypeus alutaceous. Antenna (Fig. 24) with segments 3-5 of increasing width, 2 very short, about half as long as 3, 3 and 4 of equal length, 4-9 not widened apically, almost symetrical, rectangular, much longer than wide. Length of antennomeres: 1.6; 1.0; 1.9; 1.9; 2.1; 2.1; 2.4; 2.3; 2.2.

Pronotum wide, campaniform, with greatest width at base (W/L = 1.5), not expanded behind eyes; moderately bulging, without oblique impression on sides of basal lobe. Pronotum disc with dense, large, ocellate, contiguous punctures. Elytra 1.1 times longer than combined width, their sides convex; disc flattened; two teeth at base of interstriae 3 and 4. Striae on disc narrow and shallow; interstriae flat, with strong microsculpture.

Hind femora moderately incrassate, at their widest 1.7 times wider than mid femora; mesoventral margin with short, obtuse preapical denticle; hind tibia apically moderately widened, with dorsomesal and ventral carinae complete, lateral not reaching base, ventrolateral not reaching apex; apex of tibia with mucro slightly longer than width of tarsomere 1 at base; lateral denticle short, about 30% mucro length, and dorsal denticles minute.

Abdomen with ventrite 5 emarginate, ventrites 2-5 strongly telescoped; ventrite 1 basally without a patch of short or dense setae. Last visible abdominal tergite subtriangular, 1.07 times longer at base than wide, with apex turned under.

Genitalia: Median lobe (Fig. 22) slender (maximum width excluding basal hood / total length = 0.14), apically widened, narrowed before apex ; basal hood small, circular, not emarginate; ventral valve acutely triangular, with apex acute, bearing a central group of four setae; dorsal valve braced by a wide sclerotized ring; no hinge sclerites; internal sac lined basally with small weakly sclerotized tubercles, followed by a double series of moderately sclerotized hooked teeth; saccus smooth, with a proximal triangular slerite with two large teeth and distally a pair of strongly dented sclerites; distal bulb with aciculate spicules, specially around gonopore. Basal strut (Fig. 23) with a large keel; lateral lobes fused on 75% their length; apex of parameres with seven setae.

Female. Similar to male, but antennae shorter, segments 6-10 transverse, darker: in some specimens only apical margin of segments darkened, in other specimens segments

6-11 black; last visible tergite not bulging, less convex, slightly more elongated than in male, with a median and two lateral longitudinal lines of dense white setation.

Etymology

The specific epithet refers to the village of Vĩnh An, capital of the Vĩnh Cửu district, Đồng Nai Province. Specimens were collected in the Vĩnh An (or Trị An) forest, about 10 km north of Vĩnh An (11°11'44 N, 107°03'16 E)

Host plants

Larvae develop in *Desmodium styracifolium* seeds (Leguminoseae, Fabaceae, Desmodieae); this host is common in Southern Asia and Southeast Asia, from India to Southern China and the Philippines (ILDIS 2010).

Discussion

Quite similar with *B. alysicarpi* Delobel, except for shape and length of antennal segments in male. Main differences in genital morphology are as follows: shape of ventral valve (more slender and pointed in *alysicarpi*); arrangement and number of large pointed tubercles of internal sac; shape of proximal sclerite in saccus; parameres fused to 75% (40% in *alysicarpi*).

Distribution

Vietnam.

KEY TO *BRUCHIDIUS* SPECIES ASSOCIATED WITH DESMODIEAE IN VIETNAM

The following key is mainly based on colour characteristics of both integument and setation, and is meant to provide a practical way of identifying specimens bred from Desmodieae seeds. It must however be stressed that all these species are closely related with each other, and often uneasily distinguished. The key is designed for males, but females will be correctly identified in most cases.

1. Antenna testaceous or light brown, sometimes darkened medially or apex of terminal segments darkened ……..……. 2
–. Antenna black or dark brown, with base testaceous or reddish (includes specimens with 3 to 5 basal segments reddish ventrally); elytral integument black ….. 10
2. Base of posterior femora black, rest reddish-brown ……..……. 3
–. Posterior legs entirely black; sometimes a red tinge on mesial side and/or tarsomeres 3-4 more or less reddish) ……..……. 7
3. Elytron entirely black, with two basal teeth ……..……. 4
–. Elytron partly testaceous or brown ……..……. 5
4. Larger species (1.7 mm), antenna light testaceous; antennal segments 1-3 moniliform ……..……. *meibomiaca* Arora
–. Smaller species (1.4 mm), antenna light brown with apical half darkened; antennal segments 1-4 moniliform ……..……. *alacer* Delobel

