

NOTES ON THE PHASMATODEA OF THE WEST INDIES: TWO NEW GENERA*

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The West Indies have a diverse, but poorly known, fauna of stick-insects, about 80 species being recorded in the literature. In preparing a review of the West Indian Phasmatodea over the past couple of years, I have accumulated probably the largest collection of Antillean stick-insects ever assembled. This has been the result of borrowing material from a number of institutions and of recent collections made in the West Indies; included in this material are representatives of the two genera described below. Thanks are due to the following who helped supply the material described in this paper: Dr. David Rentz and Dr. W. Wayne Moss, Academy of Natural Sciences of Philadelphia (ANSP); Dr. Ashley B. Gurney, U.S. National Museum (USMNH); Dr. Robert J. Lavigne, University of Wyoming (RJL); Dr. Howard E. Evans, Museum of Comparative Zoology (MCZ); and Mr. Will Dirk and Dr. George E. Drewry, Puerto Rico Nuclear Center and Luquillo Experimental Forest, Puerto Rico. Dr. Niilo Virkki of the Agricultural Experiment Station, Rio Piedras, Puerto Rico, has been helpful in elucidating the cytogenetics of one of the new species. T. Preston Webster of the Biological Laboratories, Harvard University, has been in the West Indies three times, and, when not collecting *Anolis*-lizards, has brought back a number of interesting phasmatids. Finally, I would like to acknowledge support for my recent collecting trip in Puerto Rico and St. Thomas by an Evolutionary Biology Grant from Harvard University (NSF Grant, GB19922, R. C. Rollins, Principal Investigator).

Fam. Phasmatidae, subfam. Phibalosomatinae

Genus **Taraxippus** new genus

Female: Body form elongate, subcylindrical, extremely spinose.

Head elongate, the vertex swollen and spinose. Antennae longer than the anterior legs; scape depressed; pedicel subconical. Compound eyes small, but protruding; ocelli absent.

Pronotum subrectangular; defensive gland opening present. Prosternum transverse, lyriiform. Mesothorax elongate, swollen dorsally and expanded laterally just behind the apex; dorsal pre-median

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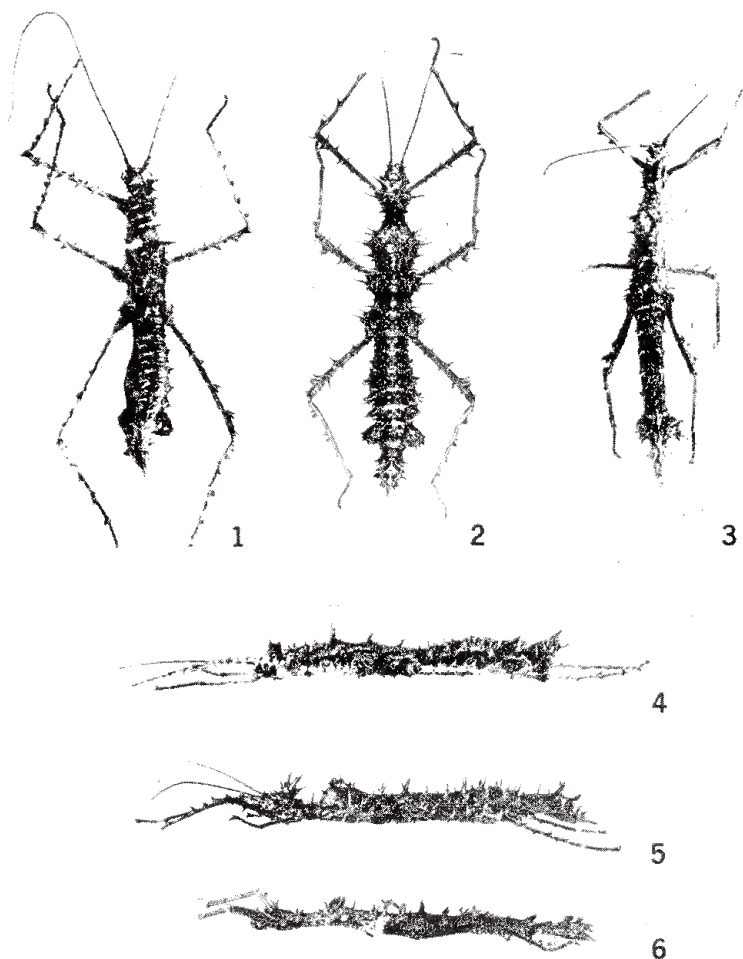


Figure 1. *Mirophasma ? cirsium* (Redtenbacher), Alta de los Cruces, Colombia. (MCZ). Dorsal view.

