SYSTEMATICS, MORPHOLOGY AND PHYSIOLOGY

A Revision of *Neomegalotomus* (Hemiptera: Alydidae)

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Neotropical Entomology 37(1):030-044 (2008)

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RESUMO - Duas espécies de *Neomegalotomus, N. parvus* (Westwood), a espécie tipo, e *N. rufipes* (Westwood) são reconhecidas. As duas espécies são redescritas a partir de espécies tipo e a chave para identificação é apresentada. As seguintes espécies são sinonimizadas com *Neomegalotomus parvus*: *N. simplex* (Westwood), *N. latifascia* (Berg), e *N. pallescens* (Stål) (todas novas sinonímias). *N. jamaicensis* (Westwood) é sinonimizada com *N. rufipes* (nova sinonímia). As espécies tipo de todas as espécies até agora colocadas no gênero são também redescritas, exceto *N. debilis* (Walker) e *N. vicinus* (Westwood). *N. parvus* ocorre do México através da América Central até o norte da Argentina e em direção à Venezuela e ilhas caribenhas adjacentes ao leste. *N. rufipes* encontra-se espalhada no sul do Caribe em direção à Venezuela. As duas espécies se sobrepõem em distribuição: *N. parvus* é encontrado em St. Vincent e Tobago, enquanto *N. rufipes* ocorre em Grenada, a qual situa-se entre essas duas ilhas.

PALAVRAS-CHAVE: Heteroptera, praga-da-soja, neotrópicos, Caribe

ABSTRACT - We recognize two species in *Neomegalotomus, N. parvus* (Westwood), the type species; and *N. rufipes* (Westwood). The two species are redescribed from type specimens, and are keyed. We synonymize the following species with *Neomegalotomus parvus*: *N. simplex* (Westwood), *N. latifascia* (Berg), and *N. pallescens* (Stål) (all **new synonymies**). We synonymize *N. jamaicensis* (Westwood) with *N. rufipes* (**new synonymy**). The type specimens of all species hitherto placed in the genus are also redescribed, except those of *N. debilis* (Walker) and *N. vicinus* (Westwood). *N. parvus* occurs from México through Central America into northern Argentina and east into Venezuela and adjacent Caribbean islands. *N. rufipes* is widespread in the Caribbean south towards Venezuela. The two species overlap in distribution: *N. parvus* is found on St. Vincent and Tobago, whereas *N. rufipes* occurs on Grenada, which lies between those two islands.

KEY WORDS: Heteroptera, soy pest, neotropics, Caribbean

Neomegalotomus Schaffner & Schaefer is an alydine genus occurring throughout the neotropics and neosubtropics. Some of its members have become pests of soybean in South America, where this crop is already of great importance. *Neomegalotomus* species have also been recorded as minor pests of other crops (Schaefer & Panizzi, in preparation), and could become pests of other legume crops as well (see Schaefer 1998). To understand the biology and ecology of a pest is essential to controlling it, and essential to that understanding is a thorough knowledge of the pest's systematics.

The status of the species within *Neomegalotomus*, like the systematics of the genus itself, has remained unclear: Several species were originally poorly described, and several have been synonymized without discussion or comparison with types (and some types are in poor condition); the genus has long needed revision. In addition, the species are not easily separated, partly because their descriptions were based on color patterns, and these patterns vary widely and inconsistently.

Most species in *Neomegalotomus* were described (very briefly) by Westwood (1842), in what was then the large and catch-all genus *Alydus*. Distant (1901a) removed several of Westwood's *Alydus* species to other genera (*Riptortus, Mirperus Megalotomus*). *Megalotomus* was recently shown to be exclusively Holarctic (Schaffner & Schaefer 1998), and the Neotropical species were removed to a new genus *Neomegalotomus* (Schaffner & Schaefer 1998, Schaefer & Panizzi 1998).

Westwood's (1842) and Distant's (1901a) papers raise a question about the type of the genus *Neomegalotomus*. Westwood's *Alydus parvus* has been treated as the type (Schaffner 1964, Schaefer & Panizzi 1998, Schaffner & Schaefer 1998). Of the *Alydus* species described by Westwood and now included in *Neomegalotomus, Alydus simplex* has

page priority (p. 18) over all the others, including both *Neomegalotomus parvus* (Westwood) (p. 19) and *N. rufipes* (Westwood) (p. 19, directly following *N. parvus*). However, page priority lacks nomenclatorial force, and it alone cannot determine the type of a genus — Schaefer (2007) notwithstanding. Based on arguments presented elsewhere (Nemésio 2007), it is clear that ***Neomegalotomus parvus* (Westwood)** (Figs. 1, 2) **is the type of the genus**; it is equally clear that the position taken by Schaefer (2007) is wrong. (Note: The four species Westwood [1842] described between his *Alydus simplex* and his *A. rufipes* are now in *Hyalymenus*, and do not concern us here.) In 1901, Distant (1901a) wrote, "The type and only specimen [of *N. simplex*] possesses neither head nor pronotum. Judging from the remaining portions of the body, it is almost certain that this is a synonym of *Megalotomus rufipes* Westw.?" (p. 331; question mark in original). He thus did not synonymize the two species.

After some searching, we have been able to examine the holotype (a male) of *A. simplex*. Although head, prothorax, and most legs are missing, the abdomen is not, nor are the male genitalia. The ventral rim of the genital capsule so closely resembles that of *N. parvus*, that we synonymize *Neomegalotomus simplex* with *N. parvus* (i.e., the *N. simplex* ventral rim resembles that in Fig. 3A; and see Appendix). Therefore we disagree with Distant (1901a). Moreover, other characteristics, less diagnostic, also support our synonymy,

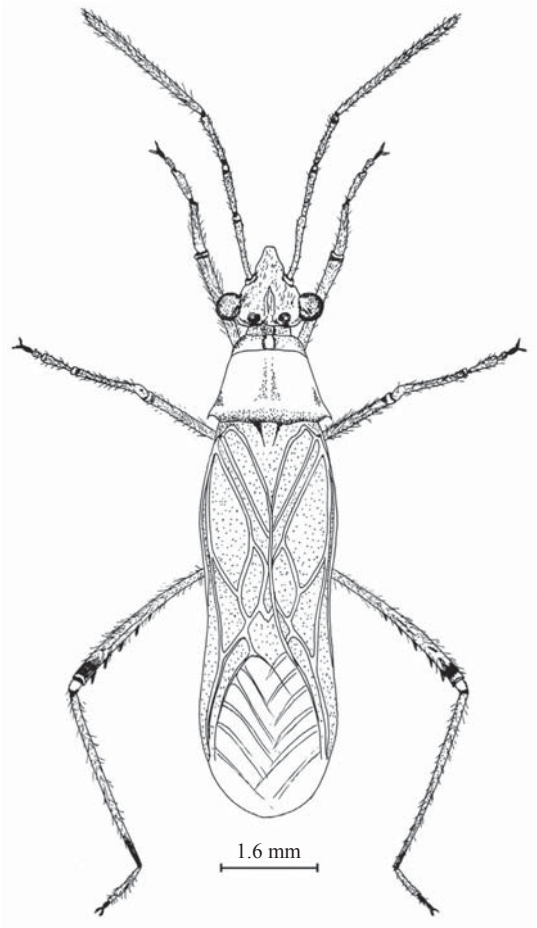

Fig. 1. *Neomegalotomus parvus,* male (Paraná State, Brazil).

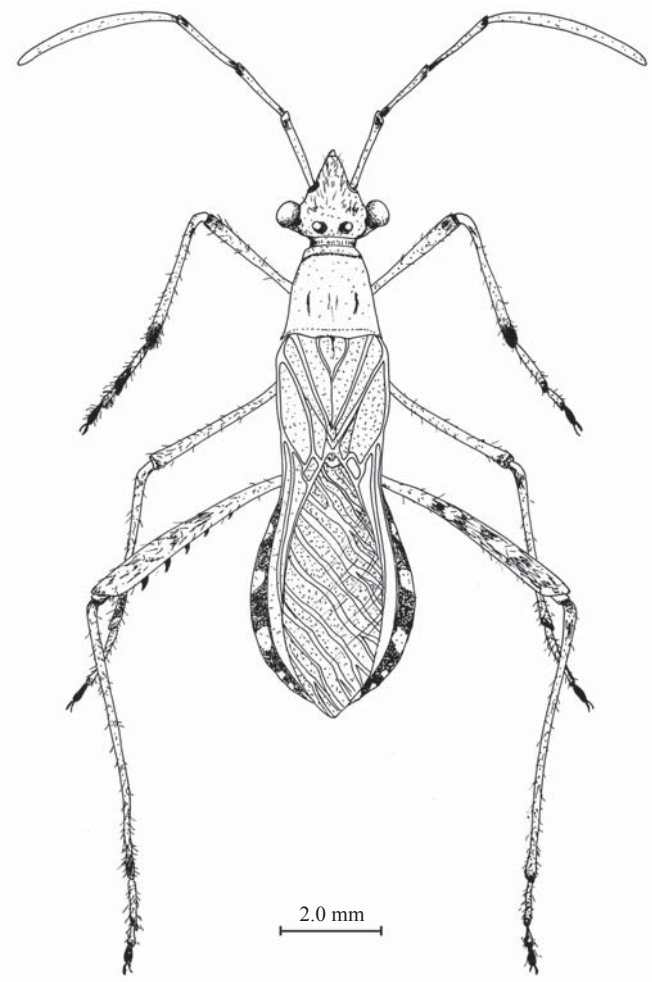

Fig. 2. *Neomegalotomus parvus,* female (Paraná State, Brazil).

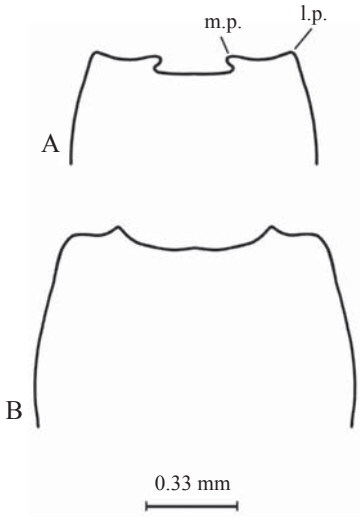

Fig. 3. Ventral rims of genital capsules (dorsal views) of holotype males of A. *Neomegalotomus simplex* [=*N. parvus*], B. *N. rufipes*. 1.p. = lateral protuberance, m.p. = medial protuberance.

as does the fact that Westwood (1842) states the *A. simplex* holotype "habitat in Brasilia," where *Neomegalotomus rufipes* (Westwood) does not occur.

