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## New data on *Spermophagus* from Vietnam, with the description of a new species (Coleoptera: Chrysomelidae: Bruchinae: Amblycerini)

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ABSTRACT. We report on several *Spermophagus* species that were reared from Convolvulaceae and Malvaceae seed samples collected in the southern part of Vietnam. *S. takuensis*, a new species reared from *Poranopsis* seeds, is described in the *S. stemmleri* species group. The larval food plants of 13 of the 18 *Spermophagus* species in the fauna of Vietnam are now identified. Biological data on Oriental *Spermophagus* are discussed.

Key words: entomology, taxonomy, Convolvulaceae, Malvaceae, *Ipomoea*, *Merremia*, *Poranopsis*, *Urena*, *Xenostegia*, larval diet.

### INTRODUCTION

Our present knowledge of Oriental *Spermophagus* is fragmentary. BOROWIEC's revision of the genus (1991) recorded 31 species in the Eastern paleotropical region; since then, 14 species of the same geographical origin have been described (ANTON 1993, 1996, 1999a, b, 2000, BOROWIEC 1995, DELOBEL, 2008). For Vietnam, BOROWIEC (1991) mentions ten species: *S. abdominalis* (F.), *S. aeneipennis* PIC, *S. drak* BOROWIEC, *S. ligatus* CHEVROLAT, *S. mannarensis* DECELLE, *S. negligens* PIC, *S. niger* MOTSCHULSKY, *S. perpastus* LEA (= *pfaffenbergeri* BOROWIEC), *S. variolosopunctatus* GYLLENHAL and *S. vietnamensis* BOROWIEC. Four more species, *S. cornutus* DELOBEL, *S. insularis* DELOBEL, *S. titivilitius* BOHEMAN et *S. voarum* DELOBEL were recently added to the list of *Spermophagus* in the fauna of Vietnam (DELOBEL 2008).

In this paper we address primarily the question of relationships between Oriental *Spermophagus* species and their host plants. As known host plants of *Spermophagus*

belong to two botanical families, Malvaceae and Convolvulaceae, we collected fruits of different plants belonging to these two families during years 2008-2011; techniques used for sample collection and seed beetles rearing were identical with those described by DELOBEL & DELOBEL (2003). Malvaceae were identified in PHAM-HOÀNG HỒ's 'Flore illustrée du Vietnam' (2002), and Convolvulaceae in the Flora of China (RHUI-CHENG & STAPLES 1995).

A review of all species known from Vietnam is given here, together with available biological data. A species reared from seeds of a Convolvulaceae belonging to genus *Poranopsis* is also described; additional data are given on the morphology of *S. drak* BOROWIEC 1991, the description of which was accidentally cut off at printing; the first author thanks LECH BOROWIEC for his help on that occasion. Geographical distribution of species is based on BOROWIEC's (1991) review, to which numerous original records have been added.

Abbreviations used: MNHN, Muséum national d'Histoire naturelle, Paris; CBAD, A.D.'s collection; CKWA, K.W.A.'s collection.

### ***Spermophagus aeneipennis* PIC, 1917**

Previously recorded from seeds of *Ipomoea pes-tigridis* (Convolvulaceae) (BOROWIEC 1991); but see chapter Discussion. Distribution: India, Nepal, Sri Lanka, Thailand, Laos, Vietnam.

### ***Spermophagus abdominalis* FABRICIUS, 1781**

Reared from seeds of Convolvulaceae *Ipomoea hederacea* (Vung Tau, March 2011), *I. indica* (Xuyen Moc, February 2008), *I. obscura* (Binh Chanh, February 2008; Vung Tau, January 2010), *I. pileata* (Dau Tieng, January 2011), *I. triloba* (Binh Thanh, January 2010), *Merremia hirta* (Ben Cat, February 2011). Previously recorded from *Ipomoea aquatica*, *I. pes-tigridis*, *I. purpurea* (BOROWIEC, 1991), and *I. pes-tigridis*, *Merremia hederacea*, and *Xenostegia tridentata* by DELOBEL (2008). Distribution: Tropical Africa and Asia, China, Japan, Korea, Eastern Russia.

### ***Spermophagus albosparsus* GYLLENHAL, 1833**

Reared from *Hibiscus surattensis* (Malvaceae) seeds (Vung Tau, January 2010). Distribution: India, Nepal, Sri Lanka, Bangladesh, Myanmar, Thailand, Laos, Vietnam, Malaysia.