Figure 2. *Taraxippus paliurus* n. sp., St. Louis du Nord, Haiti. (ANSP). Dorsal view.

Figure 3. *Lamponius restrictus* (Redtenbacher), Jayuya, Puerto Rico. (ANSP). Dorsal view.

Figure 4. *Mirophasma ? cirsium*. Lateral view.

Figure 5. *Taraxippus paliurus*. Lateral view.

Figure 6. *Lamponius restrictus*. Lateral view.

swelling of the notum concave in the middle and expanded laterally into strong spines. Mesosternum granulose and laterally spinose. Metathorax transverse, rectangular. Median segment about 0.8 times the length of metanotum.

Abdominal segments transverse, segments II-VII laterally expanded into spinose lobes, VIII-X narrower than the preceding. Supraanal plate small, triangular. Cerci short, slightly curved. Sternite VII with a postero-median praeopercular organ; subgenital plate elongate, extending beyond the apex of the abdomen, acuminate apically.

Legs elongate and slender. Anterior femora straight basally. Four posterior tibiae anareolate. First tarsomere slightly longer than the next two together. Tegmina and wings absent.

Male: Unknown.

Type species: *Taraxippus paliurus* Moxey, new species.

Distribution: This genus is known only from the type locality in the northwestern part of Haiti.

Derivation of name: *Taraxippus*, the horse-scarer, was the name given to the ghost of Glaucus.

The state of the suprageneric classification of the phasmatids is in such chaos that it is extremely difficult to place this remarkable genus in the present scheme. At first glance, it would appear to belong to the pygirhynchine genus *Mirophasma* Redtenbacher (1906), but it can readily be excluded from this group on the basis of its anareolate tibiae and the relatively large median segment. It would thus seem to belong to the Phibalosomatinae, being somewhat related to *Lamponius* Stål (1875), from which it may be distinguished by its basally straight anterior femora and the elongate first tarsomere. It is unfortunate that the male of *Taraxippus* is not known, for it would help to resolve its relationships; I have some reservations about describing it at all from a single specimen, but it is so interesting, that I feel more is to be gained by placing a name in print than by not.

The females of *Taraxippus paliurus* n.sp. (Figures 2 and 5), *Lamponius restrictus* (Redtenbacher, 1908)¹ (Figures 3 and 6), and

¹Originally described in the genus *Pericentrus* Redtenbacher (1908), this species was placed in *Antillophilus* Carl (1913) by Rehn & Hebard (1938). My recent collecting in Puerto Rico convinces me that *Antillophilus* (type species: *A. brevitarsus* Carl), is a junior synonym of *Lamponius* Stål (type species: *Pygirhynchus guerini* Saussure, 1868). Thus, the species of *Lamponius* are: *L. guerini* (Saussure), *L. portoricensis* Rehn (1903), *L. klugi* Redtenbacher (1908), *L. bocki* Redtenbacher (1908), *L. restrictus* (Redtenbacher, 1908), new combination, *L. brevitarsus* (Carl), n. comb., and *L. dominicae* Rehn & Hebard (1938).

Mirophasma ? *cirsium* Redtenbacher (1906)² (Figures 1 and 4) form a stunning convergent complex. In all three, the body and legs have become extremely spiny, the vertex of the head and the mesonotum swollen, and abdominal segment VII of the female laterally expanded. The color in life is either green or a mottled green and brown. The habitat of *Mirophasma* is unknown, but from the altitude of capture (2200 m) and its overall appearance, I would assume that it, like the *Taraxippus* and *Lanponius* species, inhabits wet mossy forest, where the spinosity and green color would provide excellent camouflage from a predator.

Taraxippus paliurus new species

(Figures 2 and 5)

Type locality: High mountains near St. Louis du Nord, Haiti.

Color light green in life, light reddish brown preserved.

Acanthotaxy³: Head with supra-antennal, supra-orbital, lateral and medial coronal spines; a pair of median spines is situated just anterior to the well-developed occipital median spines; scape with a single spine. Pronotum with anterior, posterior, and postero-lateral pronotal spines present; mesonotum with the anterior mesal, pre-median, post-median, posterior, inter-posterior, and lateral mesonotal spines; anterior and medio-lateral metanotal spines present, medially there is a pair of strong compound spines; mesopleura with lateral, supra-coxal and mesopleural spines; metasternum with a pair of antero-lateral spines; metapleura with lateral, supra-coxal, and meta-pleural spines; medial spines of median segment strong, anterior and posterior spines reduced. Abdominal tergites II-VII with anterior, medial, lateral, and full posterior series of spines; VIII with anterior and postero-lateral spines, full posterior series robust; IX with the anterior and second paired posterior spines strongly reduced, first paired posterior and postero-lateral spines present; X with the typical complement of spines, although the second paired posteriors are reduced; abdominal sternites II-VI with two paired lateral and two paired medial spines; VII with three paired lateral spines. All femora and tibiae armed with thorn-like spines.