Because the holotype of *Neomegalotomus simplex* (Westwood) is so fragile, and is already partly destroyed, we decided not to remove and dissect its male genitalia. We observed the genital capsule and the parameres without dissection (specimen on the pin), but our accounts and figures of the aedeagus and its parts are from Brazilian specimens of the species.

We have examined the holotypes of these species: *N. parvus* (Westwood 1842), *N. simplex, N. rufipes* (Westwood 1842), *N. pallescens* (Stål 1858), *N. latifascia* (Berg 1894), *N. jamaicensis* (Distant 1901), and *N. consobrinus* (Westwood 1842); the last species was synonymized with *N. rufipes* by Distant (1901a).

Neomegalotomus pallescens was synonymized by Distant (1901a) with *N. rufipes*. However, we believe the former species is in fact synonymous with *N. parvus,* and we discuss our reasons in the Appendix.

We have not seen the holotypes of *Neomegalotomus debilis* (Walker 1871) and of *N. vicinus* (Westwood 1842). Distant (1901a) synonymized *N. debilis* with *N. rufipes,* although without explanation; nevertheless, because we have not seen the type of the former, we accept Distant's synonymizing of it with the latter. *N. vicinus* was described by Westwood (1842:19) as a variant of *N. consobrinus* ("An. Species distincta?"). Subsequently it has been treated as a species by Stål (1870) and by Lethierry and Severin (1894). Schaffner (1964) lists the species as a synonym of *N. rufipes,* but we have been unable to find who synonymized it. Nevertheless, because it was described as a variant of *N. consobrinus*, and because Distant (1901a) synonymized *N. consobrinus* with *N. rufipes* (and we agree: see Appendix), we here synonymize *N. vicinus* (Westwood) with *N. rufipes* (**new synonymy)**.

Based on structural characters we conclude that there are two species, *N. parvus* (Westwood) (the type species) and *N. rufipes* (Westwood). All other named species have been synonymized with one of these two, or are synonymized here (see Appendix). Both species are highly variable in color and pattern. *N. parvus* ranges from northern Argentina north into Mexico to the west and into the Lesser Antilles to the east. *N. rufipes* occurs from Florida south into the Greater Antilles.

The brevity of many of the species descriptions, the great variation in color and pattern, and the poor condition of some of the holotypes, combined to make this a difficult genus to revise, because its species have been difficult to sort out. Because of this confusion and (we hope) to forestall future confusion, we include here (in Appendix) detailed descriptions of the holotypes of most of the species so far described, even though some of them have been synonymized, or are synonymized here.

Materials and Methods

In addition to the holotypes listed above, we have examined about 1200 additional specimens from the entire range of the genus (southern Florida through northern Argentina), in order to find consistent similarities in the greater variety of color and patterning. We sought and found structural differences consistent by region, and then compared these with holotypes. Altogether, we found two combinations of structural character-states which also correlated well with geographic distributions. One such state characterizes *N. parvus, N. simplex, N. pallescens,* and *N. latifascia*; the other characterizes *N. rufipes, N. consobrinus,* and *N. jamaicensis* (Tables 1 and 2). Because the holotype of a given species is either one sex or the other, we could not compare all structures of all holotypes. By integrating all the data, we found consistent views of what we conclude are two valid species in the genus (Table 1).

Results

Ubiquitous and commonly collected, the species of *Neomegalotomus* (as *Megalotomus*) occur in many faunal lists and are often recorded as pests of legume crops (especially soy) in South America. We only include these references here if they also provide a new country record. The records of the bugs as pests of crops shall be included, with descriptions of the immature stages and notes on the species' biology, in another paper (Schaefer & Panizzi, in preparation).

Table 1. Characteristics of *Neomegalotomus parvus* and *N. rufipes.*

Characteristic	*N. parvus*	*N. rufipes*	Figure
Metathoracic scent gland auricle lobes	Anterior and posterior lobes only partly separated	Lobes clearly separated	4
Genital capsule: remnant of 9th tergum	Lobed	Broadly rounded	---
Paramere	Subapical tooth sharp	Subapical tooth rounded, knoblike	5
Aedeagus: ventromedian conjunctival appendage	Markedly sinuate	Slightly curved	7
Aedeagus: thecal appendages	Distally with prominent lobe	Without lobe	8
First valvifer	Small, less narrowed, less triangular	Large, narrowed apically, more triangular	9
Ninth paratergite	Larger	Smaller	9
Spermatheca	Bulb smoothly C-shaped	Bulb bowed	10

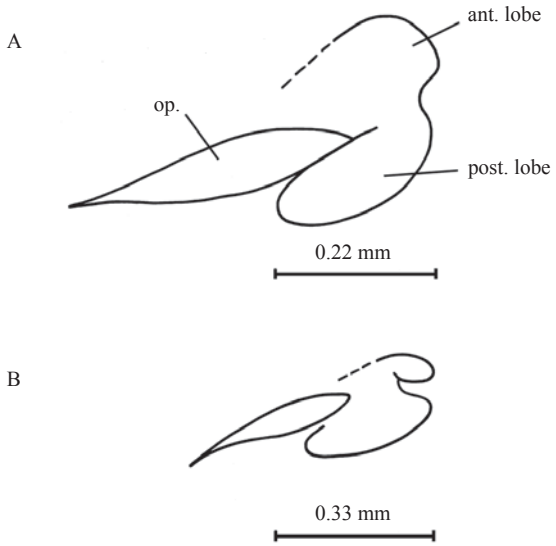

Fig. 4. Left metathoracic scent apparatuses of A. *Neomegalotomus parvus* (holotype), B. *N. rufipes* (holotype). ant. lobe = anterior lobe of auricle, post. lobe = posterior lobe of auricle.

Neomegalotomus Schaffner & Schaefer, 1998

Alydus Fabricius 1803 [part]: 248 (orig. descr.); *Megalotomus* Fieber 1861 [part]: 58, 226 (orig. descr.); *Neomegalotomus* Schaffner & Schaefer 1998: 395 (orig. descr.); *Megalotomus*, Brailovsky & Flores, 1979: 275 (redescr.); *Megalotomus,* Grillo R., 1989: 91 (key to genera); *Neomegalotomus,* Schaefer & Panizzi, 1998: 669 (correct generic name).

Description (amended and corrected from Schaffner & Schaefer 1998). Light to dark brown. Total length 10-11 mm. (Tables 2, 3). Head almost flat between eyes, declivent anteriorly, a little wider than long (width including eyes); with slight elongate depression submedial to eye; ocelli set on tubercles and facing slightly laterally; distance between bases of ocellar tubercles less than distant from tubercle to ipsilateral eye; clypeus much surpassing paraclypei. Antennal segment I surpassing apex of head; segment IV slightly curved, other segments straight; segment IV>I=III>II (Table 2). Rostrum extending between mid coxae or to level of their posterior border; segment I=II>IV>III. Pronotum wider than long, sloping upward posteriorly; punctate; often with two short longitudinal impressions, one on each side of midline just behind anterior margins; anterior one-sixth of pronotum slightly depressed, set off from posterior five-sixths as a poorly defined "anterior disk"; small collar anterior to this; pronotum with small acute or subacute spine just anterior to each posterior (humeral) angle. Posterior border of pronotum slightly and broadly concave medially, a small lappetlike posterior protuberance on either side of concavity. Scutellum obscurely punctate, longer than wide, apex pale, rounded, turned up slightly. Forewing extending to or slightly beyond end of abdomen. Corium punctate, bordering membrane for about three-quarters of membrane's length. Metathoracic scent gland opening and peritreme prominent, bilobed (lobes sometimes connected, forming an S). Without corial stridulitrum or femoral plectrum. Femora lightly setose; tibiae more heavily setose, especially distally, without spines; tibiae straight; tarsi heavily setose; distance between hind coxae less than one-half diameter of a coxa, this distance equal to that between fore coxae; distance between mid coxae greater; hind femora slightly incrassate, armed posteriorly with several or

Table 2. Measurements (mm) of holotypes of *Neomegalotomus* species.

	N. simplex (a)	*N. parvus*	*N. pallescens* (a)	*N. latifascia* (a)	*N. rufipes*	*N. jamaicensis* (b)	*N. consobrinus* (b)
Total length	8.97 (h)	10.40	10.27	11.89 (c)	10.01	11.77	11.48
Pronotal length	---	1.73	1.85	1.98	1.72	2.01	2.18
Pronotal width (d)	---	2.14	2.01	2.24	2.01	2.24	2.24
Scutellar length	---	1.02	1.19	1.19	1.02	1.05	1.06
Scutellar width	---	0.73	0.83	0.76	0.71	0.69	0.74
Antennal I	---	1.39	1.49	---	1.58	1.39	1.45
II	---	1.22	1.19	---	1.20	1.22	---
III	---	1.37	1.60	---	1.44	1.42	---
IV	---	3.02	1.60 (broken)	---	3.63	3.27	---
Head length (e)	---	1.58	1.52	1.59	1.52	1.65	1.62
Head width (f)	---	1.22	1.16	1.39	1.16	1.36	1.22
Length forewing	8.19	7.54	7.48	8.58	6.76 (g)	8.06	8.80
Corium length	6.24	5.78	6.05	6.89	5.98	6.37	5.78

(a) Synonymized here with *N. parvus;* (b) Synonymized here with *N. rufipes;* (c) Abdomen missing; estimated; (d) Not including spines; (e) To ocellar line; (f) Not including eyes; (g) Wing crumpled; estimated; (h) Excluding head and prothorax

a row of prominent spines, hind tibiae straight, each lacking apical spine or tooth; 1st tarsal segment longer than 2nd and 3rd together, 3rd longer than 2nd. Connexivum of abdomen black, sometimes with large yellow spots; occasionally in some specimens lateral edge of abdominal sterna (lateral to spiracles) streaked with black. Abdomen wider than high; sterna III, IV, part of V with a shallowly grooved keel on midline. Genital capsule of male (Fig. 3) with ventral rim incised medially, with small protuberance on either side of incision (="lateral protuberance"); and lacking surcapsular spines. Parameres (Fig. 5) small, directed medially. See also Diagnosis, below. *Measurements:* Tables 2 and 3.