### ***Spermophagus cornutus* DELOBEL, 2008**

Previously reared in Vietnam from seeds of *Merremia umbellata orientalis* (Convolvulaceae). Distribution: Vietnam.

***Spermophagus drak* BOROWIEC, 1991**

Reared from seeds of *Urena lobata* (Malvaceae) (Cu Chi, February 2008). BOROWIEC's (1991) original description should be completed as follows:

The first ventrite in male possesses a remarkable feature: a large and elongated speculum, rimmed with strong reddish setae. Median lobe moderately short (maximum width excluding basal hood/overall length = 0,19), slightly widened apically; ventral valve an equilateral triangle, with transparent and obtuse apex, and numerous sensilla; internal sac devoid of granules, tubercles or sclerites, but with a series of transversal constrictions, followed by a group of setiform needles; saccus smooth; gonopore very feebly sclerotized. Tegminal strut narrow, with strong carina; basal plate with a subtriangular sclerite, and rounded apex; lateral lobes very large, tape-like, bearing a series of strong setae on internal side ending at 3/4 of lobe length, and short setae on whole length of outer side.

Female similar to male, except base of first ventrite with a small area devoid of setation, ventrite 5 not emarginate; antenna hardly shorter than in male. Genitalia: ovipositor of «standard» type; sternite 8 with a rather short *spiculum gastrale*; segment 9 short, with short dorsal longitudinal apodemes, ending well before apex of apical lobes. Apical lobes short, blunt; base of pecten widened, pubescent suture present, slanted.

Holotype and five paratypes bearing mentions "Vietnam, M'Drak, E. of Ban Me Thuot, 4-600m, 8-19.XII.60", "C.M. Yoshimoto collector", deposited in the Bishop Museum. Distribution: China, Thailand, Laos, Vietnam, Malaysia.

***Spermophagus insularis* DELOBEL, 2008**

Previously reared in Vietnam from seeds of *Merremia umbellata orientalis* (Convolvulaceae). Distribution: Vietnam.

***Spermophagus johnsoni* BOROWIEC, 1985**

No known host plant. Distribution: Myanmar, Thailand, Laos, Vietnam, Malaysia.

***Spermophagus ligatus* CHEVROLAT, 1877**

No known host plant. Distribution: India, Myanmar, Thailand, Laos, Vietnam.

***Spermophagus longepygus* ANTON, 1993**

No known host plant. Distribution: Tadjikistan, India, Nepal, China, Thailand, Laos, Vietnam, Malaysia, Indonesia.

***Spermophagus mannarensis* DECELLE, 1986**

Reared from seeds of *Merremia hederacea* (Nha Be, January 2008; Binh Thanh, January 2010; Saigon, January 2011) and *Ipomoea triloba* (Vung Tau, March 2011); previously reported from Vietnam by BOROWIEC (1991), who reports it also from Mangalore (India) from seeds of *M. chryseides* (a synonym of *M. hederacea*). Intercepted in Washington in a batch of seeds of *Hibiscus esculenta* (Malvaceae); the relationship between the seed beetle and the latter plant clearly deserves further clarification.

That species belongs to the *Spermophagus mannarensis* species-group as defined by BOROWIEC (1991) and redefined by ANTON (1993). It differs from *S. coimbatorensis* BOROWIEC in shape of the transversal plate of tegmen and number of setae on the internal side of lateral lobes and from *S. rajasthanicus* ANTON in shape of the ventral valve and number of setae on lateral lobes. Distribution: India, Sri Lanka, Thailand, Laos, Vietnam, The Philippines.

***Spermophagus negligens* PIC, 1917**

Previously reared from seeds of *Urena lobata* in Vietnam (DELOBEL, 2008). Distribution: Myanmar, Thailand, Laos, Vietnam, Indonesia, China.

***Spermophagus niger* MOTSCHULSKY, 1866**

Reported in India from *Urena lobata* and an unidentified *Hibiscus* species (BOROWIEC, 1991). Distribution: India, Nepal, Bhutan, China, Taiwan, Thailand, Vietnam, Malaysia, Indonesia, The Philippines.

