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Key to Florida Alydidae (Hemiptera: Heteroptera) and selected exotic pest species

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Abstract. A key to the fourteen native Florida species and seven exotic pest species of Alydidae is presented here. The key uses external, non-genitalic morphology and allows for rapid separation of the native species and exotic pests included herein.

Resumen. Se presenta una clave para identificar 14 especies nativas de Florida y siete especies invasoras plagas de Alydidae. La clave utiliza la morfología externa y no-genitalica para la identificación rápida de las especies nativas y plagas exóticas incluidas.

Key words. Adventive species, systematics

Introduction

The family Alydidae is a relatively small group of Heteroptera belonging to the superfamily Coreoidea, commonly known as the "broad-headed bugs." These insects are phytophagous and feed primarily on legumes and grasses. The group contains several important species that are serious economic pests of rice (*Oryza sativa* L.) and legumes (Panizzi et al. 2000). There are 14 native species of Alydidae reported in the state of Florida, none of which is known to be of major economic importance (Ahmad 1965; Barber 1954; Froeschner 1988).

The purpose of this key is twofold. First, this key will provide a species-level identification tool for Florida species that is easily accessible to those without intimate knowledge of this family of insects (Appendix 1). Second, it will permit swift separation of native Florida fauna from a selected group of potentially devastating exotic pest species (Appendix 2). The primary literature relies on genitalic characters (*ex*. Ahmad 1965). One of the goals of this key is to separate exotic species from Florida species without having to rely on genitalic characters.

More information on most of the major and minor alydid pest species can be found in Panizzi et al. (2000), an excellent reference on the economically significant Alydidae.

Materials and Methods

This key was constructed using information from a number of publications and from examination of specimens in the Florida State Collection of Arthropods (FSCA).

Two PhD dissertations (Schaffner 1964; Abbas 2002) were useful in the construction of the key; mainly for diagnostic characters of species in the genus *Riptortus* Stål. Schaffner's (1964) dissertation also contained quality identification characters for *Alydus* Fabricius. Schaefer's (2004) key to the New World genera of Alydidae was of great utility in the construction of this work. Ahmad's (1965) world revision of the Leptocorisinae also helped in writing this section of the key. His revision includes species

descriptions, keys, and images of dissected genitalia of males and females. Most of the characters used for species level identification are genitalic, and some characters based on external morphology display considerable intraspecific variation, making identification by exterior characters difficult for some species.

All photographs were taken of FSCA specimens by M. Andrew Jansen using the FSCA auto-montage system, with the exception of the images of *Riptortus clavatus* (Thunberg) *Riptortus dentipes* (Fabricius), and *Stenocoris southwoodi* Ahmad, which were taken by Samuel Z. Howard, Smithsonian Institution, and provided to us by Thomas J. Henry, United States National Museum (USNM).

Results

Alydinae: Alydini

Alydus Fabricius 1803

Members of this genus have been documented feeding on a variety of legumes, including *Baptisia leucantha* T. & G., *B. leucophaea* Nutt., and *Lespedeza capitata* Michx., as well as on a non-legume, *Ceanothus americanus* L. (Yonke and Medler 1968). Two species occur in Florida.

Burtinus Stål 1859

B. notatipennis Stål 1859 has been recorded on Pidgeon Pea (*Cajanus cajan* (L.) Millsp.), and is a minor pest of other legumes (King and Saunders, 1984).

Hyalymenus Aymot and Serville 1843

The subgenus *Tivarbus* Stål of *Hyalymenus* Amyot and Serville is problematic. Torre-Bueno (1939) revised *Hyalymenus* subgenus *Tivarbus*, and provided descriptions and an identification key; however, Torre-Bueno's (1939) key is based on morphometric characters that are not reliable. Schaffner (1964) also came to the conclusion that the subgenus needs reworking. Torre-Bueno listed three Florida species in the subgenus (Appendix 1), but, it is not known whether these names represent one variable species or several species. Clearly, the genus is in need of revision.

Megalotomus Feiber 1860

Megalotomus quinquespinosus (Say 1825) has been reported on *Baptisia tinctoria* (L.), *Oxytropis*, *Lupinus*, *Ceanothus americanus* L., and *Rhus glabra* L. (Yonke and Medler 1965).

Neomegalotomus Schaffner and Schaefer 1998

The recently erected genus *Neomegalotomus* Schaffner and Schaefer (1998) is a difficult pest group. Schaefer and Ahmad (2008) published a revision of the genus *Neomegalotomus*, synonymizing many former species and leaving only two as valid. These species are *N. rufipes* (Westwood 1842) and *N. parvus* (Westwood 1842). The article included illustrations of genitalia, descriptions, and an identification key. These species are similar, and can be difficult to separate without genitalic dissection due to intraspecific variation.

Neomegalotomus parvus is a pest of legumes in Brazil (Panizzi et al. 2000), and has been reported from crops such as common beans (*Phaseolus vulgaris* L.), soybean (*Glycine max* (L.) Merrill), pigeon pea (*Cajanus cajan* (L.) Millsp.), cotton (*Gossypium* spp.), and tomato (*Lycopersicon esculentum* Mill.). It can transmit yeast-spot disease (*Nematospora coryli* Peglion) by feeding on the seeds of its host (Paradela Filho et al. 1972).