Table 3. Body length (mm.) of *Neomegalotomus parvus* and *N. rufipes*, by country.

Country	Average length (range) (n = 5)
N. parvus	
México	10.87 (9.10-12.68)
Honduras	11.17 (9.88-12.74)
Panamá	10.54 (8.78-11.70)
Colombia	11.06 (10.21-14.17)
Peru	12.22 (10.66-13.26)
Bolivia	12.08 (11.18-12.87)
French Guiana	10.34 (8.65-11.64)
Venezuela	10.63 (9.75-11.83)
Paraguay	11.88 (10.47-13.07)
Brazil	11.25 (9.69-12.94)
Argentina	11.84 (10.14-13.91)
N. rufipes	
Hispaniola (Dominican Republic)	10.67 (8.65-12.55)
Cuba	10.78 (9.17-11.90)
Puerto Rico	10.47 (9.56-11.57)
"Caribbean"	10.53 (8.26-12.55)

The smallest and the largest in each series were among the five specimens chosen.

Distribution. The two species of the genus occur from central Mexico and southern Florida south through the Caribbean and through Central America into Argentina and Brazil (see lists and discussion below). Six specimens of *Neomegalotomus parvus* have been collected on Santa Cruz, Galápagos Islands (Henry & Wilson 2004).

Type species. *Neomegalotomus parvus* (Westwood).

Included species. *Neomegalotomus parvus* and *Neomegalotomus rufipes* (Westwood).

Diagnosis. *Neomegalotomus* is a rather nondescript genus, not differing in any major or unique way from other alydine genera. Members of the genus lack a forewing stridulitrum and the genital-capsule surcapsular spine of some genera; the hind tibiae are straight, not bowed, and lack spines; nor is the scent gland apparatus reduced. What separates *Neomegalotomus* from other alydines, besides these negative features, is a series of small differences, not all of which are individually exclusive to the genus. Its color is light to dark brown, not black or brownish black, and some specimens have a reddish tinge (see below), which is unusual in the family. The hind coxae of the genus are not more widely separated than the other coxae; the ocellar tubercles are closer to each other than either is to the ipsilateral eye. Each posterolateral corner of the pronotum bears a short sharp spine; the posterior border just behind it is indented slightly, so the spine appears subterminal (Fig. 6). The spine itself is neither prolonged nor almost needlelike, as it is in some other genera. On the posterior border of the pronotum there are two small rounded lappets, each a little closer to the midline than to the lateral edge of the border (Fig. 6). These are not projections of the posterior border (as occur for example in *Hyalymenus* [CWS, unpublished] and several Old World genera [Göllner-Scheiding 2000; CWS, unpublished]), but

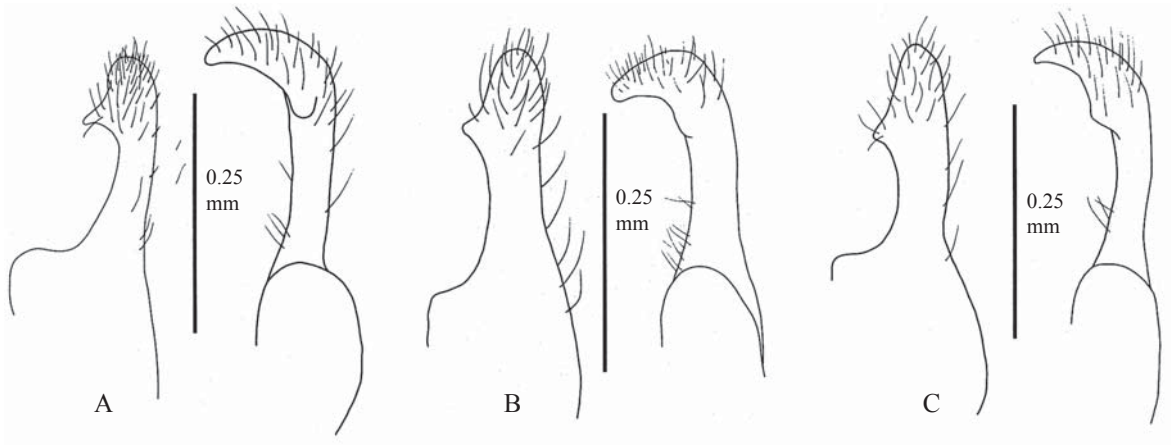

Fig. 5. Parameres (dorsal views left, lateral views right) of A. *Neomegalotomus simplex* [=N. *parvus*], B. *N. rufipes* (holotype), C. *N. consobrinus* (holotype) [=*N. rufipes*].

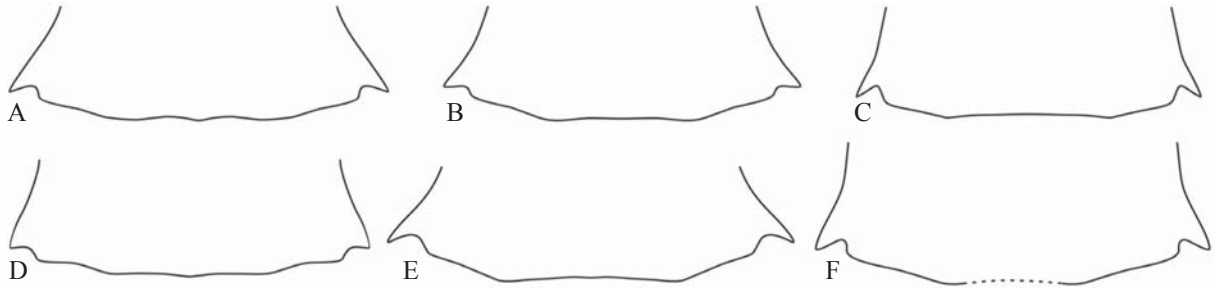

Fig. 6. Posterior pronotal borders (diagrammatic) of holotypes of A. *Neomegalotomus parvus,* B. *N. pallescens* [=*N. parvus*], C. *N. rufipes*, D. *N. consobrinus* [=*N. rufipes*], E. *N. jamaicensis* [=*N. rufipes*], F. *N. latifascia* [=*N. parvus*] (medial region destroyed by pin). Note: The pronotum of the *N. simplex* holotype itself has been destroyed by the pin.

are of slightly different color and texture, and appear to originate from below the pronotum's base.

A subterminal humeral spine like that in *Neomegalotomus* occurs in four other alydine genera (*Hyalymenus, Megalotomus, Mirperus,* and *Riptortus* [Göllner-Scheiding 2000; CWS, unpublished]), and a terminal spine occurs in *Tupalus* and *Euthetus* (CWS, unpublished); the posterolateral angles of the pronota of 12 other alydine genera (including *Burtinus*) are rounded or, if sharp, are spineless. Of the four genera with a subterminal spine, none is a likely sister genus of *Neomegalotomus*, each having different apomorphies probably of greater phylogenetic significance than this one: *Hyalymenus* has strongly curved hind tibiae; *Megalotomus* has the forewing stridulitrum and the surcapsular spines; *Mirperus* has a hind-femoral membranous area; and *Riptortus*, a genus widespread in the paleotropics, has a long apical hind-tibial spine.

The tip of the scutellum of *Neomegalotomus* is pale, rounded, and slightly upturned; these are features common to most alydines (Schaefer, unpublished) and therefore of little systematic significance.

Neomegalotomus closely resembles *Burtinus*, whose range [Texas and Florida south through the Caribbean, Central America, and northern South America (Schaefer & Ahmad 2007)] is enclosed by that of *Neomegalotomus*. However, *Burtinus* has, and *Neomegalotomus* lacks, the stridulitrum; each ocellus of *Burtinus* is closer to the ipsilateral eye than to the other ocellus; *Burtinus* lacks the posterolateral spine of the pronotum (although this corner may be sharp); and the lateral margins of the anterior of the corium are straight in *Burtinus* and slightly concave in *Neomegalotomus* (giving the latter a more debonair look than the former). Also, *Neomegalotomus* varies in overall size much more than does *Burtinus*.

More generally, *Neomegalotomus* is smaller and slighter than most other New World alydines and, indeed, than most Old World genera as well.

Neomegalotomus parvus (Westwood) (Fig. 1)

Alydus parvus Westwood, 1842: 19 (orig. descr.) **new synonymy**; *Alydus parvus,* Stål, 1870: 214 (cat.); *Alydus parvus,* Lethierry et Severin, 1894: 107 (cat.); *Alydus simplex* Westwood, 1842: 18 (orig. descr.); *Alydus simplex,* Stål, 1870: 214 list); *Alydus pallescens* Stål, 1858: 34, (orig. descr.) **new synonymy**; *Alydus (Megalotomus) pallescens,* Stål, 1870: 214 (cat.); *Alydus pallescens,* Uhler, 1893: 705 (listed from St. Vincent); *Alydus pallescens,* Uhler, 189:. 180 (listed from Grenada, biol. notes); *Alydus (Megalotomus) latifascia* Berg, 1894: 17 (orig. descr.) **new synonymy**; l07 (cat.); *Megalotomus parvus,* Distant, 1901a: 331, 333, Plate XXX, fig. 5 (note, list, color illustr.); *Megalotomus parvus*, Paradela Filho, Rossetto, & Pompeu, 1972: *Megalotomus pallescens,* Lethierry et Severin, 1894: *Megalotomus pallescens*, Van Duzee, 1907: 12-13 (brief redescr.; listed from Jamaica); *Megalotomus palescens* [sic], Costa Lima, 1940: 89-91 (figures, nymphs; photograph, adult); V (photographs, adult, nymph); *Megalotomus rufipes,* Brailovsky & Flores 1979: 275, 308 (redescr., distrib. in México, figure); *Alydus pallescens*, *Megalotomus pallescens,* Quintanilla, Rizzo, & de Nuñez, 1981: 147, 148 (listed from Misiones, Argentina; p.147 under "Alydidae," p. 148 under "Coreidae"!); *Megalotomus* (?) sp., Michel, 1994: 26 (listed from Paraguay); *Neomegalotomus parvus*, Henry & Wilson 2004: 76 (first record from Galápagos Isl.); *Neomegalotomus parvus,* Schaffner & Schaefer 1998: 395 (list). *Neomegalotomus simplex,* Schaefer 2007: 320-321 [*N. simplex,* not *parvus,* type of genus and correct name of soybean bug **(note: this is incorrect; see above)**].