Holotype: A female, pinned. High Mts. near St. Louis du Nord.

²My specimen of this species, from the locality of Alta de los Cruces, Colombia, 2/10, 2200 m (MCZ), agrees well with Redtenbacher's description, except for its much larger size (55 mm as opposed to 25 mm for his specimen). Either my specimen represents a closely related new species, or his specimen was immature.

³As used by Rehn & Rehn (1939) on the Obriminae of the Philippines.

On wet mossy tree. April, 1929. Haiti. E. C. Leonard, Coll. Light green in life. (ANSP).

Derivation of name: From the thorny shrub, *Paliurus australis*.

Measurements of type:

Length	57 mm
Length of mesonotum	12.5 mm
Length of metanotum	4.2 mm
Length of median segment	3.3 mm
Length of anterior femur	13.5 mm
Length of median femur	10.2 mm
Length of posterior femur	13.5 mm

Genus *Agamemnon* new genus

Body form elongate and slender; surface rugose or granulate.

Head elongate, rectangular, with a pair of tubercles or spines between the eyes. Antennae longer than the anterior legs; scape depressed; pedicel subconical. Compound eyes small, but prominent; ocelli absent.

Pronotum elongate, rectangular; defensive gland opening present. Prosternum transverse, lyriform. Mesothorax elongate, cylindrical in the male, slightly narrowed anteriorly in the female; notum of female medially carinate. Metathorax elongate, rectangular, cylindrical in the male; notum medially carinate in the female. Median segment about 0.5-0.7 times the length of the metanotum.

Abdomen cylindrical in the male, segments II-VIII elongate, IX quadrate, X transverse, rounded posteriorly; abdomen broader in the female, segments II-VII subquadrate, VIII-X narrower than the preceding. Supraanal plate of female prominent, elongate. Cerci short, curved in male, straight in female. Vomer of male triangular, with a short sclerotized tip; subgenital plate fornicate, apex rounded; genitalia with a dextral sclerotized "hook." Sternite VII of female with a highly specialized postero-median praeopercular organ; subgenital plate elongate, exceeding the end of the abdomen, apex rounded.

Legs elongate and slender. Anterior femora strongly curved basally. Four posterior tibiae anareolate. First tarsomere longer than the second, but not longer than the next two together. Tegmina and wings absent.

Type species: *Agamemnon iphimedea* Moxey, new species.

This genus is most closely related to *Ocnophila* Brunner (1907), from which it may easily be distinguished as follows:



7



8



9



10



11



12

Agamemnon

1. First tarsomere of hind tarsi not longer than the next two together (Figures 19 and 20)
2. Median segment more than 0.45 times the length of metanotum
3. Supraanal plate of female large, elongate (Figures 24 and 25)
4. Praeopercular organ of female specialized (Figures 29 and 30)
5. Subgenital plate of female exceeding the end of the abdomen by one-third its length (Figures 24 and 25)
6. Abdominal segment X of male broadly rounded posteriorly

Ocnophila

1. First tarsomere of hind tarsi longer than the next two together (Figure 21)
2. Median segment less than 0.40 times the length of metanotum
3. Supraanal plate of female small, not elongate (Figure 26)
4. Praeopercular organ of female unspecialized
5. Subgenital plate of female barely exceeding the end of the abdomen (Figure 26)
6. Abdominal segment X of male with a median projection posteriorly

Distribution: The genus is known only from the West Indies, with the type species, *A. iphimedea*, from eastern Puerto Rico and a second species, described by Saussure (1868) as *Pygirhynchus thomae*, from St. Thomas, and herein recorded from western Puerto Rico. The females of these two species may be distinguished:

1. Supraanal plate subquadrate, broadly rounded and with a median notch apically, shorter than abdominal segment X; mesonotum more than three times the length of the metanotum; anterior femora shorter than the posterior ... *A. iphimedea* new species.
- 1'. Supraanal plate lanceolate, longer than abdominal segment X; mesonotum less than three times the length of the metanotum; anterior femora longer than the posterior *A. thomae* (Saussure).