Riptortus Stål 1859

Three species of *Riptortus* are included. All are serious pests of legumes in Asia and Africa, where they feed on the seeds of crop plants, such as soybean, common bean, and cow pea (*Vigna unguiculata* (L.) Walp.) (Panizzi et al. 2000). These bugs primarily are pests of legumes, but feeding on various seeds in other plant families has been reported.

***Stachiocnemus* Stål 1870**

We were unable to find any published host plant records for *Stachiocnemus apicalis* (Dallas 1852) or any other member of this genus, only that members of the genus have "been observed feeding on seeds and are not predaceous" (Schaffner 1964).

Micrelytrinae: Micrelytrini

***Esperanza* Barber 1906**

Esperanza texana Barber 1906 has been recorded only from Bermuda grass, *Cynodon dactylon* (L.) *pers.* (Wheeler and Henry 1984).

***Protenor* Stål 1867**

Protenor australis Hussey 1925 occurs in Florida and is thought to feed on members of the family Gramineae (Schaefer 2004).

Micrelytrinae: Leptocorisini

***Leptocorisa* Latreille 1825**

Two species of *Leptocorisa* are included in the key. These Asian bugs are similar to the New World and African genus *Stenocoris*. Both species are major rice pests in Asia and the Pacific, where they feed on developing kernels, especially at the milk stage (Chi Serrano et al. 2014; Lakshmanan et al. 1992). *Leptocorisa acuta* (Thunberg 1783) also is reported as a vector of a fungal pathogen in rice (Chi Serrano et al. 2014; Lakshmanan et al. 1992). In experiments that involved spraying a spore suspension on rice heads with and without bugs, only the bug-infested heads developed sheath rot disease. Disease severity was proportional to the size of the infestation. Burrion and Litsinger (1981) was used to distinguish between *L. acuta* and *L. oratorius* (Fabricius 1794).

***Stenocoris* Burmeister 1839**

Stenocoris southwoodi Ahmad 1965 is a rice pest that occurs in Africa (Ahmad 1965; Hill 2008; Pathak and Khan 1994). *Stenocoris southwoodi* was reported from South America by Pathak and Khan (1994), but this may be an error, as others say that this species is restricted to tropical Africa (Ahmad 1965; Hill 2008). It also feeds on developing kernels and causes damage similar to that of the *Leptocorisa* species in Asia.

Key to Florida Alydidae and Selected Exotic Pest Species

A list of the Florida fauna (Appendix 1) and of the seven exotic pest species (Appendix 2) are presented at the end. A key to these species is included below.

Not all exotic species are included in the key, and thus, it is possible that some potential minor pests may key to the wrong species. All species-level identifications, especially of pests, should be double-checked against the appropriate literature and an identified reference specimen, whenever possible. This key was designed for use by agricultural inspectors, so some of the couplets may lead to other exotic species that are similar in appearance. In some instances, species can be confirmed only by genitalic dissection. Those noted as "(Exotic Pest)" currently are not known in Florida, but could arrive at any time (Frank and McCoy 1992). Specimens identified as potential exotic species should be submitted to a specialist for confirmation.

1. Hind femur bearing spines (Fig. 1a); trichobothria of abdominal sternum five (visible sternum 3) arranged in a row lateral or anterior to spiracle ..... **Subfamily Alydinae, 9**

— Hind femur without spines (Fig. 1b); trichobothria of abdominal sternum five arranged in a triangle posterior to spiracle ..... **Subfamily Micrelytrinae, 2**

2(1). Second rostral segment shorter than third and fourth combined; third rostral segment more than half as long as fourth; evaporative area of metathoracic scent gland smooth (Fig.1c) .... **Tribe Leptocorisini, 4**

— Second rostral segment longer than or subequal to third and fourth combined; third rostral segment less than half as long as fourth; evaporative area of metathoracic scent gland coarsely punctate (Fig. 1d) ..... **Tribe Micrelytrini, 3**

3(2). Scutellum with vertical spine at apex (Fig. 2a); paraclypei simple in lateral view .... ***Esperanza texana* Barber**
— Scutellum without vertical spine at apex (Fig. 2b); paraclypei bifid in lateral view .... ***Protenor australis* Hussey**

4(2). Brown, ventro-lateral spots present on abdomen (Fig. 3a) (exotic pest) .... ***Leptocorisa oratorius* (Fabricius)**
— Without brown spots on abdomen (Fig. 3b) **5**

5(4). Humeral angles with darkened spots (Fig. 3c); collar with a pair of black, dorso-lateral spots, dark brown spot behind compound eye absent (exotic pest) .... ***Leptocorisa acuta* (Thunberg)**
— Humeral spots absent (Fig. 3d); or, if present, with black spots present on the collar and behind eye **6**

6(5). Lateral black line present from genae to at least the lateral side of the collar; humeral angles with black spots (Fig. 7c) (exotic pest) ..... ***Stenocoris southwoodi* Ahmad**
— Lateral black line from genae to the collar absent or incomplete, humeral angles without black spots; or with a black line from antenniferous tubercles to collar and humeral angles with black spots **7**

7(6). Hemelytra tinged black, appearing at rest to have a black spot on the dorsum (Fig. 3e)..... ..... ***Stenocoris tipuloides* (DeGeer)**
— Hemelytra with anal vein tinted black, but lacking the appearance of a dorsal spot (Fig. 3f) . **8**