Description of *Neomegalotomus parvus* (Westwood) (holotype female). *Color. Head*: Brown, band on midline very slightly darker, this fading at base of clypeus and extending posteriorly to between ocelli; small irregular pale patch just lateral to ocellus; eye and ocellar tubercle dark brown, base of eye pale; slight elongate depression submedial to eye; antennal segments I-III same color as head, their apices slightly darker; IV slightly darker, reddish. Side of head dark brown dorsally, with broad pale longitudinal band medially, this interrupted along middle by smaller irregular chestnut-brown band; head ventrally brownish black (nearly black); buccula dark brown, rimmed with yellow. Rostrum dark brown, apex darker. *Thorax*: Pronotum same color as head, except: Callus paler; a short darker band medially just posterior to collar, this band with paler median stripe; and posterior border edged with yellow. Scutellum same color as head and pronotum, tip pale. Thoracic pleura chestnut brown dorsally, pale ventrally (including metathoracic scent gland apparatus), pale region indistinct, mottled with brown. Thoracic venter nearly black, a continuation of black of head. Fore, mid femora same color as antennal segments I-III; fore, mid tibiae pale, darker distally; fore, mid tarsi dark; hind legs missing. Corium light brown,

lightly speckled with reddish flecks, these larger and more abundant distally; tip reddish; membrane milky white, veins milky brown. *Abdomen*: Venter mottled with dark and light brown; darker medially and submedially, paler laterally; pale line medially, ending at 6th sternum; spiracles and a small area anterior to spiracles yellow; pale area between medial and submedial dark areas with reddish yellow spotting. Ovipositor of same color and mottling as abdominal venter. *Structure*: *Structure*: Tables and Figs. 3A; 4A; 5A; 6A,B,F; 7A,B; 8A; 9A; 10A; and see Diagnosis, below. Length of humeral spine less than distance from base of spine to ventral edge of pronotum's posterolateral border. Genital capsule of male with sloped (not straight) medial ventral rim protuberance and blunt lateral protuberance (Fig. 3A). *Measurements*: Tables 2 and 3.

Labels. 1) [red-rimmed white circle] Type; 2) TYPE./ WESTW.(HOPE)/C. Hemipt. 1842/Part II, p. 19/Distant, P.Z.S.,/ 1901, p. 325-335/Pl. xxx, fig. 5,3; 3) Megalotomus/ parvus/ Westw.; 4) TYPE HEM: 345/ ALYDUS PARVUS/ WESTWOOD/ HOPE DEPT. OXFORD.
Holotype deposited in Hope Entomological Collections, University of Oxford.

Synonymy. We synonymize *Neomegalotomus simplex* (Westwood), *N. latifascia* (Berg), and *N. pallescens* (Stål) with *N. parvus* (**new synonymies**), and redescribe their holotypes (Appendix).

Note. Distant (1893) described *Galeottis formicaria* n. gen., n. sp., from Guatemala and Nicaragua. He placed this genus just before *Trachelium* in the alydid subfamily Micrelytrinae. Poppius & Bergroth (1921) wrote that this is probably the nymph of an alydine, perhaps of *Hyalymenus tarsatus* (F.). Costa Lima (1940) subsequently agreed, suggesting that Distant's genus and species is the nymph of "*Megalotomus*, provavelmente de espécie *M. pallescens* "(p. 90). Distant himself wrote that *G. formicaria* might be based on an immature; nevertheless, he believed it to be a micrelytrine. *Trachelium*, the genus close to which Distant placed his *Galeottis*, is an ant mimic, as are most (all?) nymphs of Alydinae. We have not seen specimens of this species.

Distribution. *Neomegalotomus parvus* ranges roughly between 24º north and 30º south. The northernmost specimens we have seen are from central México (Nayarit, Tamaulipas, and south) on the west, and St. Vincent and Barbados on the east. Our southernmost specimens come from the most northern Argentina provinces and from the southern Brazilian states of Paraná and Santa Catarina (but not Rio Grande do Sul), and Bolivia and Paraguay. The only more-southern record is a single specimen from Uruguay (Montevideo); and we believe it is significant that Ruffinelli & Pirán (1959) do not list the genus from Uruguay at all; although their list was restricted to cotton insects, at least one species of *Neomegalotomus, N. parvus*, has been recorded on cotton, in the Rio de Janeiro region (L.A.A. Costa, letter to senior author, Jan. 25, 1993). Six specimens of this species have also been collected on Santa Cruz, Galápagos Islands (Henry & Wilson 2004).

We have examined specimens of *N. parvus* from the following countries (listed alphabetically), and Mexican and Brazilian States, and Argentine Provinces. Numbers of specimens examined are in parentheses. **ARGENTINA: Chaco** (6), **Corrientes** (6), **Formosa** (6), **Misiones** (23), **Salta** (9), **Tucuman** (1), other: "Puesta" (3), "Puerto Tijo" (1) [note: Tucuman specimen labeled "BRAZIL/ La Aquadita"/ Tucuman Province"; because "La Aquadita" is Spanish, and there is no Tucuman Province in Brazil, we consider this an Argentine specimen]. **BARBADOS** (2). **BELIZE** (6). **BOLIVIA** (57). **BRAZIL: Distrito Federal** (3), **Goiás** (2), **Maranhão** (3), **Mato Grosso** (11), **Minas Gerais** (12), **Paraná** (110, mostly from Embrapa Soja station, Londrina), **Pernambuco** (1), **Rio de Janeiro** (2), **Rio Grande do Norte**

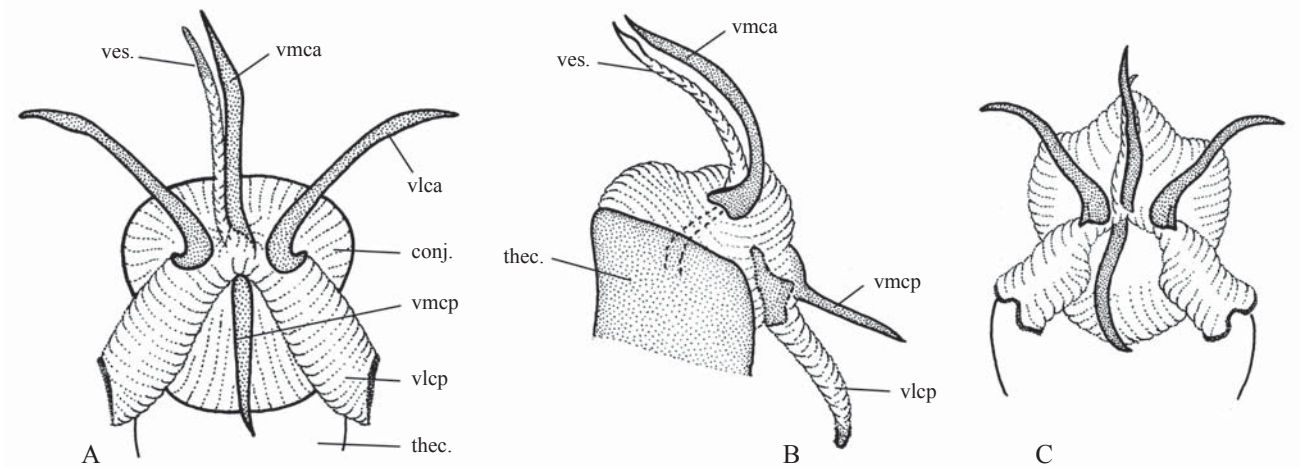

Fig. 7. Aedeagal structures. A. aedeagus of *Neomegalotomus parvus* (ventral view), B. aedeagus of *N. parvus* (lateral view), C. aedeagus of *N. rufipes* (holotype) (ventral view). Conj. = conjunctiva, thec. = theca, ves. = vesica, vlca = ventrolateral conjunctival appendage (anterior) (sclerotized), vlcp = ventrolateral conjunctival appendage (posterior), vmca = ventromedial conjunctival appendage (anterior), vmcp = ventromedial conjunctival appendage (posterior).

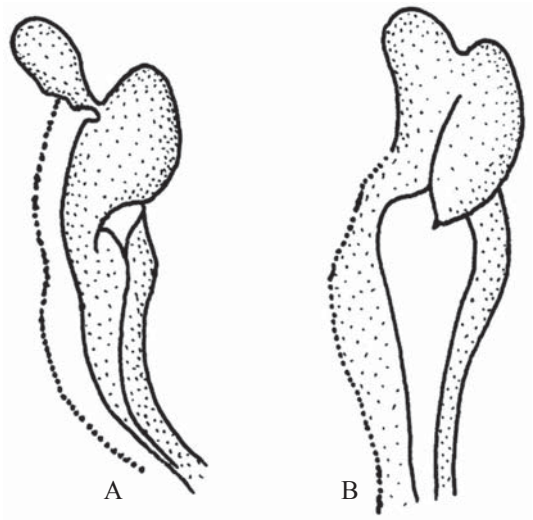

Fig. 8. Thecal appendages of A. *Neomegalotomus parvus*, B. *N. rufipes* (holotype).