***Spermophagus perpastus* LEA, 1899**

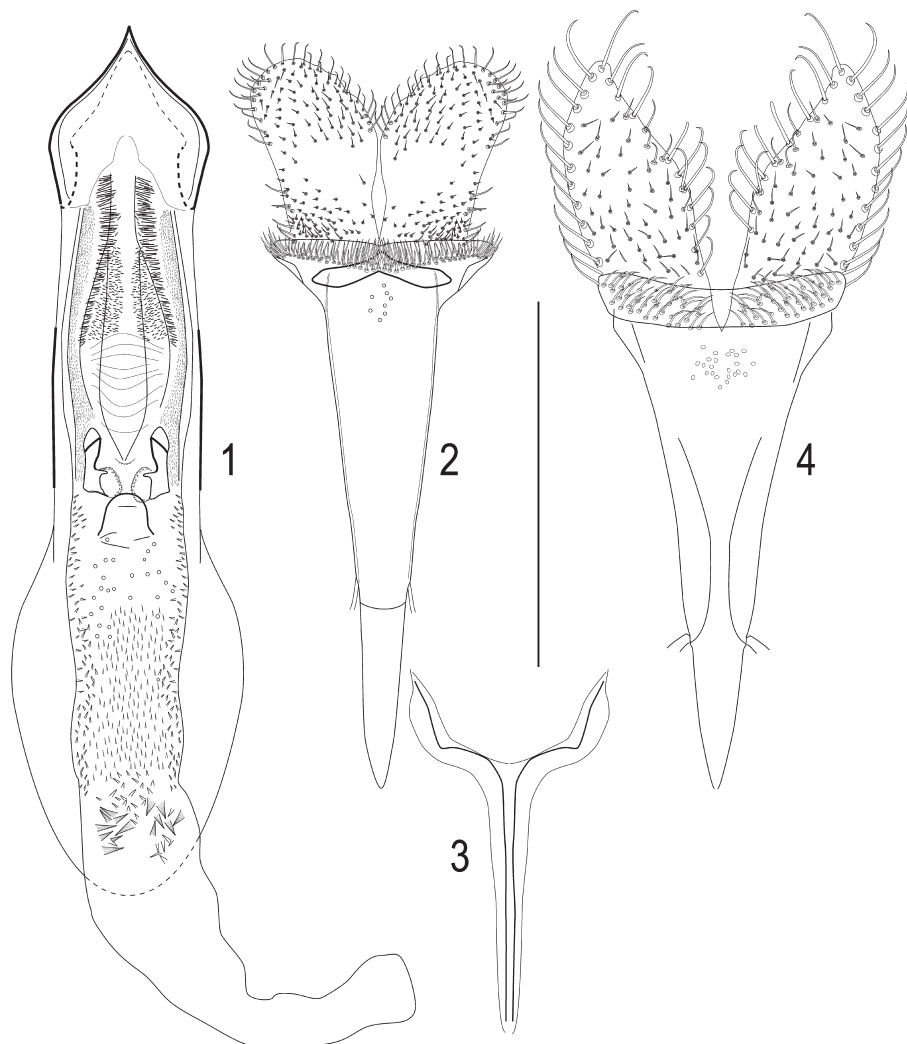
(syn. *Spermophagus pfaffenbergeri* BOROWIEC, 1986)

Reared from seeds of Convolvulaceae *Ipomoea pileata* (Dau Tieng, January 2011), *I. triloba* (Binh Thanh, January 2010) and *Xenostegia tridentata* (Saigon, February 2008). Previously reported in India from seeds of *Ipomoea pes-tigridis* (BOROWIEC, 1991). Specimens from Indonesia (Java, Soerabaja 1938) deposited in Museum Leiden, The Netherlands, were reared from fruits of *Ipomea hederacea*. Distribution: India, Sri Lanka, Myanmar, Thailand, Laos, Vietnam, Indonesia, Australia, The Philippines.

***Spermophagus takuensis* n. sp.****TYPE MATERIAL**

Holotype: Male, "VIETNAM, Prov. Binh Thuân, Thuan Nam, Nui Ta Ku, 15 fev. 2011, ex *Poranopsis* pr. *sinensis*, Trang Cong Hoang & A. Delobel coll.", "*Spermophagus takuensis* n. sp., A. Delobel & K.-W. Anton des. 2011", MNHN. Paratypes: 6 males and 5 females, same data as holotype, one male dissected (slide 00211), MNHN, CKWA, CBAD.

*S. takuensis* is a new member of the *stemmleri* species group (ANTON 1999). This group consists in three oriental species, *S. atrispinus* BOROWIEC, 1995 from India, Nepal, Thailand, Laos and China, *S. montanus* ANTON, 1999 from Laos, and *S. stemmleri* DECELLE, 1977 from Afghanistan, Pakistan, Bhutan, Thailand, Laos and China. Males in this group are characterized by the presence of long erect setae on ventral side of antenna, internal sac with a pair of sclerites in the middle, and lateral lobes divided into small ventral lobes and large tape-like dorsal lobes.