Figure 7. *Agamemnon iphimedea* n. sp., Luquillo Experimental Forest, Puerto Rico. (RJL). Male, dorsal view.

Figure 8. *A. iphimedea*, Luquillo Experimental Forest, Puerto Rico. (RJL). Female, dorsal view.

Figure 9. *A. thomae* (Saussure), Aguadilla, Puerto Rico. (USMNH). Female, dorsal view.

Figure 10. *A. iphimedea*. Male, lateral view.

Figure 11. *A. iphimedea*. Female, lateral view.

Figure 12. *A. thomae*. Female, lateral view.

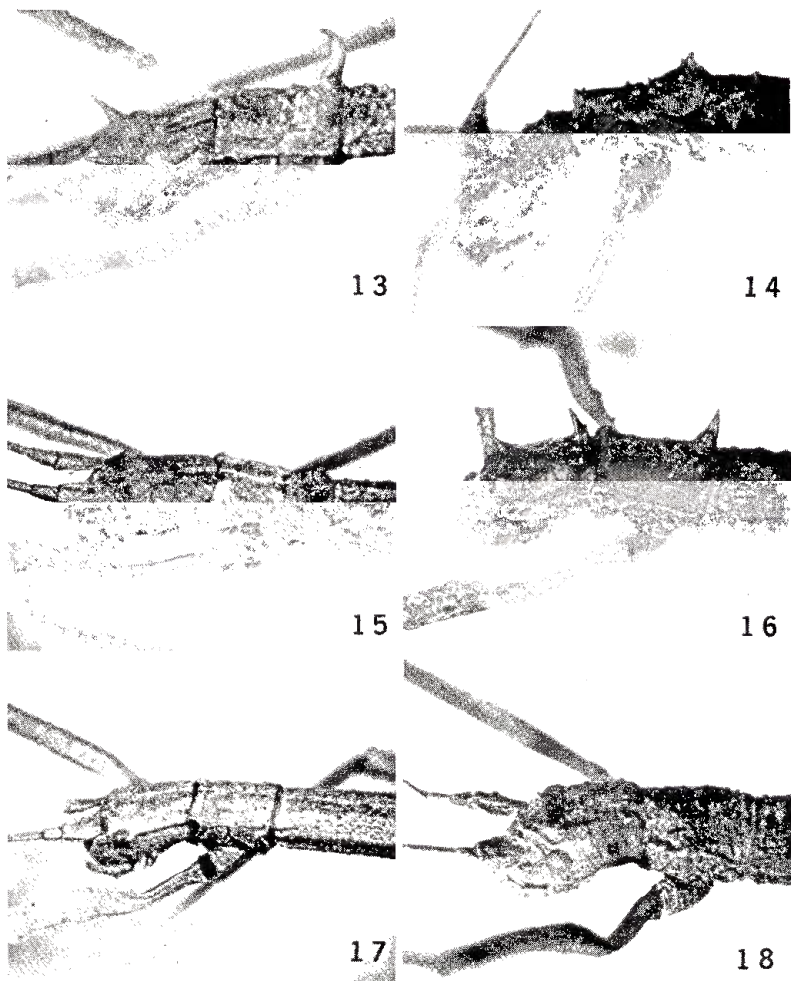


Figure 13. *A. iphimedia*. Male, head and prothorax.

Figure 14. *Ocnophila pocyi* (Bolivar), Upper Ovando River, eastern Oriente, Cuba. (MCZ). Male, head and prothorax.

Figure 15. *A. iphimedia*. Female, head and prothorax.

Figure 16. *A. iphimedia*. Female, head and prothorax with well-developed spines. (ANSP).

Figure 17. *A. thomae*. Female, head and prothorax.

Figure 18. *Ocnophila pocyi*. Yunque de Baracoa, Oriente, Cuba. (MCZ). Female, head and prothorax.

Derivation of name: Agamemnon was a Greek hero of the Trojan War.

Agamemnon iphimeidia new species

(Figures 7, 8, 10, and 11)

Lamponius sp. III/Günther + *Lamponius* sp. (No. 232) + *Lamponius* sp. V/Roberts. Virkki, 1970:G-57.

Type locality: Luquillo Experimental Forest, eastern Puerto Rico.