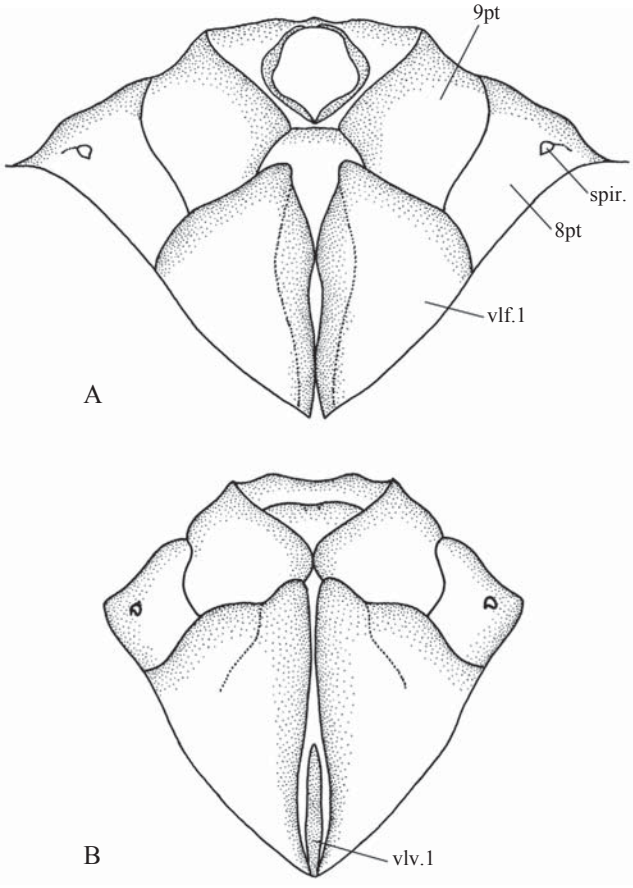

Fig. 9. Ovipositors of A. *Neomegalotomus parvus*, B. *N. rufipes* 8pt = eighth paratergite, 9pt = ninth paratergite, spir. = spiracle, vlf.1 = first valvifer, vlv.1 = first valvula.

(1; note: This specimen is labeled "Sao Roque, Brazil"; if this is Cabo do São Roque, it is on the coast of RN), **Rondônia** (28), **Santa Catarina** (41), **São Paulo** (45). **COLOMBIA**

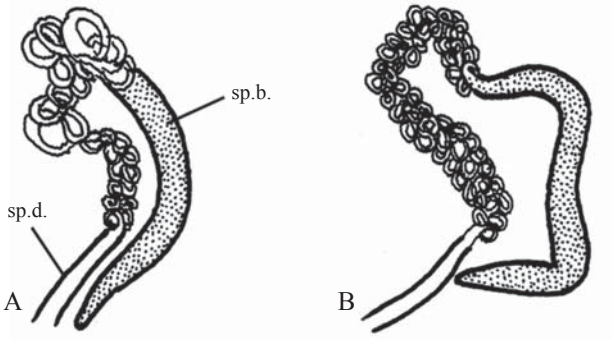

Fig. 10. Spermathecae of A. *Neomegalotomus parvus*, B. *N. rufipes.* sp.b. = spermathecal bulb, sp.d. = spermathecal duct.

(36). **COSTA RICA** (17). **ECUADOR** (7). **FRENCH GUIANA** (17). **GUATEMALA** (2), **GUYANA** (16). **HONDURAS** (18). **MÉXICO: Campeche** (6), **Chiapas** (3), **Guerrero** (8), **Nayarit** (11), **Oaxaca** (6), **Quintana Roo** (1), **San Luis Potosi** (9), **Tabasco** (4), **Tamaulipas** (11), **Vera Cruz (**7), **Yucatan** (8). **NICARAGUA** (10). **PANAMA** (10). **PARAGUAY** (37). **PERU** (24). **ST. VINCENT** (1). **SALVADOR** (3). **TOBAGO** (4). **TRINIDAD** (51). **URUGUAY: Montevideo** (1). **VENEZUELA** (38).

Neomegalotomus rufipes (Westwood) (Fig. 2)

Alydus rufipes Westwood 1842: 19 (orig. descr.); *Alydus rufipes,* Stål, 1870: 215 (cat.); *Alydus rufipes* Lethierry & Severin, 1894 113 (cat.); *Alydus consobrinus* Westwood 1842: 20 (orig. descr.) syn. by Distant (1901a); *Alydus consobrinus,* Lethierry & Severin, 1894: 113 (cat.); *Alydus consobrinus,* Distant, 1901a: 331 (list) and 335 (syn.; misspelled "*consorbrinus*"); *Alydus vicinus* Westwood 1842: 20 (orig. descr., as possible n. sp.) **new synonymy;** *Alydus vicinus,* Stål, 1870: 215 (cat.); *Alydus* (*Megalotomus*) *pallescens,* Stål, 1870: 214 (cat.); *Alydus debilis* Walker 1871: 160 (orig. descr.) syn. by Distant (190la); *Alydus debilis,* Lethierry& Severin, 1894: 113 (cat.); *Alydus debilis* Distant, 1901a: 331 (list); *Alydus debilis,* Distant, 1901b: 427 (syn.); *Alydus simplex*, Distant, 190la:331 (possible syn.); *Megalotomus rufipes,* Distant, 1901b: 427 (list); *Megalotomus rufipes,* Barber, 1923: 21 (recorded from Barbados and Antigua; list of further distrib.; "subject to great color variation"); *Megalotomus rufipes,* Barber, 1939: 323 (brief redescr., recorded from Puerto Rico); *Megalotomus rufipes,* Hussey, 1956: 88 (recorded from Key Largo, Florida); *Megalotomus rufipes*, Brailovsky and Flores, 1979: 275 (redescr., distrib. México); *Megalotomus rufipes,* Froeschner, 1988: 8 (cat.; distrib. Florida); *Megalotomus jamaicensis* Distant 1901b: 427 (orig. descr.) **new synonymy**; *Megalotomus jamaicensis,* Barber, 1923: 21 (possible syn.); *Neomegalotomus rufipes,* Schaffner & Schaefer 1998: 395 (list).

Description (holotype male). *Color*. *Head*: Reddish brown, without band on midline or clypeus, area between antennifers slightly more red; very slightly paler lateral to ocellus; eye mottled brown, base of eye pale, ocellar tubercles and area

between tubercles dark brown; shallow broad depression submedial to eye; antennal segments same color as head, apices slightly more red, tip of IV pale. Side of head dark brown dorsal to eye, then pale yellow, remainder of side broadly pale yellow, this continuing onto thoracic pleura, darkening anteriorly to light brown (including bucculae). Head nearly black ventrally. Rostrum chestnut brown, tip darker. *Thorax*: Pronotum yellow brown, except: callus and collar paler, medially with short dark band (including callus and collar), this band with very narrow paler medial stripe; callus laterally with short brown stripe; posterolateral angle red, posterolateral spine pale-tipped, and posterior border of pronotum edged with yellow brown. Scutellum color as pronotum, tip pale. Thoracic pleura same color as pronotum, with broad pale band extending from that of head and including metathoracic scent gland apparatus; band on meso- and metapleura with a few reddish brown spots. Thoracic venter nearly black. All coxae dark brown; fore, mid femora reddish brown; fore, mid tibiae brown, apically reddish brown; fore, mid tarsi darker brown and even darker apically; one mesothoracic leg glued onto paper point, hind legs missing. Corial veins pale, deeply suffused with red, veins distally red or with red flecks; corium between veins milky brown; membrane milky white, membrane veins pale brown. *Abdomen*: Venter laterally brown with many small red spots; spiracles (but not area anterior to them) brown; abdomen ventrally with wide brownish black band continuous with that of thorax and head. *Structure*. Tables and Figs. 3B; 4B; 5B,C; 6C,E; 7C; 8B; 9B; 10B; and see Diagnosis, below. Length of humeral spine greater than or equal to distance from base of spine to ventral edge of ronotum's posterolateral border. Genital capsule of male with straight (not sloped) medial ventral rim protuberance and rounded lateral protuberance (Fig. 3B). *Measurements.* Tables 2 and 3.

Note. Genitalia dissected and in vial on pin.

Labels. 1) [red-rimmed white circle] Type; 2) [printed] TYPE./WESTW. (HOPE)/ C. Hemipt. 1842/Part II, p. 19/ Distant, P.Z.S.,/1901, p. 325-335.; 3) [handwritten] America eq.; 4) [handwritten] Megalotomus/ rufipes/ Westw.; 5) [printed and handwritten] TYPE HEM: 346/ ALYDUS/ RUFIPES/ WESTWOOD/ HOPE DEPT. OXFORD.
Holotype deposited in: Hope Entomological Collections, University of Oxford.

Synonymy. We synonymize *Neomegalotomus jamaicensis* (Distant) with *Neomegalotomus rufipes* (**new synonymy**) (see Appendix). We have examined the holotype of this species, as well as that of *N. consobrinus* (Westwood), synonymized with *N. rufipes* by Distant (1901a). Because there are striking differences in color among these holotypes, we describe them briefly in the Appendix.

Distribution. *Neomegalotomus rufipes* occurs from southeastern Florida south through the Caribbean to St. Lucia and Grenada (see discussion below).

We have examined specimens of *Neomegalotomus rufipes* from the following countries (listed alphabetically): **ANTIGUA** (3). **BAHAMAS** (3). **CUBA** (60). **DOMINICAN REPUBLIC** (75). **GRAND CAYMAN** (1). **GRENADA** (7). **GUADELOUPE** (9). **JAMAICA** (20). **MARTINIQUE** ("Martinica" on label) (1). **PUERTO RICO (UNITED STATES)** (26). **ST. LUCIA** (12). **ST. MARTIN** (1). **UNITED STATES: Florida: Monroe County** (3), **Broward Co.** (2), **Martin Co.** (1).

Key to species of *Neomegalotomus*

1a. Metathoracic scent gland auricle usually somewhat flattened and separation between anterior and posterior parts of auricle shallow; median protuberance of ventral rim of male's genital capsule pointing medially.....
.....*Neomegalotomus parvus* (Westwood)
1b. Metathoracic scent gland auricle rounded, convex, separation between anterior and posterior parts deep; median protuberance of male's genital capsule pointing ventrally.....*Neomegalotomus rufipes* (Westwood)

Diagnosis (species). As mentioned above, there are many color and pattern differences among the populations of *Neomegalotomus,* and among the various described species. These differences vary so widely and with so little correlation among themselves, that they cannot be used to distinguish species. We discuss some of these differences and patterns here.

Many specimens of *Neomegalotomus* (including the holotypes of *N. jamaicensis* [=*N. rufipes*] and *N. simplex* [=*N. parvus*], of *N. parvus* itself, and of *N. latifascia* [=*N. parvus*]) have a pale line, continuous or interrupted, of varying sizes and lengths, running from the side of the head along the thoracic pleura. This line occurs in specimens from all localities we studied. A similar pale line or series of spots occur in many other alydine species (e.g., *Riptortus* spp. [Kikuhara 2006]; other genera [Schaefer, unpublished]); this feature has little or no systematic significance.