8(7). Median longitudinal red line on ventral abdominal segments present, sometimes faint (Fig. 4b) ..... ***Stenocoris furcifera* (Westwood)**
— Median longitudinal red line on abdominal segments absent (Fig. 4a) .... ***Stenocoris filiformis* (Fabricius)**

9(1). Metathoracic scent gland peritreme absent (Fig. 4c); hind tibiae with two rows of prominent spines ..... ***Stachiocnemus apicalis* (Dallas)**
— Metathoracic scent gland apparatus well developed; hind tibiae with a single row of spines or lacking spines altogether (Fig. 4d) **10**

10(9). Hind tibia curved, with an apical spine (Fig. 4e) **11**
— Hind tibia straight, without an apical spine (Fig. 4f) **14**

11(10). Posterior margin of pronotum immediately anterior to base of scutellum straight (Fig. 4g); it is not possible to reliably identify the species in this genus ..... **Genus *Hyalymenus***
— Posterior margin of pronotum (anterior to base of scutellum) with small posteriorly directed denticle on midline (Fig. 4h) (exotic pests) ..... **Genus *Riptortus,* 12**

12(11). Thoracic maculae present from head to metapleuron as a pale band of continuous, parallel-sided fascia, often outlined with a fuscous border (Fig. 5a); male and female 14.5 mm; scent gland ostiolar peritreme ridge-like (exotic pest) ..... ***Riptortus linearis* (Fabricius)**
— Thoracic maculae present, with non-parallel sides, sometimes entire, divided and reduced, or occasionally absent entirely; male and female less than 14.5 mm; ostiolar peritreme not ridge-like **13**

13(12). Meso and metathoracic maculae divided and reduced, sometimes absent; black nodules randomly distributed on the pronotum and thorax; humeral spines relatively short and broad (Fig. 7a) (exotic pest) ..... ***Riptortus clavatus* (Thunberg)**

— Meso and metathoracic maculae entire, never divided or subdivided; lacking randomly distributed black nodules; humeral spines relatively long and narrow (Fig. 7b) (exotic pest) ..... ***Riptortus dentipes* (Fabricius)**

14(10). Without stridulatory device on lateral edge of hemelytra; humeral angle of pronotum with distinct spine (Fig. 5b) **15**

— With stridulatory device on lateral edge of hemelytra; without humeral spine or with only a very small one (Fig. 5c) **16**

15(14). Metathoracic scent gland auricle usually somewhat flattened and separation between anterior and posterior lobes of auricle shallow (Fig. 5d) (Exotic Pest) ..... ***Neomegalotomus parvus* (Westwood)**

— Metathoracic scent gland auricle rounded, convex, with separation between anterior and posterior lobes deep (Fig. 5e) ..... ***Neomegalotomus rufipes* (Westwood)**

16(14). Distance between bases of ocellar tubercles equal to or greater than distance from base of ocellar tubercle to eye (Fig. 6a) ..... ***Burtinus notatipennis* Stål**

— Distance between bases of ocellar tubercles less than distance from base of ocellar tubercle to eye (Fig. 6b) **17**

17(16). Scent gland auricle bilobed (Fig. 6c) ..... ***Megalotomus quinquespinosus* (Say)**

— Scent gland auricle not distinctly bilobed (Fig. 6d) **18**

18(17). Side of head and thorax with broad, pale fascia forming a stripe (Fig. 6e); humeri rounded ..... ***Alydus pilosulus* Herrich-Schaeffer**

— Side of head and thorax without fascia, and uniformly black (Fig. 6f); humeri rounded ..... ***Alydus eurinus* (Say)**

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Appendix 1. Florida Alydidae

Alydidae
- Alydinae
  - Alydini
    - *Alydus* Fabricius 1803
      - *A. eurinus* (Say 1825)
      - *A. pilosulus* Herrich-Schaeffer 1847
    - *Burtinus* Stål 1859
      - *B. notatipennis* Stål 1859
    - *Hyalymenus* Aymot and Serville 1843 (subgenus *Tivarbus* Stål 1859)
      - *H. longispinus* Stål 1870
      - *H. notus* Torre-Bueno 1939
      - *H. potens* Torre-Bueno 1939
    - *Megalotomus* Feiber 1860
      - *M. quinquespinosus* (Say 1825)
    - *Neomegalotomus* Schaffner and Schaefer 1998
      - *N. rufipes* (Westwood 1842)
    - *Stachiocnemus* Stål 1870
      - *S. apicalis* (Dallas 1852)
- Micrelytrinae
  - Micrelytrini
    - *Esperanza* Barber 1906
      - *E. texana* Barber 1906
    - *Protenor* Stål 1867
      - *P. australis* Hussey 1925
  - Leptocorisini
    - *Stenocoris* Burmeister 1839 (subgenus *Stenocoris* Burmeister 1839)
      - *S. tipuloides* (DeGeer 1773)
    - *Stenocoris* (subgenus *Oryzocoris* Ahmad 1965)
      - *S. filiformis* (Fabricius 1775)
      - *S. furcifera* (Westwood 1842)

Appendix 2. Known significant alydid pests that have not been recorded in Florida.