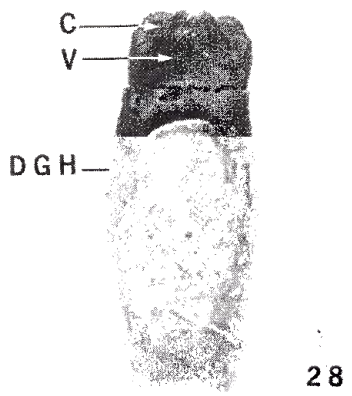
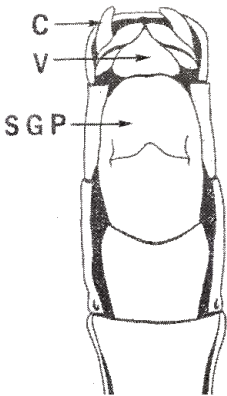
Color dark reddish brown to black.

Female: Elongate. Head with a pair of tubercles between the eyes, vertex tuberculate (Figures 15 and 16); first seven antennal flagellomeres not as decidedly elongate as in the male. Pronotum with a pair of tubercles on the anterior, a pair of stubby spines on the posterior margin; the posterior spines may occasionally become enlarged (Figure 16). Abdominal segment VII depressed, VIII slightly narrowed posteriorly, IX transverse and narrowing, X subquadrate, slightly narrowed; supraanal plate subquadrate, broadly rounded and notched apically; abdominal sternite VII with the lateral carinae terminating in a blunt, posteriorly directed spine, behind which sometimes is another smaller one (Figure 29). Subgenital plate with a median carina in the apical two-thirds; ovipositor valves crossed (Figure 31). Femora and tibiae with the margins subdentate.

Male: Elongate, cylindrical. Head with a pair of strong spines between the eyes, vertex tuberculate (Figure 13); first seven antennal flagellomeres each very elongate, the remaining shorter, lighter colored. Pronotum with a pair of large tubercles on the anterior margin and a pair of large, anteriorly curved spines on the posterior margin (Figure 13). Mesonotum granulose, the granules being numerous anteriorly. Subgenital plate strongly fornicate, with a median longitudinal carina and a transverse V-shaped ridge (Figures 22 and 27). Genitalia only slightly chitinized, with an irregularly lobed basal mass displaced somewhat dextrad, and with a strongly chitinized dextral hook (Figure 28). Anterior coxae with a lateral spine; femora and tibiae with the margins subdentate.

Egg: Large, ovoid, surface coriaceous. Micropylar plate shield-shaped, about twice as long as broad. Operculum slightly convex. Length 3.5 mm. (Figure 32).

Penultimate nymphal instar: Female — similar to the adult, but the antennae are shorter, the abdomen tapers gradually apically, and



the subgenital plate reaches only to the middle of segment X. Length 55 mm. (Figures 34 and 35).

Cytogenetics: Virkki (1970) reported the karyotype of this species as $2n=34+XX$; the male (Virkki's number 180)⁴ haploid number being $17^{II}+X$. In the male, there was one pair of acrocentric, or almost acrocentric, autosomes forming a long rod bivalent and two pairs of metacentrics forming rings, the chiasmata being localized near the centromere. The other autosomes are small- to medium-sized. The X-chromosome is large and submetacentric.

Habitat: I found this species never more than two-thirds of a meter off the ground on *Piper*-shrubs in the Luquillo Forest. *Lanponius portoricensis* Rehn, the common species of stick-insect in the Forest, also occurs frequently on *Piper*, but is usually found at heights of about one to two meters.

Derivation of name: Iphimedeia, a daughter of Triops, is a noun in apposition to the generic name.

Rearing: In captivity, this species can be raised on *Rhododendron* spp., *Persea americana*, and *Parthenocissus tricuspidata* leaves. One female was kept alive from July to December, 1969; apparently she was a virgin at the time of capture, for she never laid any eggs during the time I observed her. From the recent collecting trip, I had three living females, one of which molted from a nymph to imago. The following notes on defensive behavior derive from observations made on these four.

Behavior⁵: i) Primary defence — The insect is nocturnally active.

⁴Although I have not seen this specimen (it was sent by Virkki to Klaus Günther in Berlin), the brief description given by Günther (*in litt.*) convinces me that assignment to this species is extremely probable.

⁵In this discussion, I have followed the format and terminology used by Robinson (1969).

Figure 19. *A. iphimedeia*. Female, left hind tarsus.

Figure 20. *A. iphimedeia*. Male, left hind tarsus.

Figure 21. *Ocnophila poeyi*. Female, left hind tarsus.

Figure 22. *A. iphimedeia*. Male, lateral view of apex of abdomen.

Figure 23. *Ocnophila poeyi*. Male, lateral view of apex of abdomen.

Figure 24. *A. iphimedeia*. Female, lateral view of apex of abdomen.