1-4. *Spermophagus* male genitalia: 1-3 – *Spermophagus takuensis* n. sp., ventral view (1 – median lobe; 2 – tegmen; 3 – spiculum gastrale); 4 – *Spermophagus montanus* ANTON, ventral view of tegmen. Scale: 0.5 mm

## DESCRIPTION

Length (pronotum-pygidium): 2.2-3.0 mm; width: 1.6-1.9 mm.

Integument black; hind tibial spines reddish, claws apically lightened.

Vestiture thin, moderately dense, not completely covering body surface, ventrally yellowish grey on sternites, with margins of segments yellowish red; dorsally predominantly yellowish grey with apex of elytra black and a dark brown pattern on pronotum and anterior 2/3 of elytra. Last visible tergite with dense vestiture of longer setae, yellowish grey basally, brownish medially.

Body 1.9 times longer than deep. Head short, eyes transverse, separated by only 0.15 times head width including eyes; distance between posterior rim of eyes and apex of clypeus / distance between eyes = 3.9 (5.0 times including labrum); eye cleft to about half of its length, width at bottom of sinus composed of 6-7 ommatidia; frons and vertex convex, without interocular carina or tubercle, with deep punctures, very dense near eyes. Antennae moderately long, extending to basal 1/4<sup>th</sup> of elytra; segment 3 shorter than 1, longer than 2, 5 square, 6-10 longer than wide, 11 twice as long as wide. Length of antennomeres: 3.2; 1; 1.6; 1.3; 1.6; 2.1; 2.7; 2.8; 2.7; 2.5; 3.5.

Pronotum short and transverse, about 1.8 times wider than long, pronotum disc doubly punctured, coarse punctures elongate, particularly dense on posterior and lateral parts of disc. Lateral margin in lateral view convex. Scutellum triangular.

Elytra about as long as wide together, with maximum width at midlength. Humeral calli distinct. Striae with dense round punctures, intervals with dense micropunctures and a few irregularly spaced larger ones.

Ventrites without impressions or tubercles. Hind legs without sexual characters; hind tibiae with lateral carina smooth, dorso-lateral carina sharp on basal 4/5<sup>th</sup>; apical spines sharp, longer than greatest width of tibia, subequal; claws with large tooth.

Male. Ventral margin of antennal segments 3-9 with row of long erected setae; segments 10-11 each with a single similar seta. Abdomen moderately telescoped, sternite 5 emarginate to half of its length, last visible tergite slightly wider than long ( $L/L = 1.1$ ), with maximum convexity at apical third.

Genitalia: Median lobe (Fig. 1) oblong, widened apically, ventral valve pentagonal, with acute tip, dorsal valve with angulated widening in the middle, less acute apically. Internal sac with a pair of particular sclerites in the middle, each bearing basally a circular dented vesicle, followed by a thinly sclerotized odd plate; apical half with a pair of long lateral strands of granules and two large strands of small setae oriented transversally; basal part of median lobe first lined with numerous transparent spines, followed by two small groups of larger, more sclerotized spines, rest of lobe smooth. Lateral lobes (Fig. 2) strongly modified, each one divided into dorsal and ventral lobes; dorsal lobes tape-like, with rounded tip, margins with about 25 long setae, ventral surface with numerous short setae; ventral lobes fused, short, with numerous long and strong setae. Basal plate long and moderately widened apically, bearing near apex a transversal sclerotized area. Spiculum gastrale modified (Fig. 3).

Female similar to male, but antennae shorter, reaching slightly beyond elytral base, and ventral margin of antennal segments without erected setae. Abdomen less telescoped, ventrite 5 only slightly emarginate.

## ETYMOLOGY

The specific name refers to type locality, on slopes of Mount Takou (Núi Tà Kú) near Phan Thiet, 10°49'15"N, 107°53'08"E, about 250m. a.s.l.

## BIOLOGY

The larva feeds in fruits of a species close to, but different from *Poranopsis sinensis* (Hand.-Mazz.) Staples. This herbaceous climber develops on the lower slopes of mount Takou. At the time of adult emergence, yellowish, empty egg shells remain attached to fruit envelope enclosed within the three papery outer sepals of the host.

## DISTRIBUTION

Vietnam.