Alydidae
- Alydinae
  - Alydini
    - *Neomegalotomus* Schaffner and Schaefer 1998
      - *N. parvus* (Westwood 1842)
    - *Riptortus* Stål 1859
      - *R. clavatus* (Thunberg 1783)
      - *R. dentipes* (Fabricius 1787)
      - *R. linearis* (Fabricius 1775)
- Micrelytrinae
  - Leptocorisini
    - *Leptocorisa* Latreille 1825
      - *L. acuta* (Thunberg 1783)
      - *L. oratorius* (Fabricius 1794)
    - *Stenocoris* (subgenus *Erbula* Stål 1873)
      - *S. southwoodi* Ahmad 1965

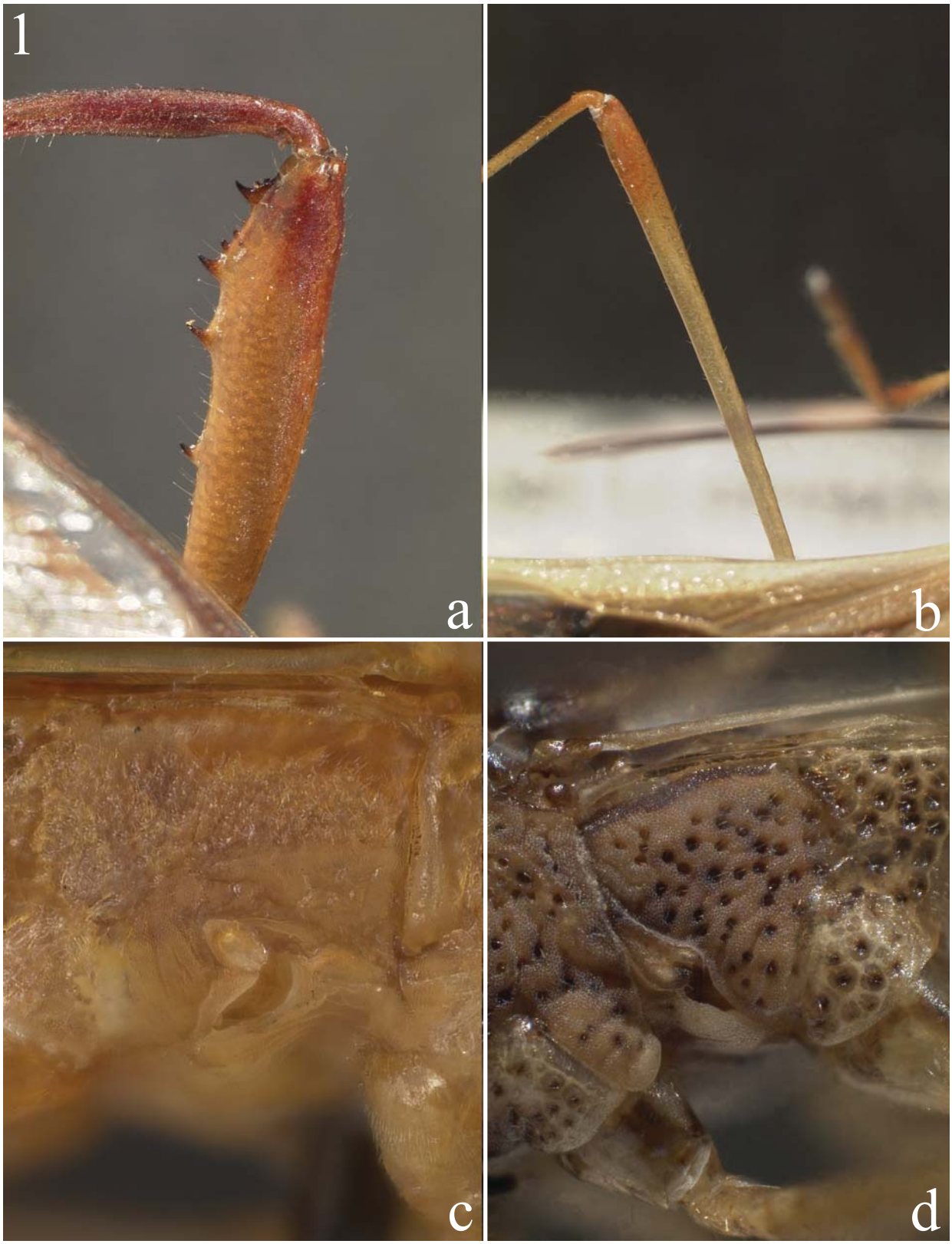

Figure 1. Images of diagnostic characters for couplets 1 and 2. (a) *Hyalymenus* sp., hind femur; (b) *Stenocoris tipuloides*, hind femur; (c) *Stenocoris tipuloides*, scent gland evaporative area; (d) *Esperanza texana,* scent gland evaporative area.

Figure 2. Images of diagnostic characters for couplet 3. (a) *Esperanza texana,* arrow indicates vertical spine on apex of scutellum; (b) *Protenor australis*, head and thorax, lateral view; arrows indicate bifid paraclypei.