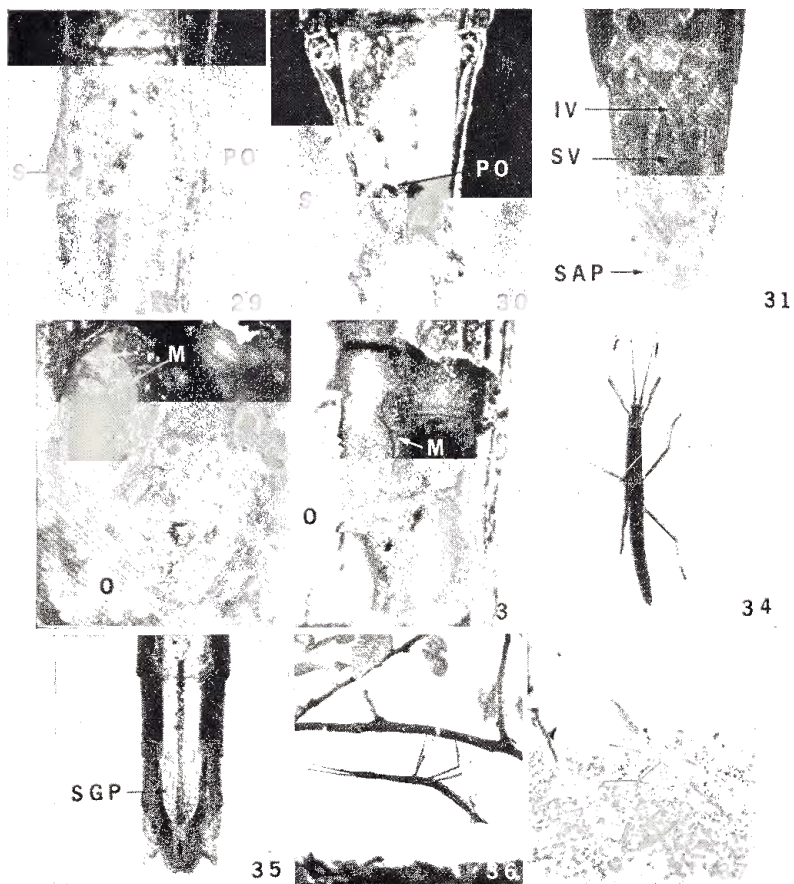
Figure 25. *A. thomae*. Female, lateral view of apex of abdomen.

Figure 26. *Ocnophila poeyi*. Female, lateral view of apex of abdomen.

Figure 27. *A. iphimedeia*. Male, ventral view of apex of abdomen.

(CFM). C, cercus; SGP, subgenital plate; V, vomer.

Figure 28. *A. iphimedeia*. Male, ventral view of apex of abdomen with the subgenital plate removed to expose the genitalia. (CFM). C, cercus; DGH, dextral genital hook; V, vomer.



During the day, it may assume a resting attitude as shown in Figure 36, although it will also rest on the substrate (Figures 37 and 38).

ii) Secondary defence — The insect does not display and has almost no escape behavior. It is in general unresponsive to tactile stimulation, although it may move the stimulated part of the body away from the source of the disturbance (Figure 39). After repeated pinching, it will walk away slowly, rocking moderately as it does so, and then assume a resting position again. If grasped, the insect becomes immobile, with the fore limbs protracted, and the intermediate and posterior limbs extended in the lateral plane (Figure 40). The species will not regurgitate, and, although defensive gland openings are present on the pronotum, the gland is much reduced and probably non-functional (Figure 41). In a 70 mm specimen of *A. iphimedia*, the gland is only 2 mm long, whereas in an *Anisomorpha buprestoides* (Stoll) of the same length, the gland is 10 mm long (Figure 42).

Holotype: A female, preserved in alcohol. El Verde Research Station, El Verde, Puerto Rico. 22.iii.70. T. P. Webster. (MCZ).

Allotype: A male, preserved in alcohol. Same data as type. Copulated with female type in plastic collecting bag. (MCZ).

Paratypic material: El Yunque, P. R. Alt. 1600 ft. Feb. 22, 1927. Coll: S. T. Danforth. 1♀⁶ (ANSP). El Toro Trail, 1st.

⁶This specimen is contained in the type collection of the Academy of Natural Sciences of Philadelphia under J. A. G. Rehn's manuscript name "Lamponius danforthi," with type number 5709.

Figure 29. *A. iphimedia*. Female, sternite VII and base of subgenital plate. PO, praepercular organ; S, lateral spine, just below which can be seen the small additional spine.

Figure 30. *A. thomae*. Female, sternite VII and base of subgenital plate. PO, praepercular organ; S, lateral spine.