5. Elytron mostly black, only extreme apex testaceous ….…….. *desmodei* Arora
–. Entire disc of elytron testaceous ……..…….. 6
6. Large species (2 mm), with pronotum partly brown; elytron with two basal teeth ……..……. *dendrolobii* n. sp.
–. Smaller species (1.5 mm), with black pronotum; elytron with a very small basal tooth ……..……. *christiae* n. sp.
7. Antenna more or less darkened centrally, last segment lighter than preceeding ones ……..…….. *nebulatus* n. sp.
–. Antenna testaceous, last segments sometines darkened ……..…….. 8
8. Antennal segments 5-8 subtriangular, almost as wide as long … *alysicarpi* Delobel
–. Antennal segments 5-8 subrectangular ……..…….. 9
9. Small species (1.2-1.4 mm), with grey and black vestiture….... *vinhanensis* n. sp.
–. Larger species (1.9-2.4 mm), with yellowish vestiture and brown spots …… ..……. *phuanensis* n. sp.
10. Posterior legs entirely black ……..…. 11
–. Posterior legs partly reddish or brown ……..…….. 14
11. Elytral vestiture variegated, whitish with dark markings ……..…….. 12
–. Elytral vestiture uniform ……..…….. 13
12. Antenna shorter, measuring less than 70% body length; a large and well defined black area beyond middle of elytron ……..…….. *brincki* Decelle
–. Antenna longer, measuring about 90% body length; black lateral area of elytron smaller, poorly defined .. *anderssoni* Decelle (specimens with black posterior legs)
13. Elytral base with a small basal tooth; antennal segments 5-10 wider than long ……..…….. *mussooriensis* Arora
–. Elytral base without tooth; antennal segments 5-10 longer than wide …..... ..……. *mendosus* (Gyll.)
14. Smaller species (1.2-1.3 mm), elytra elongated (1.2 times longer than wide together), with a small basal tooth or a blunt tubercle. Antenna almost as long as body length (excluding head), its apical segments black; posterior tarsi black ……..…….. *anderssoni* Decelle (specimens with posterior legs partly red)
–. Larger species (1.7-1.8 mm), elytra short (1.05 times longer than wide together), with 2 distinct basal teeth. Antenna shorter, with apical segments not black, but dark brown; pronotum black with only a few yellow and whitish spots; posterior tarsi reddish ……..…….. *urariae* n. sp.

In any case, dissection and examination of male genitalia will be of primary interest. The above-mentioned species can be distributed in four categories according to the number of sclerites present in the saccus. Most of them show a single large sclerite in the proximal region; this odd sclerite is roof or gutter-shaped, its less sclerotized parts are an extension of the saccus wall, while the more or less dented but always strongly sclerotized part protrudes in the lumen - a similar structure has been observed in the *Bruchidius subarmatus* species group (Delobel, 2009). Usually a pair of strong, dented, rod or crescent-like sclerites exists distally to the former one; *B. alacer, alysicarpi, brincki,*

dendrolobii, desmodei, mussooriensis, nebulatus, and *vinhanensis* possess these three sclerites. The odd sclerite is absent in *B. anderssoni* and *B. mendosus*; in *B. christiae*, the structure of the saccus is particular, with a large crescentic odd sclerite and a pair of strong teeth; the saccus of *B. meibomiaca* and *B. phuanensis* does not possess any sclerite. One species, *B. urariae*, differs from all others in having three distal dented sclerites, and no proximal sclerite; its ventral valve is also wider, bears a higher number of setae, and these are located at a lower level, its basal strut is devoid of carina; *B. urariae* apparently belongs to a different group of species. It should be mentioned finally that the particular three sclerite structure is not unique to Desmodieae-associated *Bruchidius*: it is met for example in *B. nalandus* (Pic), a species that is known to feed in *Tephrosia* (Fabaceae, Millettieae) seeds (Decelle 1985; Delobel 2010a).

CONCLUSION

The key above does not include a number of related Indian species described by Arora (1977, 1980) without any knowledge of their biology, namely: *B. anusurindri, B. blemeris, B. compositus, B. dorsivalvia, B. flapoparamerica, B. kashmirensis, B. microminutus, B. obscurus, B. orientale*, and *B. swalikus*. Because of their morphological similarity with species bred in Vietnam from Desmodieae seeds, it may be hypothesized that some of these species will eventually be found to share the same biology.

Sixteen or 17 species of Desmodieae belonging to ten different genera are presently known to be predated upon by *Bruchidius* species in Asia; a list of these host plants is given below.

Genus *Alysicarpus*:
On *A. monilifer*: *B. mendosus* (with doubt); on *A. vaginalis: B. alacer, B. alysicarpi, B. mussooriensis*.

Genus *Christia*:
On *C. pierrei: B. christiae.*

Genus *Dendrolobium*:
On *D. umbellatum: B. meibomiaca*; on *D. rugosum: B. dendrolobii, B. phuanensis*; on *D.* sp: *B. phuanensis.*

Genus *Desmodium*:
D. gangeticum: B. anderssoni; *D. heterocarpon: B. brincki, B. nebulatus*; *D. styracifolium: B. vinhanensis*; *D. triflorum: B. alacer.*

Genus *Lespedeza*:
On *L. bicolor: B. japonicus.*

Genus *Phyllodium*:
On *P. pulchellum: B. desmodei*; on *P. vestitum: B. desmodei*.

Genus *Pycnospora*:
On *P. lutescens: P. nebulatus*.

Genus *Tadehagi*:
On *T. triquetrum: B. minutissimus, B. meibomiaca* (with doubt).

Genus *Uraria*:
On *U. crinita: B. urariae*.

Presently available data seem to indicate a clear trend towards stenophagy and a high level of specialization among species studied here. Information on seed beetles infesting such a large group of Leguminous hosts as Desmodieae remains however scanty. This is due in part to a particular seed dispersal mechanism in the tribe, and also to the small size of seeds: large seed samples are often uneasy to gather, and adults are usually very small, extremely similar in appearance, and therefore difficult to identify precisely. For those reasons, it does not seem sensible at the moment to discuss host plant insect relationships in this interesting biological group; further research may reveal a much larger number of variously related species.

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