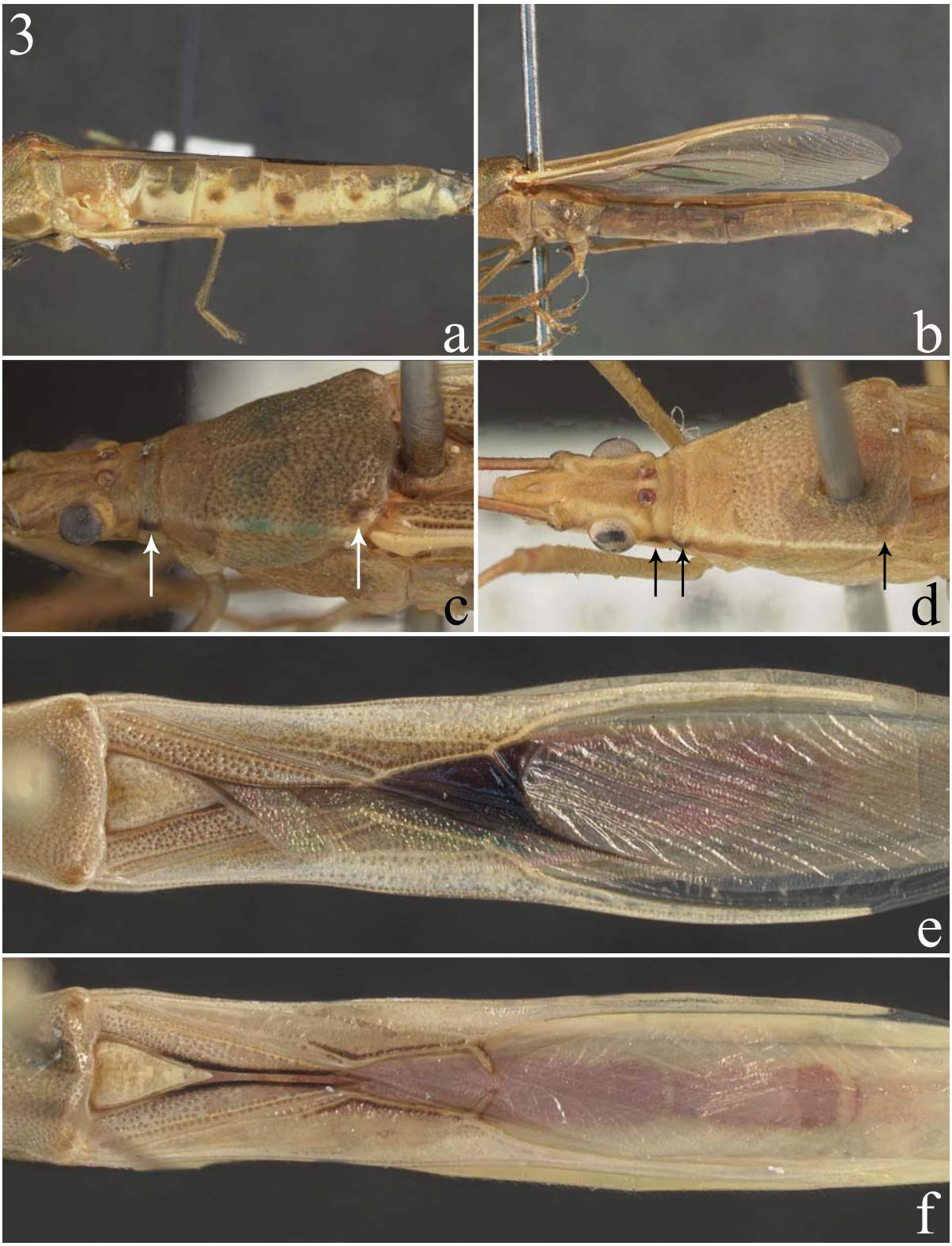

Figure 3. Images of diagnostic characters for couplets 4, 5 and 7. (a) *Leptocorisa oratorius,* abdomen, lateral view; (b) *Leptocorisa acuta*, abdomen, lateral view; (c) *Leptocorisa acuta*, arrows indicate markings on collar and humeri; (d) *Stenocoris tipuloides*, arrows indicate presence of markings behind the eye and on the collar, and **absence** of markings on the humeri; (e) *Stenocoris tipuloides*, hemelytra dorsal view; (f) *Stenocoris filiformis*, hemelytra, dorsal view.