Figure 31. *A. iphimedia*. Female, ventral view of apex of abdomen with the subgenital plate removed to show the crossed ovipositor valves. IV, inferior valve of ovipositor; SAP, supraanal plate; SV, superior valve of ovipositor.

Figure 32. *A. iphimedia*. Eggs in dissected female. (CFM). M, micropylar plate; O, operculum.

Figure 33. *A. thomae*. Eggs in female abdomen. M, micropylar plate; O, operculum.

Figure 34. *A. iphimedia*. Penultimate nymphal instar of female. (CFM). Note the regenerating left hind leg.

Figure 35. *A. iphimedia*. Nymphal female, ventral view of apex of abdomen. (CFM). SGP, subgenital plate.

Figure 36. *A. iphimedia*. Female resting on twig. (CFM).

Figure 37. *A. iphimedia*. Female resting on ground. (CFM).

½ mile. Sierra de Luquillo, Puerto Rico. 23.iii.70. T. P. Webster. 2 ♂♂. (CFM). 1st ½ mile on El Toro Trail, El Yunque, Puerto Rico, c. 2500'. T. P. Webster, S. Rand, E. E. Williams, W. Hall. 26-27.vi.1969. 1♀ (CFM). Night. Tropical wet forest. El Verde, P. R. xii.12.69. R. Lavigne 1♀. (RJL). Mossy forest. El Yunque, P. R. 3200'. iii.28.70. R. Lavigne, F. Lavigne, Preston Webster. 1♂1♀. (RJL). El Yunque, c. 3000 ft., P. R. May, 1938. Darlington. 1♂. (MCZ). El Verde. 3.9.64. N. Virkki. 4♀♀.⁷ (ANSP). 1st ½ mile of El Toro Trail, Luquillo Experimental Forest, Puerto Rico. 7.iv.1971. George Drewry and C. F. Moxey. 2 immature ♀♀. (CFM). 1st ½ mile of El Toro Trail, Luquillo Experimental Forest, Puerto Rico. 12.iv.1971. Will Dirk and C. F. Moxey. 1♀. (CFM). El Verde Research Station, Luquillo Experimental Forest, Puerto Rico. May, 1971. Will Dirk. 1♀. (CFM). No data. 1♀. (USMNH).

Measurements of types:	Female	Male
Length	73 mm	65 mm
Length of mesonotum	19.5 mm	19.8 mm
Length of metanotum	4.6 mm	5.5 mm
Length of median segment	3.0 mm	2.9 mm
Length of anterior femur	16.5 mm	15.6 mm
Length of median femur	14.4 mm	14.6 mm
Length of posterior femur	17.7 mm	17.4 mm
Length of supraanal plate	1.0 mm	—

Agamemnon thomae (Saussure, 1868) new combination
(Figures 9 and 12)

Pygirhynchus thomae Saussure, 1868: 64; Saussure, 1872: 170; Kirby, 1904: 408.

Type locality: St. Thomas, West Indies.

Color light brown.

Female: Elongate, slender. Head with a pair of short, erect spines between the eyes; vertex with very small tubercles (Figure 17). Pronotum with small tubercles. Mesonotum laterally tuberculate, less than three times the length of the metanotum. Abdomen longitudinally rugose; segment VII not depressed, but narrowed posteriorly, VIII-X with the lateral margins subparallel, X slightly narrowed apically; supraanal plate lanceolate, medially carinate, reaching to the end of the subgenital plate, thus having a beak-like appearance (Figure 25); lateral carinae of sternite VII each ending

⁷These are specimens numbered 244, 250, 251, and 252 by Virkki, 1970: G-57.