## REMARKS

Of the three species in the *stemmleri* group, the new species is most closely related to *S. montanus*, from which it differs in details of male genitalia. The median lobe of *takuensis* is wider apically, with dorsal valve particularly widened; apical transversal setae are much shorter than in *montanus*; the paired median sclerites are associated with two circular vesicles (only one in *S. montanus*); the dorsal lobes of parameres are apically rounded (acute in *montanus*, see Fig. 4), marginal setae are shorter and less numerous in *takuensis*; the basal plate of *montanus* lacks the transversal sclerotized plate observed in *takuensis*.

Three other *Spermophagus* feed in seeds of Convolvulaceae belonging to tribe Poraneae (BOROWIEC 1991, 1995): *S. atrispinus* BOROWIEC, *S. sinensis* PIC, from India, Nepal, Bhutan, Thailand, Laos and China, and *S. sophorae* FAHRAEUS, an African species also present in India and Sri Lanka. All were reared from *Porana racemosa* seeds. Of these, only *atriispinus* belongs to the *stemmleri* group, while the host plants of *montanus* and *stemmleri* remain unknown.

***Spermophagus titivilitius* BOHEMAN, 1833**

Reared from Convolvulaceae *Ipomoea pes-caprae* (Tien Phu, February 2011) and *Merremia umbellata orientalis* (Binh Chanh, February 2008). Previously reported in Vietnam from *Ipomoea aquatica* seeds (DELOBEL, 2008). Distribution: India, Thailand, Laos, Vietnam, Malaysia, Indonesia.

***Spermophagus variolosopunctatus* GYLLENHAL, 1833**

No known host plant. Distribution: India, Nepal, China, Taiwan, Thailand, Laos, Vietnam, Malaysia, Indonesia.

***Spermophagus vietnamensis* BOROWIEC, 1991**

No known host plant. Distribution: Vietnam.

***Spermophagus voarum* DELOBEL, 2008**

Previously reared from seeds of *Urena lobata*. Distribution: Vietnam.

## DISCUSSION

In Table 1 are gathered host plant data concerning Oriental *Spermophagus* having at least one known larval host plant. These belong to a few genera of Malvaceae (*Hibiscus*, *Urena*) and Convolvulaceae (*Ipomoea*, *Merremia*, *Porana*, *Poranopsis*, *Xenostegia*). Biological information on the genus *Spermophagus* is too scanty to enable us to hypothesize on host-plant relationships within this particular group of seed-beetles, and this is true for Oriental species as well as for species in other regions of the world

Table 1. Host plants of East Paletropical *Spermophagus*. In the third column, C (Convolvulaceae) and M (Malvaceae) indicate the botanical family of the hosts; <sup>1</sup>BOROWIEC 1991; <sup>2</sup>DELOBEL 2008; <sup>3</sup>present article.

Species Group	Species	Host plants
<b><i>albosparsus</i></b>	<i>albosparsus</i>	M - <i>Hibiscus surattensis</i> <sup>3</sup>
	<i>kuskai</i>	M - <i>Abelmoschus esculentus</i> <sup>1</sup>
	<i>negligens</i>	M - <i>Urena lobata</i> <sup>1</sup>
<b><i>bengalicus</i></b>	<i>bengalicus</i>	M - <i>H. cannabinus</i> <sup>1</sup>
<b><i>cederholmi</i></b>	<i>cederholmi</i>	C - <i>Ipomoea pes-tigridis</i> <sup>1</sup>
	<i>perpastus</i>	C - <i>I. pes-tigridis</i> <sup>1,2</sup> , <i>I. pileata</i> <sup>3</sup> , <i>I. triloba</i> <sup>3</sup> , <i>I. hederacea</i> <sup>3</sup> , <i>Xenostegia tridentata</i> <sup>3</sup>
<b><i>ceylonicus</i></b>	<i>ceylonicus</i>	C - <i>Hewittia bicolor</i> <sup>1</sup>
<b><i>johnsoni</i></b>	<i>insularis</i>	C - <i>Merremia umbellata</i> <sup>2</sup>
<b><i>mannarensis</i></b>	<i>cornutus</i>	C - <i>M. umbellata orientalis</i> <sup>2</sup>
	<i>mannarensis</i>	C - <i>I. triloba</i> <sup>3</sup> , <i>M. hederacea</i> <sup>1,3</sup> ; M - <i>H. esculenta</i> <sup>1</sup>
<b><i>niger</i></b>	<i>aeneipennis</i>	C - <i>I. pes-tigridis</i> <sup>1</sup>
	<i>drak</i>	M - <i>U. lobata</i> <sup>3</sup>
	<i>niger</i>	M - <i>H. sp.</i> <sup>1</sup> , <i>U. lobata</i> <sup>1</sup>
	<i>voarum</i>	M - <i>U. lobata</i> <sup>2</sup>
<b><i>sophorae</i></b>	<i>sophorae</i>	C - <i>I. obscura</i> <sup>1</sup> , <i>P. racemosa</i> <sup>1</sup>
<b><i>stemmleri</i></b>	<i>takuensis</i>	C - <i>Poranopsis pr. sinensis</i> <sup>3</sup>
<b><i>titivilitius</i></b>	<i>abdominalis</i>	C - <i>I. aquatica</i> <sup>1</sup> , <i>I. hederacea</i> <sup>3</sup> , <i>I. indica</i> <sup>3</sup> , <i>I. obscura</i> <sup>3</sup> , <i>I. pes-tigridis</i> <sup>1,2</sup> , <i>I. pileata</i> <sup>3</sup> , <i>I. purpurea</i> <sup>1</sup> , <i>I. quamoclit</i> <sup>1</sup> , <i>I. triloba</i> <sup>3</sup> , <i>M. hederacea</i> <sup>2</sup> , <i>M. hirta</i> <sup>3</sup> , <i>X. tridentata</i> <sup>2</sup>
	<i>sinensis</i>	C - <i>Porana racemosa</i> <sup>1</sup>
	<i>titivilitius</i>	C - <i>I. aquatica</i> <sup>2</sup> , <i>I. pes-caprae</i> <sup>3</sup> , <i>M. umbellata</i> <sup>3</sup>