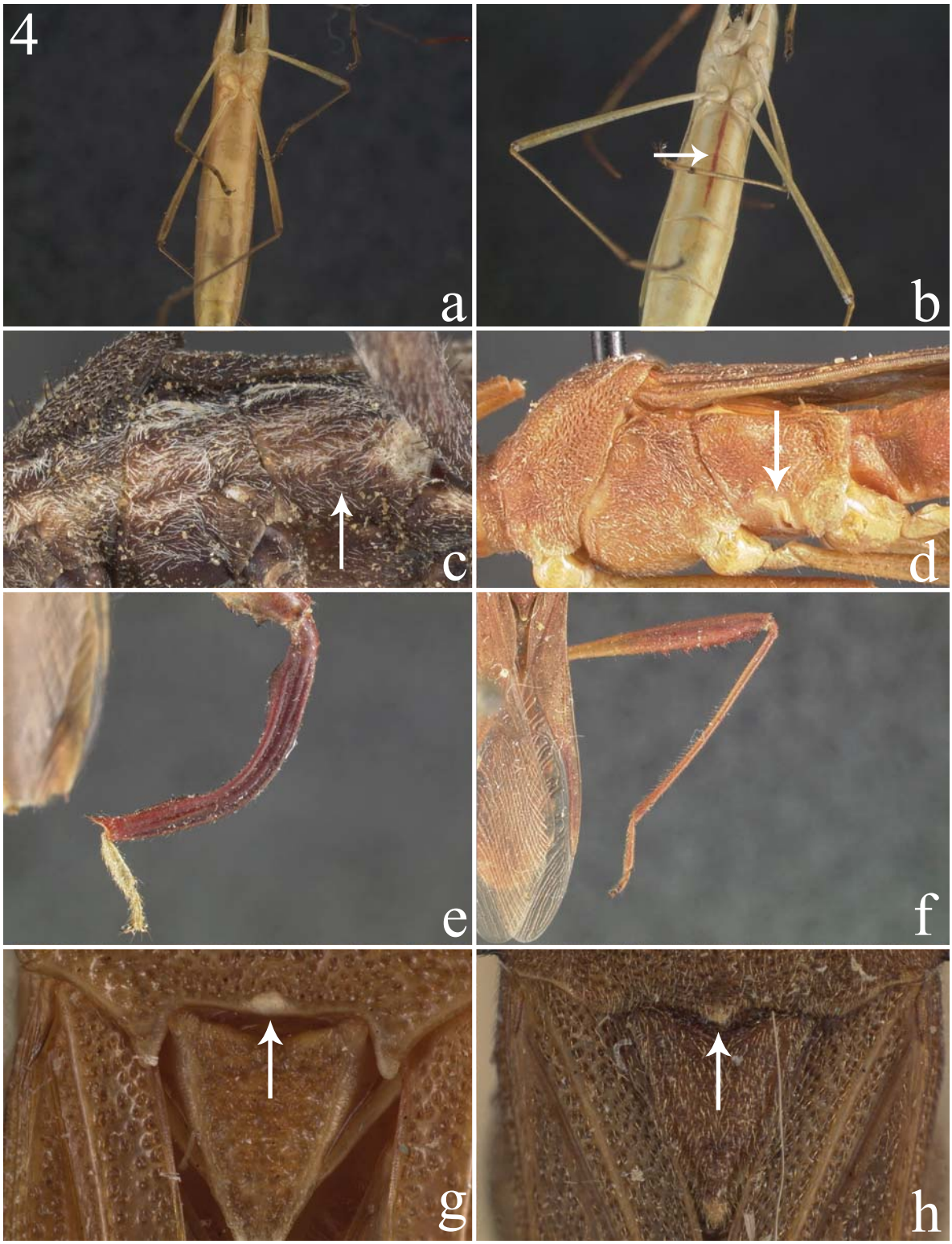

Figure 4. Images of diagnostic characters for couplets 8-11. (a) *Stenocoris filiformis*, abdomen, ventral view; (b) *Stenocoris furcifera*, abdomen, ventral view; (c) *Stachiocnemus apicalis*, thorax, lateral view; arrow indicates apparent lack of scent gland; (d) *Megalotomus quinquespinosus*, thorax, lateral view; arrow indicates conspicuous scent gland; (e) *Hyalymenus (Tivarbus)* sp., hind tibia; (f) *Megalotomus quinquespinosus*, hind tibia; (g) *Hyalymenus (Tivarbus)* sp., scutellum; arrow indicates straight posterior margin; (h) *Riptortus linearis*, scutellum; arrow indicates posterior margin with median denticulation.