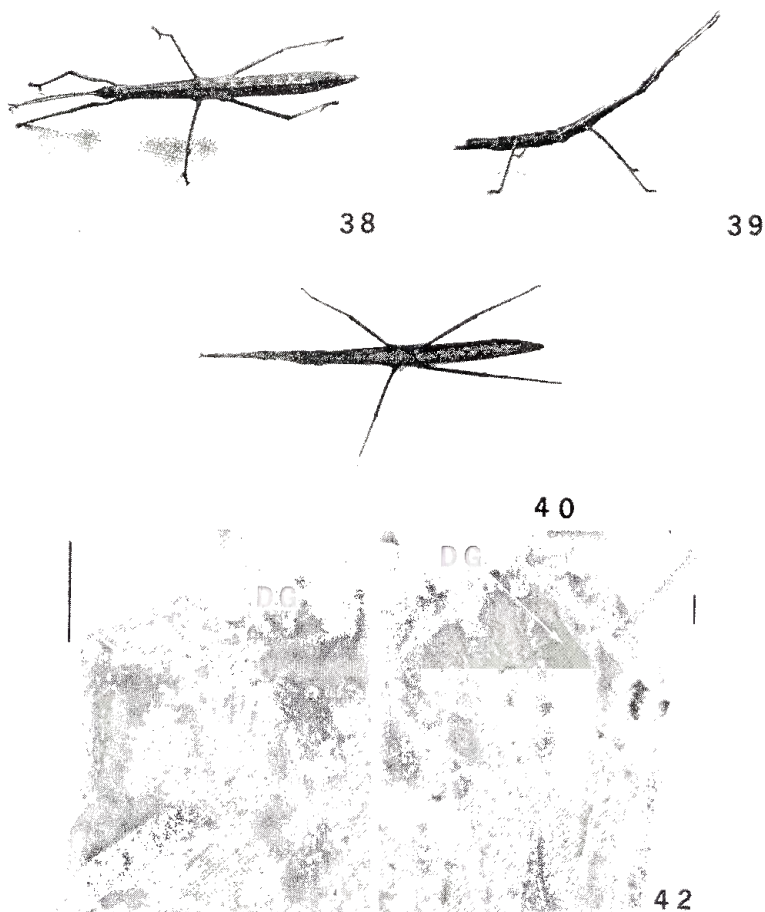


Figure 38. *A. iphimedia*. Female resting on substrate. (CFM).

Figure 39. *A. iphimedia*. Same specimen as in Figure 38, after the fore legs and antennae have been touched several times. (CFM).

Figure 40. *A. iphimedia*. Female after having been grasped and dropped, showing the extended position of the legs. (CFM).

Figure 41. *A. iphimedia*. Female, defensive gland of dissected specimen. (CFM). DG, defensive gland. Scale line equals 1 mm.

Figure 42. *Anisomorpha buprestoides* (Stoll). Female, defensive gland of dissected specimen. (CFM). DG, defensive gland. Scale line equals 1 mm.

in a small, blunt, posteriorly directed spine; each side of praeopercular organ with an oblique, blunt spine (Figure 30). Subgenital plate longitudinally rugose and medially carinate in the distal three-quarters. Margins of femora and tibiae minutely granulate, lower lateral and lower median carinae of hind four femora each with two subapical granules; posterior femora shorter than the anterior.

Male: Unknown.

Egg: Large, subcylindrical, surface granulate. Micropylar plate planaria-shaped, about three times longer than broad. Operculum flat. Length 3.5 mm. (Figure 33).

Locality: Aguadilla, Puerto Rico. From brush in field near Ramey Air Force Base. April 28, 1948. Oakley, et al. 48 16407. (USMNH).

Habitat: The region around Aguadilla does not have any particularly high land and is considerably drier than the Luquillo rain forest. Unfortunately, on my recent collecting trip, I was unable to find this species either on St. Thomas or near Aguadilla.

My specimen agrees extremely closely with Saussure's description, except for the spines between the eyes, the somewhat shorter legs, and the absence of spines on the femora.

Measurements:

Length	68 mm
Length of mesonotum	15.5 mm
Length of metanotum	6.0 mm
Length of median segment	2.9 mm
Length of anterior femur	13.0 mm
Length of median femur	10.5 mm
Length of posterior femur	12.7 mm
Length of supraanal plate	4.0 mm

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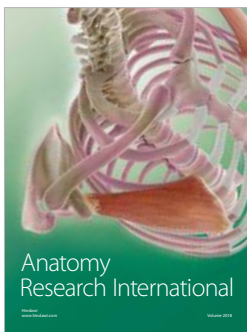
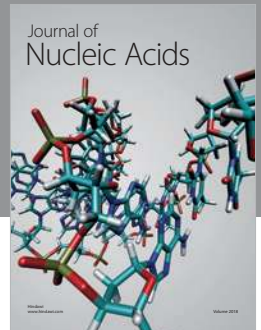
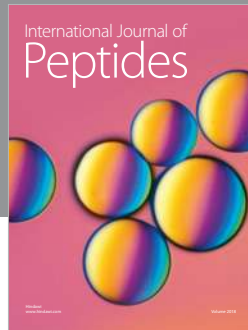
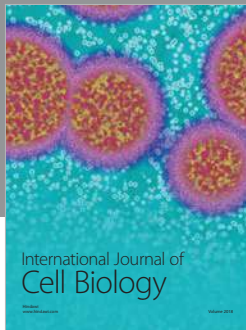
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