Common also in *Neomegalotomus*, and indeed a distinguishing feature of the *N. jamaicensis* holotype [=*N. rufipes*], is the broad yellow horizontal band occupying the middle half of the pronotum; the pronotum of the *N. latifascia* [=*N. parvus*] holotype is entirely yellow. Like the pale band (above), this character occurs sporadically but not uncommonly in most populations of both species; it occurs in some populations whose other members lack it (including specimens collected at the same place and at the same time).

Again, a yellow or partly yellow pronotum occurs elsewhere in the Alydinae, including at least one specimen of the African genus *Hypselopus* (Schaefer, unpublished). A yellowish (testaceous) band is a subgeneric character in another African genus, *Tupalus* (Schaffner, 1964).

A scattering of *Neomegalotomus* specimens, including most (22) from Cuba, have some to many reddish markings or spotting dorsally on the thorax. These are especially prevalent on the corium, in some cases rendering the corial veins reddish. In general, the paler the specimen overall, the less red. Again, there is no geographical or systematic pattern.

Size too varies greatly, even within the same region (Table 3). *N. rufipes* is slightly smaller than *N. parvus*, and therefore island populations of the genus tend to be smaller than mainland ones. But these measurements overlap too much, and vary too widely, to be significant.

However, structural characters clearly separate the species. One important difference occurs in the metathoracic scent gland auricle, or peritreme (Fig. 4). In both species, as in many other alydines, the auricle is raised and shaped as a complete or broken S, oriented mostly anteroposteriorly but slightly lateromedially, and whose top and bottom are, respectively, an anterior and a posterior lobe. In *N. rufipes,* the auricle is raised higher from the surface of the pleuron than is that of the *N. parvus* holotype. (The auricle of this holotype differs somewhat from those of some other *N. parvus* specimens, as discussed below.) The surface of the auricle itself in most *N. parvus* is flat, appearing more two-dimensional than that of *N. rufipes,* whose auricular surface is more convex and hence more three-dimensional. The separation between the anterior and posterior parts of the S in *N. rufipes* is sharper and more distinct than in *N. parvus* — the lateral indentation that separates the two parts is deeper in *N. rufipes* but slight and shallow in *N. parvus*. The anterior part of the S in *N. parvus* is flatter and broader, and somewhat smaller relative to the posterior part. The posterior part of the S is a little longer and considerably narrower in *N. rufipes* than in *N. parvus*.

Overall, the metathoracic scent gland auricle in *N. parvus* is flatter than is the *N. rufipes* auricle and more broadly applied to the metathoracic pleuron. Its anterior part is rounder and its posterior part is broader than are these parts in *N. rufipes*. These differences are in general consistent in the holotypes of the species we have synonymized with these two species, and consistent too in the many specimens we have seen from the entire range of the genus (but see below).

There are intraspecific differences in *N. parvus,* however. The anterior part of the auricle of the *N. simplex* holotype, but not that of the *N. parvus* holotype, bears two small irregular bumps, or bosses. These do not occur on other specimens we have seen, but the auricles of many other *N. parvus* specimens are less flattened and two-dimensional than others. These auricles resemble that of *N. rufipes* somewhat, although they are nevertheless flatter, less well-defined (especially their anterior parts, which merge gradually, not sharply, into the pleuron itself), and with a less well-defined separation between their anterior and posterior parts. The metathoracic scent gland auricles of these specimens are clearly those of *N. parvus* and not of *N. rufipes*.

Slight but consistent differences occur in the ventral rims of the *N. parvus* and *N. rufipes* genital capsules (Fig. 3). We compared the male holotypes of *N. rufipes* and *N. simplex* (the *N. parvus* holotype being a female), and examined other males of both species. The ventral rim of *Neomegalotomus* is incised medially and, just lateral to the incision, is a small (medial) protuberance; another occurs more laterally. The medial one slopes inward (medially, towards the incision) in the *N. simplex* holotype, and is straight in that of *N. rufipes*. The lateral one is blunt in the *N. simplex* holotype and very gently rounded in the *N. rufipes* holotype. These differences are consistent in the two species (i.e., *N. parvus* and *N. rufipes*), but there is some regional variation. For example, in some Mexican *N. parvus* the lateral protuberance is blunter than in the *N. simplex* or the *N. pallescens* holotypes (both from Brazil—no further distributional data). The capsule of a Dominican Republic *N. rufipes* has relatively larger medial and lateral protuberances than does that of the *N. rufipes* holotype, and the lateral protuberance is slightly blunter. However, despite this variation, males of the two species can usually be told apart rather easily on the pin, without dissection.

The cuplike sclerite (a structure within the capsule and occasionally visible through the base of the capsule [see Schaefer 1977]) is slightly longer and slightly more pointed in *N. rufipes* then in *N. parvus*

Like the males' genital capsules, the ovipositors of females are useful in distinguishing the two species, and are also visible on pin-mounted specimens, although here they are often obscured by debris. The differences between the two species' ovipositors are for the most part ones of degree, not of kind (Fig. 9). The holotype of *N. rufipes* is male. Therefore, for this comparison of ovipositors, we used a female from Jamaica (formerly *N. jamaicensis*, here synonymized with *N. rufipes*), and the holotype of *N. parvus*. We have compared these specimens with others from the ranges of both *N. parvus* and *N. rufipes*.

In general, the *N. parvus* ovipositor is wider and its components broader than is true of the *N. rufipes* ovipositor, although dorsoventrally the two are about equal (Fig. 9). The inner surface of the first valvifers is somewhat curved and the two structures are somewhat more tightly appressed in *N. parvus* (Fig. 9A) than in *N. rufipes* (Fig. 9B), and as a result the first valvulae of the latter species are sometimes visible (Fig. 9B, vlv. 1). The dorsal tip of the *N. parvus* first valvifer is slightly less rounded, and that of the *N. rufipes* is more lobelike, even somewhat drawn out from the rest of the valvifer. The ninth paratergite is slightly longer and the eighth paratergite somewhat more drawn out laterally in *N. simplex* than in *N. rufipes*. In the type of *N. parvus* the anus is visible (not always true in other specimens of both species). These differences are consisted in specimens from across the ranges of the two species and, in conjunction with the other structural differences, confirm the existence of only two species of *Neomegalotomus*.

N. parvus and *N. rufipes* appear to differ with respect to the posterior border of their pronota. That of the *N. parvus* holotype has a slight median "bump," or projection (Fig. 6A), whereas that of the *N. rufipes* holotype is straight across (Fig. 6C); unfortunately, this region in the *N. simplex* holotype itself is destroyed. Moreover, the pronotal borders of the holotypes of other species vary in this character (Fig. 6B, D, E). These other species were synonymized either with *N. parvus* or with *N. rufipes* on the basis of characters both more consistent and (we believe) of greater functional – and therefore of greater phylogenetic – significance.

The humeral (pronotal) spine of *N. rufipes* is longer than that of *N. parvus* (see descriptions). Although this difference holds true between the two species, its degree varies among specimens.

The pronotal collar of the *N. parvus* holotype is slightly more raised on either side of the midline than is that of the *N.*

rufipes holotype. However, in this character the *N. pallescens* holotype (synonymized here with *N. parvus*) more closely resembles *N. rufipes*; and the converse is true of the *N. consobrinus* holotype (synonymized here with *N. rufipes*).

Similarly, the angles of the pronotum's posterolateral spines differ slightly in the *N. parvus* and *N. rufipes* holotypes (cf. Fig. 6A, 6C); but the angles of these spines and their degree of sharpness differ in the other holotypes as well (Fig. 6B, D, E, F) and, in one, differ also in shape (cf. Fig. 6D with the others). Posterolateral spines occur on the pronota of several other alydine species, and here too there are some intraspecific differences (Schaefer, unpublished).

The two species are very closely related. In fact, the two species agree in all 30 of the somatic characters of the Li & Zheng (1993) cladistic analysis of Alydidae (which did not include *Neomegalotomus*).

The distribution of these two species is straightforward, with one exception. *N. rufipes* is a Caribbean species, whose range extends from three southern Florida counties (Monroe, Broward, Martin) south throughout the Caribbean to St. Lucia and Grenada. *N. parvus,* on the other hand, is a mainland species, from central México (Nayarit, Tamaulipas, and presumably the states in between) south into northern Argentina (Corriente, Chaco, Misiones, Formosa, Salta, Tucuman Provinces) and Uruguay; east into Venezuela; and thence north via Trinidad and Tobago to Barbados and St. Vincent.

The two species thus come their closest in the islands north of Venezuela. Not surprisingly, the *Neomegalotomus* on Trinidad and Tobago are the mainland *N. parvus*; so also are those on Barbados and St. Vincent. The *Neomegalotomus* on St. Lucia (about 35 miles north of St. Vincent) and on Barbados to the east are the Caribbean *N. rufipes.*

Complicating this distribution, however, is the *Neomegalotomus* on Grenada, which lies midway between St. Vincent and Tobago. These two islands bear *N. parvus*, whereas Grenada, lying between them, has *N. rufipes.* The bugs are common on Grenada: Uhler (1894) writes that "numerous specimens were collected in most parts of the island" (p. 180). Uhler identified these Grenada bugs as *Alydus pallescens* (=*N. parvus*); but we have several of Uhler's specimens (identified as Uhler's by their having been collected by H. H. Smith), and they are in fact *N. rufipes*. We have no explanation for the apparent anomaly that *N. rufipes* exists on an island between two other islands with *N. parvus,* except that these bugs feed on leguminous crops and may have been distributed with the commercial movement of host plants. This explanation seems especially likely in Brazil, where the planting of soy spreads ever further. Moreover, *Neomegalotomus*, like other alydines, fly readily and strongly; and St. Vincent, Tobago, and Grenada are not far apart. Causton *et al.* (2006), writing of *N. parvus* (as *N. simplex*), categorize this species as "potentially highly invasive," and describe it as having a "high ability to disperse and colonize."