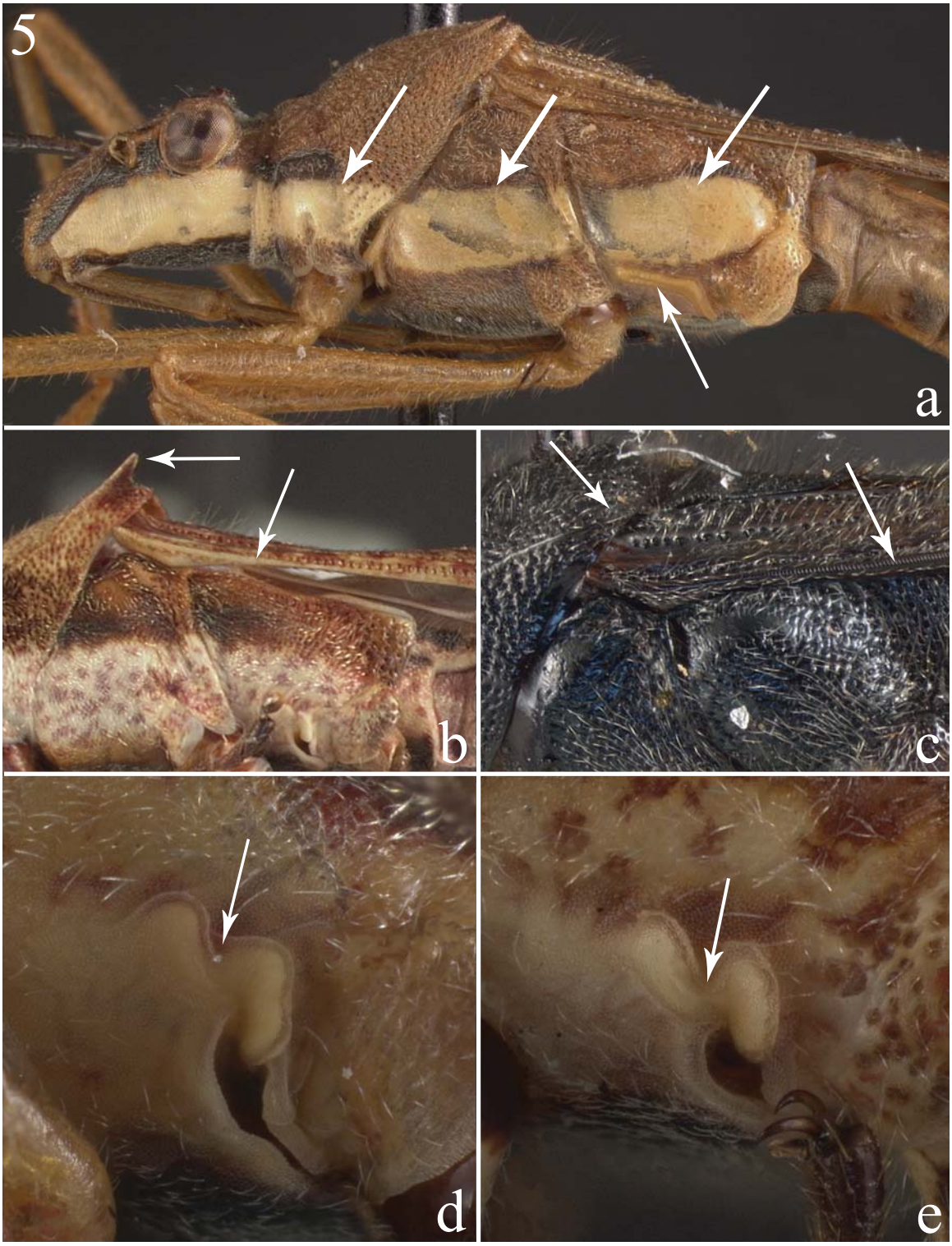

Figure 5. Images of diagnostic characters for couplets 12, 14, and 15. (a) *Riptortus linearis*, head and thorax, lateral view; arrows indicate parallel-sided fascia and ridge-like scent-gland peritreme; (b) *Neomegalotomus rufipes*, thorax, lateral view; arrows indicate presence of humeral spine and absence of stridulatory apparatus on edge of corium; (c) *Alydus eurinus*, thorax, lateral view; arrows indicate absence of humeral spine and presence of stridulatory device on edge of corium; (d) *Neomegalotomus parvus*, scent gland peritreme; arrow indicates weak separation of anterior and posterior lobes; (e) *Neomegalotomus rufipes*, scent gland peritreme; arrow indicates deep and distinct separation of anterior and posterior lobes.