(BOROWIEC 1991). A few remarks may however be done in the light of older records and data recently made available on Vietnamese species.

At the species level, when several larval hosts are identified, they all belong to a single family: *S. perpastus* feeds in *Ipomoea* and *Xenostegia*, *S. abdominalis* in *Ipomoea*, *Merremia* and *Xenostegia*, *S. titivilitius* in *Ipomoea* and *Merremia*, *S. sophorae* in *Ipomoea* and *Porana*, *S. niger* in *Hibiscus* and *Urena*. One exception to this rule is found in *S. mannarensis*, a species that feeds in *Ipomoea* and *Merremia*: a specimen of *S. mannarensis* was imported from India to U.S.A. in 1949; the label bears the mention "intr. to Wash., okra seed"; this insect may have been found dead in a batch of okra seeds (*Hibiscus esculenta*), but this has still to be confirmed. Twelve more species feed on plants belonging to a single genus. The level of polyphagy in the larval stage, as we can presently estimate it, is moderate, the most polyphagous species being *S. abdominalis*, with 12 hosts. Based on presently available data, host plant conservatism in these species seems similar with that found in seed beetles feeding in Leguminosae (DELOBEL & DELOBEL 2006; KERGOAT *et al.* 2011). Evidently, the limited number of species in families Convolvulaceae and Malvaceae should be taken into account in this comparison.

At the species-group level, conservatism also appears important. In most cases when the hosts of several species belonging to the same group are identified, these belong to the same botanical family. Thus, the *abdominalis*, *cederholmi*, *johnsoni*, *mannarensis*, and *takuensis* species groups, which were defined by BOROWIEC on purely morphological grounds, happen to feed exclusively on Convolvulaceae. The *albosparsus* and *niger* species groups, similarly defined, feed on Malvaceae. Here again, an exception is found in older records: within the *niger* group, three species feed in Malvaceae, and one (*S. aeneipennis*) in *Ipomoea pes-tigridis* (Convolvulaceae); according to BOROWIEC (1991), the label borne by the single available specimen mentions "in *Ipomea pes-tigridis*", which likely refers to adult, and not to larval, nutrition. Considering the usual lack of relationship observed between larval and adult nutrition (see for example KINGSOLVER 2004), it may be hypothesized that the actual hosts of *S. aeneipennis* are actually Malvaceae.

The larval feeding habit of three other *Spermophagus* reported in Vietnam (*ligatus* CHEVROLAT, *variolosopunctatus* GYLLENHAL, *vietnamensis* BOROWIEC) remains unknown. Finally, the following species of Convolvulaceae were heavily sampled in Vietnam, but no seed beetle emerged from the samples: *Aniseia martinicensis*, *Argyreia nervosa*, *Ipomoea alba*, *Ipomoea cairica*, *Ipomoea quamoclit* (host of *S. abdominalis* in India), *Ipomoea purpurea*, *Operculina turpethum*, *Stictocardia tiliifolia*; the fact that all of these are introduced species is noteworthy.

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