Acknowledgments

We heartily thank V. Kask (Univ. Conn.) for the drawings of structures, and D. Estavão (Embrapa Soja, Londrina, Paraná, Brazil) for the drawings of bugs. We are deeply grateful to the following for the loan of type material from their institutions, and for their patience and forbearance: I. Lansbury and J.E. Hogan (Hope Entomological Collections, University of Oxford), M. Webb (Natural History Museum, London), J.A. Schnack (Museo y Universidad Nacional de La Plata), and P. Lindskog (Naturhistoriska Riksmuseet, Stockholm). To the following also we are grateful, for sending specimens from their institutions: J.C. Schaffner (Texas A&M University, College Station), T.J. Henry (National Museum of Natural History, Washington, D.C.), J. Brambila (Florida State Collection of Arthropods, Gainesville), C. Barr (University of California, Berkeley), R. L. Blinn (North Carolina State University Insect Collection), Z.H. Falin (Snow Entomological Collections, University of Kansas), and J. E. O'Donnell (University of Connecticut Insect Collection). J. Eger (Tampa, Florida) sent several valuable specimens. Michael Wall and Jessica Lowery (University of Connecticut) cheerfully and painstakingly gathered data from a dauntingly large number of specimens; and the following unraveled for us puzzles on many specimen labels: D. Forrero (Bogotá, Colombia), A.R. Panizzi (Embrapa Soja, Londrina, Brazil), and M. del C. Coscarón (Museo de a Plata, La Plata, Argentina). We also thank M. Webb, again, for supplying label data; and the Entomological Society of America for permission to reprint the description of *Neomegalotomus* from Schaffner and Schaefer (1998). Dr. Zheng Le-Yi most kindly translated for us his paper (Li & Zheng 1993) on alydid phylogeny. Finally, we thank the Department of Ecology and Evolutionary Biology, University of Connecticut, whose members solved for us many problems, knotty and not, both botanical and geographical.

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Appendix

The original descriptions of *Neomegalotomus* species are for the most part inadequate. Here we redescribe the holotypes of *Neomegalotomus simplex* (Westwood), *N. pallescens* (Stål), and *N. latifascia* (Berg), all of which we synonymize with *N. parvus* (Westwood). We also redescribe

the holotype of *Neomegalotomus jamaicensis* (Westwood); as well as the holotype of *N. consobrinus* (Westwood), a species Distant (1901a) synonymized with *N. rufipes*.

After each redescription we explain our reasons for our synonymy of the species.

1.1. Description of *Neomegalotomus simplex* (Westwood) (holotype male). The following structures are missing from this specimen: Head, prothorax, left forewing, fore legs, hind legs except coxae and basal stubs of femora. *Color*. Overall, pale, sandy brown. *Thorax*. Meso-, metapleura pale sandy brown ventrally (including metathoracic scent gland apparatus), darker chestnut brown dorsally, this appearing as a broad band extending to abdomen; mesosternum medially with large brownish black spot, metasternum medially with smaller brownish black spot. Legs pale sandy brown, lightly speckled with very small dark spots; tibia (=mid tibia) very slightly darker apically; each coxa also with one larger spot laterally. Corium pale sandy brown, membrane pale milky white; border between corium and membrane red-spotted (solid red in ventral view); hind wing pale milky white. *Abdomen*. Dorsum (seen through hind wings) light orange brown, with some black speckling; posterior two-thirds of each connexival segment brownish black; venter pale sandy brown with considerable irregular brown and black speckling; sterna 4-7 with two submedial brownish black bands separated on midline by narrow pale stripe, these bands extending to genital capsule. *Structure*: Tables and Figs. 3A, 5A. *Measurements*: Tables 2 and 3.

Labels: 1) [red-rimmed white square] TYPE./WESTW. (HOPE)/C. Hemipt. 1842/ Part II, p. 18/Distant P.Z.S.,/1901, p. 325-335;2) [red-rimmed white circle] Type 3 (Alydus, simplex, Westw.; 4) TYPE HEM.:340/ ALYDUS/ SIMPLEX/ WESTWOOD/ HOPE DEPT. OXFORD.

Holotype deposited in Hope Entomological Collections, University of Oxford.

1.2. Synonymy of *Neomegalotomus simplex* (Westwood 1842) with *Neomegalotomus parvus* (Westwood 1842). Much of the discussion on our synonymy of *Neomegalotomus pallescens* with *N. parvus* (see below) applies here as well. Westwood (1842) writes that the holotype of *N. simplex* "habitat in Brasilia" (p. 18) and that of *N. parvus* "habitat in America Aequinoct." (p. 19); thus both are tropical South American. Accordingly, we have examined several Brazilian *N. parvus* for this discussion.

Only the tip of the corium is red in the *N. parvus* holotype, but the narrow apical third of the corium in *N. simplex* is entirely red. However, this varies in other *N. parvus* specimens, including many from Brazil, in which the corium's apical third is more or less heavily red-mottled. Also, in many of these specimens, the thoracic pleura are dark dorsally and pale ventrally, as in the *N. simplex* holotype but not in the *N. parvus* holotype.

The differences between *N. parvus* and *N. simplex* are slight and variable within and between geographic regions; and the differences are not structural. We therefore synonymize *Neomegalotomus simplex* (Westwood) with *Neomegalotomus parvus* (Westwood), based on the Prevailing Usage doctrine (International Commission on Zoological Nomenclature 1999; Art. 23.9.1), despite the former's having page priority over the latter (see Nemésio 2007).

2.1. Description of *Neomegalotomus pallescens* (Stål) (holotype male). Note: Abdomen partly detached, but intact; specimen card-mounted. *Color*: Brown. Apex of clypeus and paraclypei pale, pale line medially to level of antennifers; irregular pale spot laterally in front of antennifer, another, 8-shaped, just lateral to ocellar tubercle; larger dark brown spot posteromedial to tubercle, this continuous with dark brown medial part of tubercle itself; rest of tubercle lighter brown, like head; small dark brown spot posteromedial to eye; head below with median dark brown band, this broadening on posterior half; antennal segment IV darker than others. Broad yellow band laterally from buccula to abdomen. Pronotum slightly pale and more yellow, except collar brown. Middle of scutellum pale. End of corium red. Legs pale brown; femora with obscure brown spots, and distally slightly darker; last tarsal segment and claws dark brown. Thoracic sterna with median dark brown band, this expanded widely on posterior half of prosternum and again on metasternum. Abdominal terga brown; connexivum dark brown, connexival segments IV and V each with large yellow spot anteriorly, VI nearly all yellow [cf. *N. jamaicensis*]; abdominal sternum III pale, sterna IV-VII submedially heavily mottled with dark brown, this mottling becoming wider posteriorly; thin yellow line medially. *Structure*: Same as *Neomegalotomus parvus*; Fig. 6B. *Measurements*: Table 2.

Note: Genitalia dissected, in vial on pin.

Labels:1) F. Sahlb., 2)Brasil; 3)Typus [red label]; 4) *Megalotomus pallescens* Stål.

Type deposited in Natuurhistoriska Museet, Stockholm.

2.2. Synonymy of *Neomegalotomus pallescens* (Stål 1858) with *N. parvus* (Westwood 1842). Distant (1901a) synonymized *Neomegalotomus pallescens* with *N. rufipes,* without explanation; he was followed by Barber (1923, 1939). We believe the former species is in fact synonymous with *N. parvus* not *N. rufipes*. Here we compare the holotype of *N. pallescens* with those of both *N. parvus* (female) and *N. simplex* (male). The holotypes of *N. pallescens* and *N. simplex* are quite similar in overall color, pattern, and shape; but there are some differences. The *N. simplex* holotype is slightly darker and very slightly more reddish than the *N. pallescens* holotype, and the midcephalic line is dark in *N. parvus* and pale in *N. pallescens*. Both have a pale oval area lateral to each ocellus, but *N. parvus* lacks the dark spot posteromedial to the eye; antennal IV of *N. parvus* is reddish, but that of *N. pallescens* is brown. The sides of the head and thoracic pleura are yellow-white in *N. pallescens,* but solid brown dorsally and solid pale ventrally (meso- and metasterna). The venters of the head and thoracic sterna are dark brown to black, but this is interspersed in *N. parvus* with brown (and thus is less pronounced). In both *N. pallescens* and *N. simplex*, the narrow posterior third of the corium is red. In both types the abdominal venter is dark brown or black submedially, this interrupted medially by a pale line which extends to the sixth sternum in *N. simplex* (female) and to the seventh sternum in *N. pallescens* (male).

The two types (*Neomegalotomus parvus* and *N. pallescens*) are of different sexes and their genitalia cannot be

compared. However, their metathoracic scent gland auricles are very similar.

The *Neomegalotomus parvus* holotype "habitat in America Aequinoct." (Westwood 1842, p. 19), and the *N. pallescens* holotype was collected in Brazil (label data). We have examined several hundred male specimens of *Neomegalotomus* from Brazil, and their genital capsules are the same as those of the *N. simplex* holotype, a species which, on other grounds, we have synonymized with *N. parvus* (above). The differences (above) between the two holotypes are in color and pattern, but these differences are well within the range of variation in *N. parvus*, variation that occurs even within populations. We therefore synonymize *Neomegalotomus pallescens* (Stål 1858) with *Neomegalotomus parvus* (Westwood 1842).

3.1. Description of *Neomegalotomus latifascia* (Berg) (holotype female). Note: This specimen lacks its abdomen. *Color*: Chestnut brown, paraclypeus slightly paler; broad, indistinct, red-brown median line from clypeus to between ocelli; head lateral and posterior to eye with dark spot, each spot continuous with dark ocellar tubercle and band between tubercles; dark band also laterally from base of eye about 2/3 of distance to anterior of head. Pronotum yellow, except collar, subterminal humeral spine, and irregular band on posterolateral edge all light chestnut brown. Scutellum chestnut brown, tip pale. Head laterally with broad pale band, this extending posteriorly along thoracic pleura, including coxal bases and metathoracic scent gland apparatus [hence the specific epithet]. Fore legs chestnut brown; coxae shining chestnut brown; remainder of legs missing. Midventer of head and of thorax black. Corium brown, corial veins heavily suffused with red. *Structure*: Same as *Neomegalotomus parvus*; Fig. 6F. *Measurements*: Table 2.

Labels: 1) Types [in red]; 2) Para-/guay; 3) Alydus (M.)/ latifascia/ 1891; 4) 1460 [round blue label].

Type deposited in La Plata Museum, La Plata, Argentina.