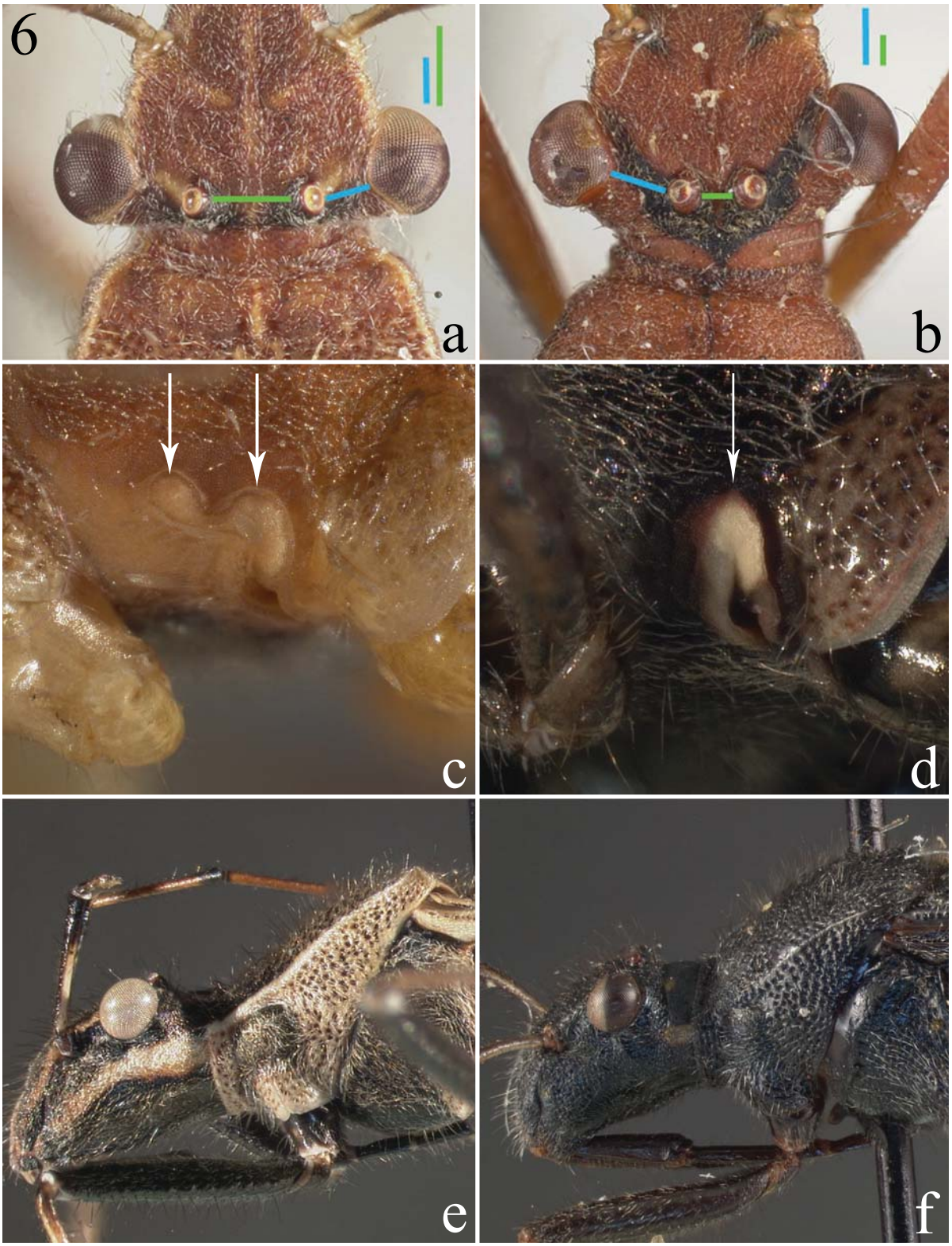

Figure 6. Images of diagnostic characters for couplets 16-18. (a) *Burtinus notatipennis*, head, dorsal view; distance between ocelli greater than distance between ocellus and eye; (b) *Megalotomus quinquespinosus*, head, dorsal view; distance between ocelli less than distance between ocellus and eye; (c) *Megalotomus quinquespinosus*, scent gland peritreme; arrows indicate two distinct lobes; (d) *Alydus pilosulus*; scent gland peritreme; arrow indicates single lobe; (e) *Alydus pilosulus*, head and thorax, lateral view; (f) *Alydus eurinus*, head and thorax, lateral view.

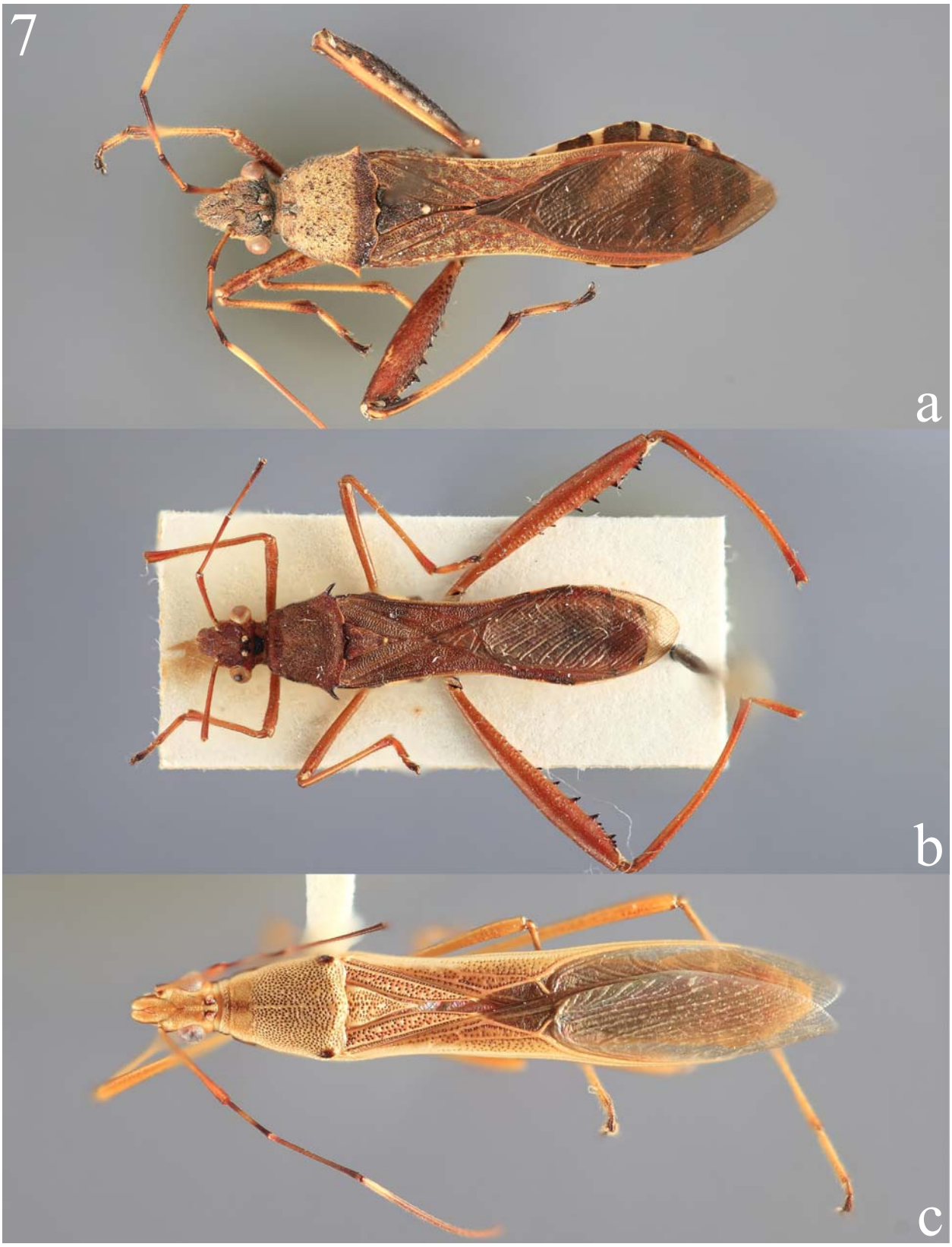

Figure 7. Habitus images of three exotic alydid pests. (a) *Riptortus clavatus*, dorsal view; (b) *Riptortus dentipes*, dorsal view; (c) *Stenocoris southwoodi*, dorsal view. Images courtesy of Samuel Z. Howard, Smithsonian Institution.