Note: Although this specimen is labeled "Typus," it is not clear by whom it was designated. Berg (1894) wrote at the end of his description of the species (p. 17), "dos ejemplares del Paraguay, de que el uno se en el Museo Nacional de Montevideo, y el ontro en mi collección hemipterológica." We assume it is this last specimen that made its way to the La Plata Museum, as did other Berg types (e.g., *Apidaurus triguttatus*; see Schaefer & Schaffner [2003]). In his unpublished revision of the Alydinae, Schaffner (1964) wrote (p. 101), "location of type unknown to me."

3.2. Synonymy of *Neomegalotomus latifascia* (Berg 1894) with *N. parvus* (Westwood 1842). Like many other specimens of all described species of *Neomegalotomus,* much of the *N. latifascia* holotype's pronotum is yellow. Also like many others, it has a pale band running from the side of the head along the thoracic pleura; this band here is larger than in many other specimens, and the species was named for it by Berg (1894). The *Neomegalotomus parvus* thorax lacks yellow but has the pale band along the head. However, other Brazilian *Neomegalotomus* have either or both, and a yellow, or partly yellow, pronotum occurs in other alydine genera, and the yellow or pale band (including or not including the head) occurs even more widely in the subfamily (Schaefer, unpublished). The presence of either or both does not suggest species status in *Neomegalotomus.*

Other features of color and pattern occurring in the *N. latifascia* holotype are also variable in the genus—e.g., the greater amount of dark color around the ocelli, and the red of the corium; the *N. parvus* holotype differs in both.

The abdomen of the *N. latifascia* holotype is missing. However, in his description, Berg (1894) writes that the abdomen's dorsum is rust-colored ("ferrugineum" the connexivum is black with yellow spots, and that much of the venter is darkened. None of this separates this species from any other.

Because the abdomen of the *Neomegalotomus latifascia* holotype is missing, we cannot compare its genitalia with those of *N. parvus* . However, we have 36 other specimens from Paraguay (the type locality of *N. latifascia*). Moreover, we have specimens of *Neomegalotomus* (several misdetermined as *N. pallescens*) from these Argentina localities: San Roque, Corrientes Province, about 200 miles south of Paraguay; Resistencia, Corrientes Province, about 40 miles southwest of Paraguay; and Iguasu, Misiones Province, across the Paraná River from Paraguay. We do not know where in Paraguay the holotype was collected, but this is a small country and these Argentine specimens quite possibly represent nearby populations. The ovipositors of all these specimens resemble those of the *N. parvus* holotype, and the male genital capsules of these specimens resemble those of the *N. simplex* holotype or of other *N. parvus* specimens.

Finally, the metathoracic scent gland of the *Neomegalotomus latifascia* holotype resembles those of other *N. parvus* specimens.

We do not hesitate to synonymize *Neomegalotomus latifascia* (Berg 1894) with *Neomegalotomus parvus* (Westwood 1842).

4.1. Description of *Neomegalotomus jamaicensis* (Distant) (holotype female). *Color.* Chestnut brown, with red-brown median line from clypeus to just before level of eyes; small elongate pale spot just lateral to ocellus; head at base of eye darker; antennal segments I and IV and distal tips of II and III chestnut brown, remainder of II and III (Stål) paler. Head laterally with irregular pale line from base of paraclypeus to posterior edge of head; otherwise chestnut brown. Medial half of pronotum yellow, including subterminal posterolateral spine; remainder of pronotum chestnut brown. Thoracic pleura chestnut brown, with irregular interrupted pale line fading out on metapleuron. Scutellum and corium chestnut brown with some paler mottling and, on corium, brown (not red) spotting. Mid coxa with yellow spot laterally; all femora brown, proximal half of each paler, hind femur with pale dorsal spot subdistally; all tibiae pale, dark distally; tarsal segment I pale proximally, dark distally, II and III dark. Fore, mid coxal cavities lined with yellow. Metathoracic scent gland apparatus yellow. Forewings splayed, revealing dorsum of abdomen: tergites II-VI red-brown; connexivum dark brown, median edge yellow, connexival segments IV and V each with yellow spot anteriorly (cf. *Apidaurus* [Schaefer & Schaffner 2003]), connexival segment VI nearly

all yellow; tergite VII dark brown with median yellow spot. Abdominal venter dark brown, with some irregular yellow spotting laterally, especially on sternum IV. Sternum II with yellow spot basally. Ovipositor of same color as abdominal venter, without spotting. *Structure*: Same as *Neomegalotomus rufipes*; Fig. 6E. *Measurements*: Table 2.

Labels: 1) Jamaica/ Mrs Swainson/ 97-200 [=1897-200 BMNH register entry]; 2) jamaicensis/ Distant [handwritten].

Type deposited in Museum of Natural History, London.

4.2. Synonymy of *Neomegalotomus jamaicensis* (Distant 1901b) with *N. rufipes* (Westwood 1842). The *N. rufipes* holotype resembles closely the holotype of *N. jamaicensis* in size, general coloration, and shape of the metathoracic scent gland apparatus. The *N. rufipes* holotype differs in lacking the yellow of the pronotum, and in the fact that its thoracic pleura and sides of the head are brown, not pale. Specimens identified as *N. rufipes* have been collected quite extensively from the Caribbean and its surroundings (see Barber 1939), and we have seen more than 100 specimens of the genus from Cuba, Hispaniola, Puerto Rico, and various smaller islands. These vary in color, color pattern, and size from "rufipes"- like (as defined by the *N. rufipes* holotype) and "jamaicensis"-like (as defined by the *N. jamaicensis* holotype), to "neither"-like. Because this variation is independent of locale, it does not support the contention that two species are involved.

Moreover, we have two specimens, both female, collected June 7, 1985, both at Irish Town, St. Andrew Parish, Jamaica. Each is dark brown, but the pronotum of one is almost entirely yellow, and that of the other is dark brown. The whitish sublateral line on the pleura of the former specimen is pale and interrupted, but is well defined and nearly continuous in the latter specimen.

The *N. jamaicensis* holotype is a female and the paramere and genital capsule of the species could not be compared with those of other types. However, these structures of other specimens from Jamaica (the type locality) and closely resembling the holotype, differ only slightly from the paramere and capsule of *Neomegalotomus rufipes,* including those of the male holotype of this species. Conversely, somatic features of the *N. jamaicensis* holotype resemble those of *N. rufipes* collected far from Jamaica (the type locality).

Finally, those characteristics thought to characterize and distinguish *Neomegalotomus jamaicensis* in fact occur in other "species" in varying amounts and to varying degrees.

This evidence is indirect, but its cumulative effect is to make nearly certain that *N. jamaicensis* is not a distinct species, but rather represents some of the great variation that occurs in the highly variable *Neomegalotomus rufipes*. This view is essentially that of Barber (1932), who, having studied "[f]ifty-one specimens from Antigua and nine from Barbados," concluded "that Distant has redescribed one of the many color forms as *M.* [i.e., *Megalotomus*] *jamaicensis* from Jamaica" (p. 21). Barber (1932) did not formally synonymize *N. jamaicensis* (Distant 1901) with *N. rufipes* (Westwood 1842), and we do so here. Finally, in 1907 Van Duzee listed *Neomegalotomus pallescens* (here synonymized with *P. parvus*) from Jamaica, apparently unaware that a few years earlier Distant (1901b) had described *N. jamaicensis* (here synonymized with *N. rufipes*). This exemplifies both the nomenclatorial and the systematic confusion with which this genus has been rife.

5.1. Description of *Neomegalotomus consobrinus* (Westwood 1842) (holotype male*). Color*: Brown, posterior half of clypeus, paraclypeus, and pronotum slightly paler; without midcephalic line from clypeus, without pale spot lateral to ocellus. Head posterolateral to eye dark. Small longitudinal dark band medially on anterior of pronotum. Antennal I (only segment remaining) same color as head. Legs same color as pronotum (mid and hind legs on left side missing). Head laterally from base of rostrum to and including coxal bases and metathoracic scent gland apparatus with broad yellow-white band, this continuous with yellow-white abdomen. Thoracic pleura same color as head (except for yellow-white band). Tip of corium with reddish mottling. Abdomen yellow-white except sternum III with irregular dark brown medial spot and sterna IV-VII with dark brown median band. *Structure*: Same as *Neomegalotomus rufipes*; Fig. 6D. *Measurements*: Table 2.

Note: Genitalia dissected, in vial on pin.

Labels: 1) TYPE/ WESTW. (HOPE)/ C. Hemipt. (1841) Part II, p. 20/ Distant, P.Z.S.,/ 1901, p. 325-351; 2) Type [round label, outlined in red]; 3) Megalotomus/ rufipes/ Westw.; 4)TYPE HEM. 350/ ALYDUS/ CONSOBRINUS/ WESTWOOD/ HOPE DEPT. OXFORD.

Type deposited in Hope Entomological Collections, University of Oxford.

5.2. Synonymy of *Neomegalotomus consobrinus* (Westwood 1842) with *N. rufipes* (Westwood 1842). The holotypes of these two species resemble each other in structure and in color. The scent gland auricle of the *N. rufipes* holotype is sharper and more raised from the pleuron than is that of the *N. consobrinus* holotype; and the anterior lobe of the *N. consobrinus* holotype's auricle is somewhat more elongate than is that of the *M. rufipes* holotype; however, the anterior lobes of both are much more similar than either is to that of the *M. parvus* holotype. The length of the pronotum of the *N. consobrinus* holotype is more nearly equal to its width (1/w = 0.97) than is that of the *N. rufipes* holotype (1/1/-086) (calculated from Table 2). The latter holotype is somewhat shorter than the former (Table 2). Both specimens are almost uniformly light brown, with reddish on their corial veins and with slightly darker heads and appendages. Each also has a broad pale fascia running from the base of the bucculae to the end of the thorax and incorporating the coxae. Finally, in both, the midventer of the head (to the "neck") and that of the thorax is black.

Because of these similarities, and the other morphological similarities discussed above, we synonymize *Neomegalotomus consobrinus* (Westwood 1842) with *Neomegalotomus rufipes* (Westwood 1842); the latter name has been far more frequently used in the literature [see synonymy] and, moreover, has page priority (p. 19) over the former (p. 20).

Received 29/I/07. Accepted 13/IX/07.